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1876
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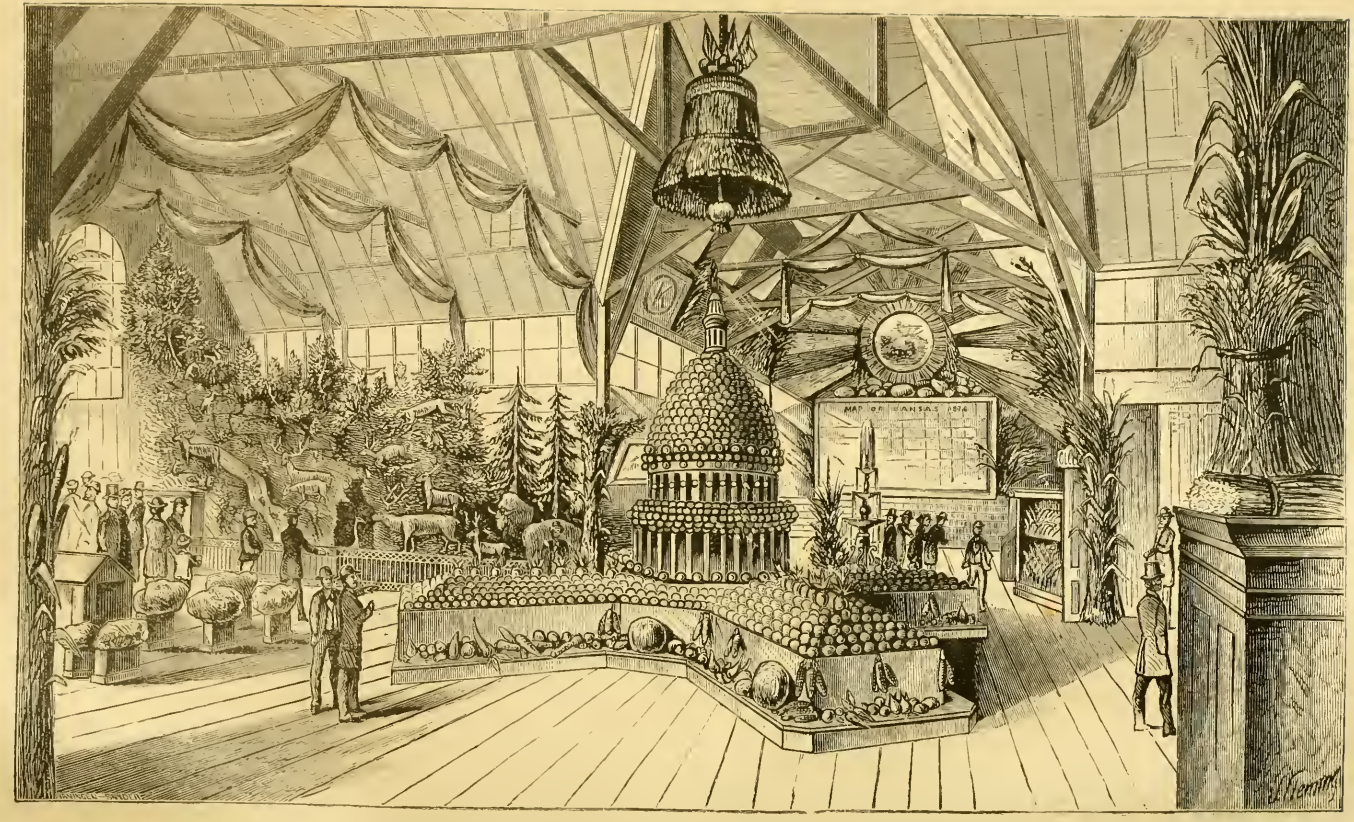

INSIDE VIEW OF KANSAS & COLORADO BUILDING.

THE

CENTENNIAL EXPOSITION,

DESCRIBED AND ILLUSTRATED,

BEING

A CONCISE AND GRAPHIC DESCRIPTION OF THIS GRAND ENTERPRISE,

COMMEMORATIVE OF THE

First Centennary of American Independence,

INCLUDING

History of the Centennial from Inception to Final Closing Ceremonies, Description of the Principal Buildings, Foreign Pavilions, Booths and State Buildings, with their interesting displays, Exhibits of resources and products of the Nations of the World; the most ingenious devices in Machinery Hall, Woman's Work in Woman's Pavilion, Mineralogical, Archæological and Geological Collections from all States of the Union, the Wonders of the Swiss Watch Department, the Centennial Live Stock Exhibition, Memorial Parades and Anniversaries of various Orders, Great State Days, Awards to Exhibitors Foreign and American, and numerous other subjects showing the magnitude and character of the New World's Fair, and illustrating the best achievements of human genius, industry and skill from all lands and all peoples.

THE WHOLE

PROFUSELY ILLUSTRATED.

Prepared with Great Care from Official Sources and Material gathered on the Ground,

BY J. S. INGRAM.

PUBLISHED BY

HUBBARD BROS.,

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PUBLISHERS' PREFACE.

NEVER before in the history of mankind have the civilized nations contributed such a display of their peculiar treasures as has been seen during this year at the great Centennial Exposition, which, for six months past, has daily drawn its tens of thousands of visitors from all parts of our own and other lands. Never before have the achievements of the industrial arts, the fine arts, and the sciences generally, shone with such lustre as gilds this epoch of the nineteenth century.

Being the fruits of prosperity and peace, and in our case certainly due in no small measure to the high civilization which our glorious institutions secure, they will be specially memorable to the American people.

Appreciating in some measure these facts, and with a sense of the universal desire for a reliable work giving a true history and an illustrated description of this great Exhibition, we have labored earnestly to place before the public just such a volume as should fulfil their desire and command their approbation. In its preparation, therefore, regardless of the course pursued by other publishers, it has been our rigid purpose to conform to a popular presentation of only those things possessing novel or superior attractions, without the least partiality or slightest

pecuniary consideration, lest it should bias our author in the manner of treatment of special exhibits.

We have also refrained from issuing this volume before the end of the Exhibition, in order that the history should be complete and the grand closing ceremonies fitly included.

Aware that books purporting to meet this prevalent want have been rushed upon the market long prior to the close of the Exhibition, we invite careful scrutiny as to completeness before purchasing. Trusting that our book shall approach to the ideal at which we have aimed, so nearly as at least to merit the patronage of a generous public, we submit it to their kind consideration.

HUBBARD BROS.

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INTRODUCTION.

IT is the aim of this work to tell the story of the grandest World's Fair that has ever been held, in a clear and simple manner, and to give a complete record of the many memorable events that were crowded into the short space of six months, which closed with so glorious a consummation on November 10th, 1876.

The subject was so vast and comprehensive, and the difficulty of embracing in the compass of a work of this character anything approaching to a satisfactory description of even the salient features of the enterprise, seemed at first so great, that it was with no little trepidation that the author undertook the task. There was no doubt in his mind, that could a work be published which would give a complete yet concise account of the Exhibition from its conception, a description of the most prominent of its rich and varied exhibits, of our progress in the industrial arts and sciences, and a record of the many celebrations that were held in Phila-

delphia during the Exhibition, it would be welcomed by hundreds of thousands of the millions who saw the Exhibition, as a memorial of their visit.

With this end in view, the present volume has been written, and it has been the aim of the author to give not a mere mass of statistical figures and facts, which would only confuse and weary the reader, but to describe those exhibits which more particularly marked the startling advancements that have been made in science, machinery and the fine arts.

As will be seen, to the United States has been allotted a much larger space than to any other nation, and this was necessary in order to give anything like a fair description of the exhibition which was made, of the natural resources of our country and their development, and of its progress in those arts which benefit mankind, in comparison with those of the older nations of the world.

All the foreign nations have been treated in order, *seriatim*, keeping each of their exhibits separate, thus rendering reference to any particular country that may be desired comparatively easy. A careful perusal will enable the impartial reader to judge for himself how successfully the United States competed in this grand peaceful contest, which was accepted by nearly every nation in the world, and how nobly Americans came forward to meet their foreign friends on this field.

If any pleasant reminiscences of visits paid to the Centennial Exhibition are evoked by a perusal of this

volume, or if some conception of the unparalleled grandeur and beauty of the display there made is imparted to any who did not witness it with their own eyes, then the author's task will not have been in vain.

His acknowledgments for assistance received in obtaining authentic and reliable data are due, and are hereby tendered to Mr. John Wanamaker, a member of the Centennial Board of Finance and Bureau of Revenue, to Capt. W. C. Stewart, Assistant Superintendent of the American District Telegraph Department on the Centennial Grounds, and to other officers of the Centennial Commission who kindly responded to his application for official information.

J. S. INGRAM.

THE
COMPLETE HISTORY
OF THE
CENTENNIAL EXPOSITION.

CHAPTER I.

SKETCH OF WORLD'S EXHIBITIONS.

THE history of Exhibitions is full of deep interest. There has been a steady development of the original idea until the primitive acorn is quite lost in the wide-branching oak.

Progress is the law of life, and Exhibitions, at once the outcome and the forebears of that very progress, have experienced its influence and have in turn reacted on it.

Of local Exhibitions there have been many, but it is not our purpose here to refer their origin, as has been ingeniously done by some writers, to "the days of Ahasuerus" and the book of Esther, when "in the third year of his reign he showed the riches of his glorious kingdom and the honor of his excellent majesty many days, even an hundred and fourscore days," the normal six months, it may be here remarked, of all International Exhibitions.

At this display in "Shushan, the palace," some five

hundred and twenty-one years before the birth of our Lord, were shown "white, green, and blue hangings, fastened with cords of fine linen and purple to silver rings and pillars of marble; the beds were of gold and silver, upon a pavement of red and blue, and white and black marble, and . . . . the vessels of gold, the vessels being diverse one from another." This diversity in "the vessels of gold" is not only a proof of the perfection to which the Industrial Arts had attained, but also lends a color to the idea that this collection to a large extent was International, for Ahasuerus (said by some to be identical with Artaxerxes), as we are told, "reigned, from India even unto Ethiopia, over an hundred and seven and twenty provinces," and the gold and silver work would point to India, as the purple would suggest the Tyrian dye, and the "fine linen" the Egyptian "byssus." Later on, when Tyre, Sidon, and Carthage became the marts of the world and the foci of Commerce, an everchanging series of industrial marvels must, in commercial phrase, have been constantly "on view," for Tyre, says the prophet Isaiah, "is a mart of nations . . . . whose merchants are princes, whose traffickers are the honorable of the earth," and the prophet Ezekiel bears witness to the extent of her commerce, in the words "Fine linen with broidered works from Egypt, was that which thou spreadest forth to be thy sail."

When the last of her rivals had disappeared, and Carthage had been blotted out, Imperial Rome, the centre of civilization and the repository of art, held her public Exhibitions, in which were garnered together the spoils of war and the triumphs of peace, trophies of art borne by the conqueror from their Grecian homes, and luxuries ingathered from every clime where the

Roman Legions had set foot or the Standard S.P.Q.R. had been planted,—

> Fine webs like woven mist, wrought in the dawn,
> Long ere the dew had left the sunniest lawn,
> Gold cloth so wrought that nought of gold seemed there,
> But rather sunlight over blossoms fair;
> Gems too they showed wrought by the hidden fire
> That eats the world; and from the unquiet sea
> Pearls worth the ransom of an argosy.

But invasion followed division, and the Empires of the East and West alike went down before Hun, Goth, and Moslem, and dark days came when the sword was lord.

For many subsequent centuries, such an idea as a collective display of articles of either art or industry would have seemed a chimera beyond even the wildest dream of the most visionary enthusiast, for though the process of collection might and doubtless would have been tedious and uncertain, that of distribution would have been as rapid and effective as a high-handed process of annexation by some robber band or neighboring potentate could make it. Nor could even a strong body of troops have been depended on to guard such treasures, for the greatest difficulty of all would have been "to guard the guards themselves."

The true germ of International gatherings, whether known as Exhibitions, Expositions, or Weltausstellungs, must be looked for in the great International Fairs of the middle ages. The enterprise of travel begotten by the Crusades had permeated from the soldier to the trader, and as security was found in society, the merchants of those days made commercial pilgrimages and interchanged merchandise at certain times and given places of resort. Some of these fairs survive to

our days, the most notable being those of Leipzig and Nijni-Novgorod.

There is another fair as noteworthy, though not so noted, as Leipzig, as respectable too in its antiquity, for it can trace its origin back to the fifth Crusade, the thirteenth century, the defeat of the Crusaders, and the capture of Louis, Saint and King, and this is the great Egyptian Fair of Tantah. Seated in the heart of the Delta, on the direct railway route from Alexandria to Cairo, at the junction of the branch line to Mansourah and Damietta (the former the place where the Cross went down before the Crescent), and inhabited mostly by "fellahs," Tantah has neither houses to receive travellers nor bazaars to display goods, so the vast plain on either side of the railway is, in fair-time, studded by thousands of tents. Held at midsummer and lasting for a week, more picturesque in its surroundings than either Leipzig or Nijni-Novgorod, it is to the full as International in its concourse and commerce.

To pass on from this, however, we come to the year 1756, when the British Society of Arts first inaugurated its series of Fine Art Exhibitions, by offering prizes for improvements in the manufacture of tapestry, carpets, and porcelain, the articles exhibited being ranged in competition. This was followed in the year 1761 by an Exhibition of agricultural and other machinery, in the rooms of the Society, for which prizes were offered, and a gentleman engaged to explain the merits of the various objects, this individual combining in himself the powers of a Board of Commissioners and the attributes of a showman, and with this ended any other attempt for many years to create a National Exhibition.

It is indeed to the year 1797 (the year V. of the

French Republic) that we must look for the true initiation of National Exhibitions. In that year the Marquis d'Avèze conceived the idea of a collective display of the industries, originated by the kings, and protected, when so much went down, by the people of France. His conception was to mass together the products of the art factories of Sèvres, the Gobelins, and the Savonnerie; his exhibition palace was ready to hand, in the Chateau of St. Cloud, then as now dismantled and uninhabited, but still a palace; the Minister of the Interior, M. de Neufchâteau, was propitious, and all seemed favorable to the project.

So d'Avèze went to work with a will, the bare walls were hidden by priceless tapestries from the Gobelins, the floors covered with the carpets of the Savonnerie, the "Chambre de Mars" set apart for the picked porcelain of Sèvres, and this was the beginning of Fructidor. Everything promised well; in this same Chamber of Mars a Wheel of Fortune was to be set up; the prizes were contained in the Exhibition itself; daily the courtyard of the chateau was crowded with the carriages of the nobility that still remained faithful to their darling Lutetia, and the day of opening was named, the 18th Fructidor.

Alas for the vanity of all earthly things! The previous day saw the gates of Paris placarded with the bills of the Directory, ordering all the nobility by name —it was, indeed, easy to count their numbers, for exile, conscription, and the tumbril had thinned their ranks —"to withdraw within twenty-four hours to, at least, thirty leagues from Paris," and on this damnatory list was the name of d'Avèze.

Was ever projector so unfortunate? To remain was to court death; to fly was to cut off the possibility of return;

for he and he alone was responsible for the contents of the chateau. But d'Avèze was a man of expedients; he sought out the Marshal d'Augereau, and obtaining from him a troop of dragoons, he forthwith placed them in charge of the chateau and its contents, and handing up the keys to the custodian, Maréchan, the Marquis placed himself with all despatch outside the circle of conscription. In the next year, 1798 (the year VI. of the Republic), in the Maison d'Orsay, No. 667, Rue de Varennes, he realized the scheme, previously abortive, and the success of the display was so pronounced that the Minister Neufchâteau carried out another Exposition in the three last days of the same year. This first official Exhibition, with a total number of 110 exhibitors, was held in a temporary building in the Champs de Mars; in it not only the State industries, but the manufacturers of France, that is to say Paris, were represented. This was the first Art Exhibition of Napoleon.

The Directorate had merged into the Consulate and the times were unquiet, but the master mind of the First Consul had fully realized the great advantages likely to accrue, not merely to manufacturers but to the country at large from comparison and competition, and the Minister of the Interior was therefore instructed to issue circulars inviting contributions for a second exhibition; and special committees of experts were formed in each department to select exhibits and to examine into the merits of inventions. The appeal was so far successful, that 229 exhibitors (more than double the number in 1798) answered to the call, and the Second Official Exhibition was held in 1801 in the Grand Court of the Louvre.

A further proof of the advantages Napoleon discerned in securing the coöperation of the industrial section of

the country is manifest in the fact that the recipients of the "gold medal" were invited by him to dinner in his capacity of First Consul; and this was the first recognition in France of the great bone and sinew of every country—the middle class.

The Third Exhibition was also held in temporary buildings in the courtyard of the Louvre, and so great had been the success of the second in stimulating trade and alleviating the distress of the artisans, that only the short breathing space of one year was allowed to elapse, the time selected being the Fructidor of the next year 1802 (the year X. of the Republic).

The catalogue, in forty-eight small pages, styled this display "Exposition Publique des Produits de l'Industrie Française," and shows the number of exhibitors to have increased to 540, amongst whom are to be noted the names of Montgolfier, the proto-aëronaut; Vaucanson, the inventor of the mechanical Duck and the Flute Player (those Wandering Jews of Continental fairs); and Jacquard; and it was from a machine exhibited by the great mechanician at this very Exhibition that Jacquard drew the first inspiration for his famous loom.

Four years passed away, Napoleon had become Emperor, before the Fourth Exhibition (the first and last during the Empire) was held on the Esplanade of the Hôtel des Invalides, with a total number of 1422 exhibitors. Then the toga gave way to the sword, then came Moscow, Leipzig, Fontainebleau, Elba, Saint Jean, and Saint Helena, and the Bourbons reigned, but not till 1819 was the idea resuscitated in the courtyard of the Louvre, the bede roll of exhibitors, 1662, showing in thirteen years for the Fifth Exhibition but a meagre increase of 240; it has been said, however, though the

quantity of the exhibitors stood comparatively still, the quality of the exhibits had rapidly progressed.

1823 and 1827 completed the series of Quadrennial Expositions (taking 1814 as the basis, and allowing for the interval of "The Hundred Days"), both held as before in the Louvre, the first showing 1648 (a slight decrease) and the latter within five of 1800 exhibitors.

The Fourth Quadrennial never saw the light, but in 1827, the year of the Seventh French Exposition, the Royal Dublin Society inaugurated the series of Triennial Exhibitions in their grounds which worked so well and did so much to promote and encourage Irish industries, and which were presented in regular succession until the last, in 1850, served as the forerunner, and was fused into the mass of International Exhibitions.

It would be tedious and unnecessary to give in detail the various Exhibitions which were held in every capital in Europe from this time on, some purely local, others more catholic and comprehensive, but all strictly national; and no one had the courage to depart from the beaten track, to suggest a comparison with other countries, till the late Prince Albert struck the key-note by his first suggestion of an *International* Jubilee, "to form a new starting-point from which all nations were to direct their further exertions."

At a meeting of the Society of Arts, held on June 30th, 1849, in Buckingham Palace, the Prince explained the outlines of that great scheme which owed so much of its subsequent success to the rare administrative ability of its author and founder, and suggested the grouping of the Exhibits into four main heads, Raw Material, Machinery and Mechanical Inventions, Manufactures, and Sculpture and Plastic Art. From that day no time was lost by distracting counsels or futile

delays, the 3d of January of the following year saw a Royal Commission appointed, on the 13th of March architects of all nations were invited to compete, the 8th of April witnessed 233 plans submitted, on the 10th of June they were on exhibition at the Institute of Civil Engineers in Great George Street, Westminster, only to be rejected "as no single plan was so accordant with the peculiar objects in view, either in the principle or detail of its arrangement as to warrant them (the Building Committee) in recommending it for adoption." On the 18th of June Sir Joseph, then Mr. Paxton, submitted to Mr. Robert Stephenson the rough sketch on a blotting-pad of what was to be the Faërie Palace by the Serpentine; in ten days the elevations, sections, working details, and specifications were carried out; on the 6th of July they appeared in the *Illustrated London News*, and the suffrages of the masses secured, on the 16th they were accepted; on the 26th the tender of Messrs. Fox and Henderson was ratified; on the 30th the contractors took possession of the ground; on the 15th of August the charter of incorporation was issued; and on the 26th of September the first column was in its place.

Without dwelling too long on details, it may be well before passing on to let facts and figures tell their own story of success. The building covered over twenty acres, its length in feet corresponded with the year of its erection, being 1851; it cost $965,840.00; it was open five months and fifteen days; it produced $2,530,-500.00; the total number of visitors was 6,039,195, and the total receipts, both at the door and from season tickets, amounted to $2,118,960.00.

The aggregate number of exhibitors was 13,937, of whom Great Britain contributed 6861, the Colonies

520, and the rest of the world 6556. Persia furnished 12, China 30, Greece 36, and Denmark 39, to this array, a remarkable contrast to their muster-roll in subsequent Exhibitions. The estimated value of the contents was $8,900,645.00.

The awards consisted of the Council Medal, ranking with a Diploma of Honor, the Prize Medal, and a Certificate of Honorable Mention, distributed as follows: Council Medals, 171; Prize Medals, 2954; and Honorable Mentions, 2123.

The glass and iron mode of construction has since made the circuit of the globe; New York in 1853, the "second edition," revised and improved, at Sydenham in 1854, the miniature copy at Melbourne, and the Glas Palast at Munich in the same year, the Dublin Exhibition of 1865, the Paleis Van Volksvlyt at Amsterdam in 1869, were all modifications of the great example of 1851, whilst the experience of a quarter of a century has suggested no more fitting materials than iron and glass for the Industrial Building of 1876.

But the Great Exhibition did not alone endure in its prototypes or in a series of World's Fairs; all these are but a means to an end, its truest monument is to be found in its offspring, South Kensington Museum and its compeers; by their means the blossoms of one display have become the fruits of the next; the taste for the beautiful, by their example, has been spread broadcast all over the earth, and Art has become the ally and not the antagonist of Industry.

South Kensington Museum may be regarded as an A B C of Art (the number of visitors from its beginning show at the present day an aggregate of nearly 15,000,000); it was the schoolmaster *at home*, it taught

the masses through their eyes, its nucleus consisting of gifts and purchases to the extent of $45,000 from the Exhibition of 1851, bit by bit it was built up, treasure by treasure it was added to, no large sums were voted for it; here was a purchase, there a gift or a bequest, until in this present day it recalls in many features the Green Vaults of Dresden or the Imperial Treasury of Vienna. It was the first to realize the fact that for women there were other occupations than the needle, whether that of the little steel stiletto, the sewing machine, or the telegraph, and the results are everywhere apparent, in the porcelain of Minton, in the black and white designs of the illustrated papers in the "Roll Call" and the "Quatre Bras" of Miss Thompson.

1853 witnessed two International Exhibitions, one at New York, the other at Dublin. The Exhibition at Gotham owed its origin to the enterprise of Mr. John Jay Smith of Philadelphia, who conceived the idea of transporting *en bloc* the contents of the palace of Hyde Park to New York, and exhibiting them in a building of somewhat similar construction. Modelled in the form of a Greek cross, with a central dome for occasions of ceremony, and, following its prototype of 1851, constructed of glass and iron, the building itself was almost perfect both in design and execution; but the originator fell ill, and as all Napoleon's Marshals could not make the man, so when the idea passed into the hands of a joint stock company, it succumbed to circumstances, for divided counsels brought delays, and its history may be briefly written as financial failure and its end fire.

The International Exhibition at Dublin owed its initiative to the public spirit of William Dargan, who proposed to spend $100,000 on a building at Dublin to

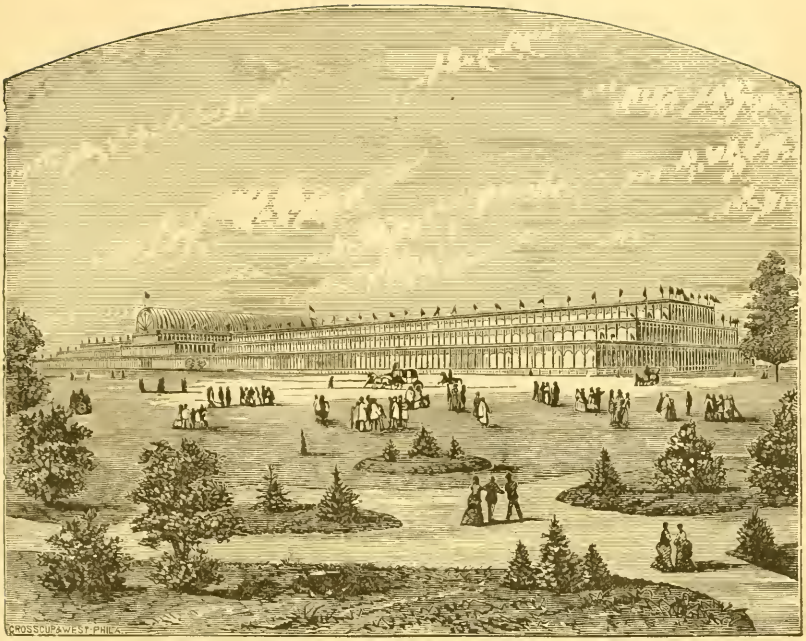
receive the industries of the Nations, but as the idea grew, so grew his gifts, until his contributions reached the total, unequalled for any individual for a similar purpose, of $400,000.

The Exhibition of 1853, unlike that of 1851, was built mainly of wood, its site was the lawn of the Royal Dublin Society, and the general idea it gave was of five Brobdignagian vegetable marrows laid side by side, the front presenting five ovals in roof and walls. The main hall was 425 feet in length by 100 in width, and 105 in height; and the side aisles ran in lesser proportions, there being no transept.

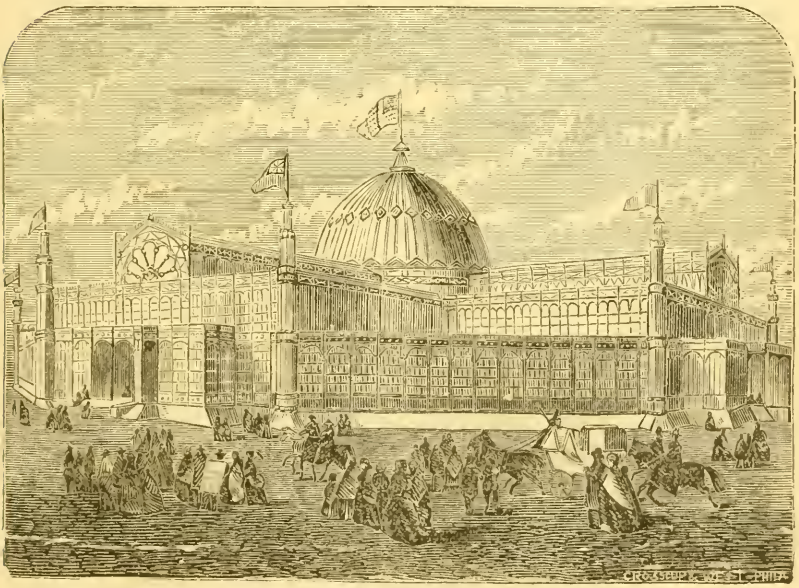
The duration of the Exhibition was from the 12th of May to the 31st October, Her Majesty, accompanied by the Prince Consort and the Prince of Wales, then a lad of twelve, visiting it in state on the 29th of August.

Munich in 1854, with her 7005 exhibitors drawn from every part of Germany, presented a total unsurpassed until the World's gathering at Vienna in 1873. The building, which still survives, designed by Herr Voit, was constructed of glass and iron, and recalls in many features the exemplar of 1851, the main difference between them being the substitution of a square-towered transept for the well-known circular roof. For a building devoted purely to national display its extent was considerable, being no less than 850 feet in length by eighty-five in height.

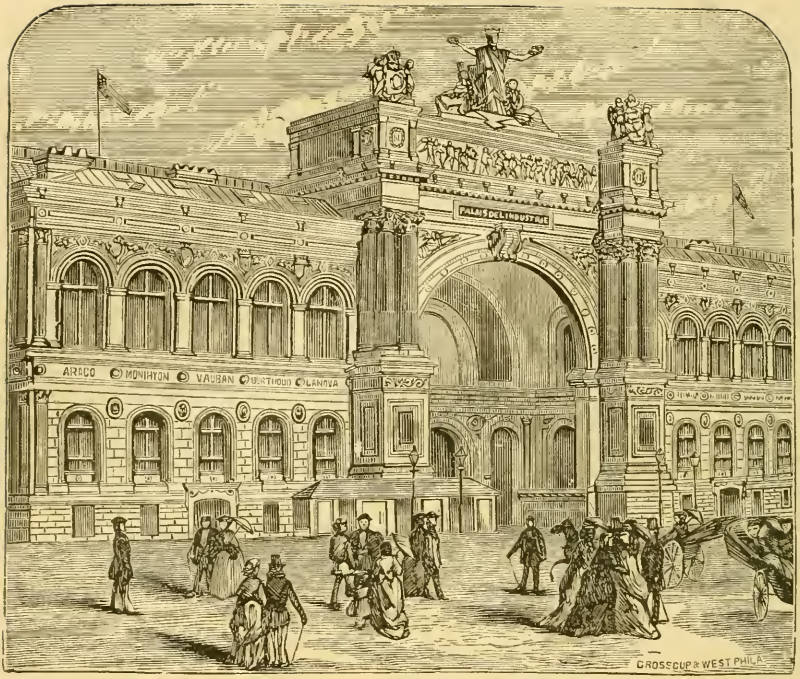
During all this time the French had been busily planning the details of their first International gathering. The decree appointing Commissioners for an *Exposition Universelle* to be held at Paris in 1855, with Prince Napoleon as President, was signed by the Emperor on the 24th December, 1853. The main build-



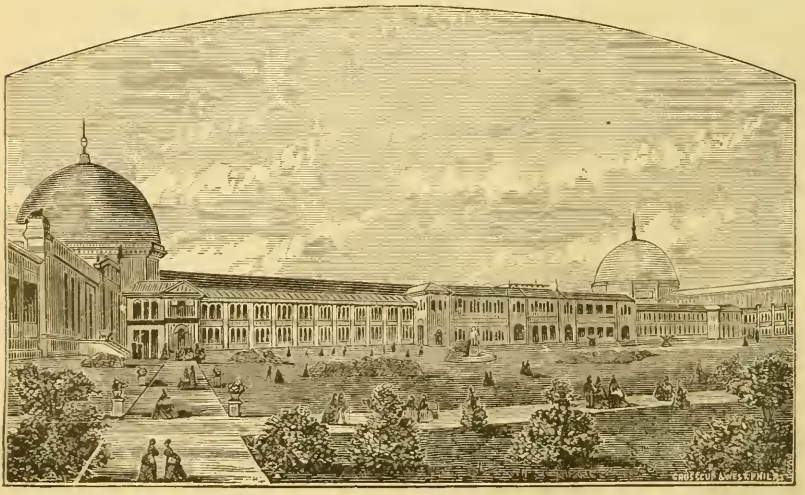
LONDON EXHIBITION, 1851.



NEW YORK EXHIBITION, 1853.



PARIS EXHIBITION, 1855.



LONDON EXHIBITION, 1862.

ing was the *Palais de l'Industrie* in the Carré Marigny, which has since witnessed so many changes, at one time welcoming the Royalties of Europe, at another devoted to the service of contemporary art, and then again desecrated to be a receptacle for a show of dogs or horses. The building with its façade of stone is undoubtedly an ornament to the Champs Elysées, but the builder's bill was a heavy one, amounting to no less than half a million. There were many modifications to the original design, including a rotunda, styled the panorama, set apart for the display of the jewels of the Empress and those of the Queen of Portugal, and choice specimens from the looms of the Gobelins and the ceramics of Sèvres. This building formed the bond of union between the main structure and the *annexe* devoted to raw produce and machinery, which extended for three-quarters of a mile along the Quai de la Conference from the Place de la Concorde to the Pont de l'Alma, abutting on the Avenue Montaigne, in which was situated the Palais des Beaux Arts.

The financial history of 1855 was an unpleasant memory, the expenses amounting to not less than $5,000,000, whilst the receipts, all told, came to but $640,000. A portion of this deficit must be set down to unreadiness, the opening taking place on the 15th of May in lieu of the 1st, and even then the several departments were inaugurated in detail, the agricultural on the 5th June, the *annexe* on the 10th, and the panorama no sooner than the 30th. But once fully opened, it was an undoubted success, and the smallness of the receipts may be partly attributed to the kindness of the Emperor, who set down the sums for admission on so low a basis that the poorest of his subjects could enter, there being twenty centime days,

whilst on the 27th May the doors were opened gratuitously to all comers. The duration of the Exhibition was from the 15th May to the 30th November, a total of 200 days, Sundays included; the number of exhibitors was 20,839, being an increase of half on the London total of 1851, whilst the visitors attained the maximum of 5,162,330, against 6,039,195 in 1851, scoring, however, on Sunday, the 9th of September, 123,017 as the greatest number, against the 109,915 registered on Tuesday, October 7th, 1851. The Fine Art Gallery was, however, the feature of the Exhibition, it being the first contemporary International display of any magnitude. Visitors to it will doubtless remember the statue of Minerva, formed of ivory, gold, and gems, and evolved from records of the marvellous work of Pheidias in the Parthenon. The original was, so say historians, forty feet in height, this reproduction executed by M. Simart, for the Duc de Luynes, being, needless to say, of much more humble proportions.

Passing on through the local industrial celebrations at Brussels in 1856, Lausanne in 1857, with 2050 exhibitors, Turin in 1858, and Hanover in 1859, the magnificent Fine Art Exhibition at Manchester, and the Dublin, Edinburgh, and Italian Art Exhibitions of 1861, we come to the great International Exhibition at London of 1862, which, owing to the loss the nation had sustained by the death of Prince Albert, on December 14th, 1861, had to struggle against the absence of court ceremonials, and to rely for success solely on intrinsic merits.

The building of brick, unornate, not to say plain, was externally distinguished by two domes, one on the axis of each transept. These domes, composed of iron and glass, rose to a height of 200 feet, were

crowned by ornamental finials fifty-five feet high, and had each a diameter of 160 feet. The main building was a parallelogram, about 1150 feet long by 560 wide, and the total area roofed in was 988,000 square feet, the total space covered and uncovered amounting to no less than 1,231,000, and the total cost some £460,000. The domes and the Picture Galleries were the great successes of the designer, Captain Fowke, and the erection of the former by Messrs. Kelk and Lucas was a triumph of engineering skill.

In the industrial and machinery sections the progress was marked in every branch, but it was in the department of Fine Arts that the 1862 Exhibition stood pre-eminent. Here were Hogarth, Gainsborough, Reynolds, Wilkie, and a goodly company of those great masters of British Art who had passed away, with those giants of the palette, Maclise, Mulready, Clarkson Standfield, Sir Edwin Landseer, and David Roberts. Thirty thousand people assisted at the opening by the Duke of Cambridge; 2000 choristers and 400 musicians gave effect to the setting by Sir Sterndale Bennett of the Poet Laureate's ode; and the effect, both of sight and sound, was one of extraordinary magnificence.

The Exhibition opened on the 1st of May, and closed on the 15th November, being a total of 171 days. The amount received was $2,042,650, and the number of visitors 6,211,103, the maximum being attained on Thursday, October 30th, with 67,891.

1865 saw many varied gatherings, all International, that of Amsterdam being devoted to flowers, at which, strange to say, neither black tulip, blue dahlia, nor green rose, put in a claim for the Grand Medal of Honor. Paris, calling a cheese conference, at which Stilton, Cheddar, Glo'ster, Gruyère, Brie, Roquefort, Bondon,

Limberger, Liptauer, Schapziger, Parmesan, Gorgonzola, Ementhaler, and Gouda stood forth as the representatives of casein; whilst the displays of Dublin, Oporto (3911 exhibitors), and Stettin (1451 exhibitors), appealed to the general mass of industries.

The Dublin Exhibition of 1865, like that of 1853, owed much to the liberality of a citizen, the munificent donor on this occasion being the late Sir Benjamin Lee Guinness. The building, a gossamer-like structure of iron and glass, was opened on the 9th of May by the Prince of Wales in the presence of some 10,000 spectators, and was closed on that day six months, having been open 159 days and fifty-one evenings, the total number of admissions, exceeding 900,000, being an average of 5000 by day and 3000 by night.

Between the Avenue de la Bourdonnaye and the Avenue Suffren, on a historic site, stood in 1867 the edifice denominated by the Emperor Napoleon as a "magnificent gasometer." To Prince Napoleon is due the conception of the idea, and the words of the Imperial Commission fully describe it "An area with two main entrances, manufactures, and products of cognate natures, to be arranged in concentric bands, with a garden in the middle. The different nationalities to intersect the bands by transepts or avenues radiating from the centre." Admirable in theory, you passed down one of the spokes of this monster wheel, and you saw all that the country had to show; you went round an ellipse, and the relative qualities of similar productions in various lands were all presented. The external ring of the building was devoted to machinery, the internal to the "History of Labor," beginning with Gaul before the use of metals, and ranging through the first and second epochs of caves, the age

of stone, the age of transition and of lacustrine dwellings, free Gaul, and Gaul under the Romans, the days of Charlemagne and of the Carlovingian kings, the Moyen-age, the Renaissance, and all the changing fashions at home and abroad down to the commencement of the last century—a magnificent idea in truth, and superbly carried out. Indeed in every sense was the Exhibition of 1867 a marvellous spectacle, with its park studded with mosques, Russian "slobodas," Swiss châlets, Tunisian kiosks, Swedish cottages, English lighthouses, Egyptian palaces (with a Museum of Egyptiology arranged by Mariette Bey), stables for dromedaries, a temple, and an "okel" or caravanserai, all massed in picturesque confusion.

One feature of the Exhibition was the engineering triumph of the age and of M. Ferdinand de Lesseps, the model of the Suez Canal, with its navy of dredges, steamers, and boats.

The Exhibition opened on the 1st April, 1867, and closed on the 3d November, a total of 117 days, Sundays included; the total number of visitors was 6,805,969; that of exhibitors, 42,217, and the amount received, $2,103,675. The greatest number of visitors on any one day being 173,923, on October 27th.

The Weltausstellung, in the Prater of Vienna, made memorable a year otherwise unnoteworthy, but the splendid pageant of 1873 is so much a thing of to-day, that there seems little reason to again describe the main building with its rotunda (within which all the domes of the world could be enclosed), surmounted by the monster model of the Imperial crown, its jewels winking in the sunlight, its hall with marvels of machinery, its Palace of Fine Art, its Museum of Amateurs, its Agricultural Halls, and the four hundred

buildings set in its splendid park, the Persian palace with its mirror mosaic, glistening in the sun, Turkish, Egyptian, Japanese, Roumanian, Styrian, Swiss, Russian, Kirgish, Samwede, Sclav, Moorish, German, Bohemian, Hungarian, Italian, Polish, French, and English dwellings all scattered amidst woodland scenery; and as Paris in 1867 placed on view the triumph of her engineer, so Italy put in evidence the latest result of human skill in a monster model of the mouth of the Mont Cenis Tunnel, railway, signals, and train complete. 186 days was it open, Sundays included; its visitors were 6,740,500, and its receipts $1,032,385.

So from the five great International Exhibitions (London, 1851, 1862; Paris, 1855, 1867; Vienna, 1873), we get a total of 32,959,097 visitors, and a cash aggregate of $7,940,820.

And now this year, 1876, has witnessed the grandest and most complete realization of the idea of a World's Fair, the International Centennial Exposition, commemorative of the One Hundredth anniversary of American Independence—the most interesting of all similar Exhibitions, because of its commemorative character as well as from its having been the largest in area, the widest in scope, and the most numerously attended of all its predecessors.

It was unprecedented, also, in this fact, that it connected a National Celebration with an International Exhibition, thus identifying the Independence and History of America with the Industrial Art and Progress of the World.

CHAPTER II.

PREPARATIONS FOR THE CENTENNIAL EXHIBITION—PLACES OF HISTORIC INTEREST IN PHILADELPHIA.

THERE has been considerable discussion as to whether the origination of the idea of celebrating the One Hundredth Anniversary of American Independence by holding an International Exhibition in Philadelphia in 1876, can be credited to any individual in particular, or whether it was the outgrowth of the spontaneous happy thought of the American people. But it seems that the honor lies between three or four distinguished citizens, in justice to whom it is necessary to give in brief the details of the inception of this grand idea, the realization of which has so far transcended even the wildest dreams of the originators themselves.

In December, 1866, Professor J. L. Campbell, of Wabash College, Indiana, wrote to Hon. Morton McMichael, then Mayor of Philadelphia, suggesting the holding of an International Exhibition at that city in 1876, as the most suitable method of observing the completion of the first century of American national existence, and presented many reasons why such a Centennial celebration should be held in Philadelphia. Mayor McMichael, in reply, cordially indorsed the proposition in his own behalf, as well as on the part of many prominent citizens of the city, and promised to take measures, at the proper time, to secure its ac-

complishment. In November, 1868, Professor Campbell wrote a second letter to Mayor McMichael, urging immediate action, and to this received a reply concurring in the opinion that the time had arrived when an active effort should be made to carry out the suggestions previously submitted and considered.

The agitation of this subject was continued in various ways, and on the 20th of January, 1870, John L. Shoemaker, Esq., a member of the Select Council of Philadelphia, introduced resolutions, which were unanimously adopted in that and in the Common branch, indorsing the proposition to hold an International Exhibition at Philadelphia in 1876. These resolutions were the first official act relating to a Centennial celebration. The Legislature of Pennsylvania and the Franklin Institute of Philadelphia promptly indorsed the movement, and appointed committees to unite with the joint committee of City Councils in presenting a memorial to Congress, showing the design and scope of the enterprise, and the importance of its being held under the auspices of the government of the United States.

The memorial of these committees was presented to Congress in January, 1871, and in accordance therewith, Hon. D. J. Morrell, a representative from Pennsylvania, and chairman of the House Committee on Manufactures, introduced a bill creating the United States Centennial Commission, whose duty it was to prepare and superintend the execution of a plan for holding an exhibition of American and foreign arts, products and manufactures, under the auspices of the government of the United States, in the city of Philadelphia, in the year 1876, which bill was enacted into a law on the 3d of March, 1871.

This legislation gave the proposed Exhibition the prestige of a national enterprise, and the following commissioners were at once appointed by the President of the United States upon the nominations of the governors of the several States and Territories, the following being the United States Centennial Commissioners:

ALABAMA — James L. Cooper. ARIZONA — Richard C. McCormick, John Wasson. ARKANSAS — Geo. W. Lawrence, Alexander McDonald. CALIFORNIA — John Dunbar Creigh, Benj. P. Kooser. COLORADO—J. Marshall Paul, N. C. Meeker. CONNECTICUT—Joseph R. Hawley, Wm. Phipps Blake. DAKOTAH —J. A. Burbank, Solomon L. Spink. DELAWARE—Henry F. Askew, John H. Rodney. DISTRICT OF COLUMBIA—James E. Dexter, Lawrence A. Gobright. FLORIDA—John S. Adams, J. T. Bernard. GEORGIA—George Hillyer, Richard Peters, Jr. IDAHO—Thomas Donaldson, C. W. Moore. ILLINOIS—Frederick L. Matthews, Lawrence Weldon. INDIANA—John L. Campbell, Franklin C. Johnson. IOWA—Robert Lowry, Coker F. Clarkson. KANSAS—John A. Martin, George A. Crawford. KENTUCKY—Robert Mallory, Smith M. Hobbs. LOUISIANA—John Lynch, Edward Penington. MAINE—Joshua Nye, Charles P. Kimball. MARYLAND—James T. Earle, S. M. Shoemaker. MASSACHUSETTS —George B. Loring, William B. Spooner. MICHIGAN—James Birney, Claudius B. Grant. MINNESOTA—J. Fletcher Williams, W. W. Folwell. MISSISSIPPI—O. C. French. MISSOURI—John McNeil, Samuel Hays. MONTANA—J. P. Woolman, Patrick A. Largey. NEBRASKA—Henry S. Moody, R. W. Furnas. NEVADA —Wm. Wirt McCoy, James W. Haines. NEW HAMPSHIRE—Ezekiel A. Straw, Asa P. Cate. NEW JERSEY—Orestes Cleveland, John G. Stevens. NEW MEXICO—Eldridge W. Little, Stephen B. Elkins. NEW YORK—N. M. Beckwith, Charles H. Marshall. NORTH CAROLINA—Samuel F. Phillips, Jonathan W. Albertson. OHIO—Alfred T. Goshorn, Wilson W. Griffith. OREGON—James W. Virtue, Andrew J. Dufur. PENNSYLVANIA—Daniel J. Morrell, Asa Packer. RHODE ISLAND—George H. Corliss, Samuel Powel. SOUTH CAROLINA—William Gurney, Archibald Cameron. TENNESSEE—Thomas H. Coldwell, William F. Prosser. TEXAS—William Henry Parsons, John C. Chew. UTAH—John H. Wickizer, Wm. Haydon. VERMONT — Middleton Goldsmith,

Henry Chase. VIRGINIA—Walter W. Wood, Edmund R. Bagwell. WASHINGTON TERRITORY—Elwood Evans, Alexander S. Abernethy. WEST VIRGINIA—Alex. R. Boteler, Andrew J. Sweeney. WISCONSIN—David Atwood, Edward D. Holton. WYOMING—Jos. M. Carey, Robert H. Lamborn.

From these appointments the following organization was completed :

PRESIDENT—Joseph R. Hawley.

VICE-PRESIDENTS—Alfred T. Goshorn, Orestes Cleveland, John D. Creigh, Robert Lowry, Robert Mallory.

DIRECTOR-GENERAL—Alfred T. Goshorn.

SECRETARY—John L. Campbell.

COUNSELLOR AND SOLICITOR—John L. Shoemaker, Esq.

EXECUTIVE COMMITTEE—Daniel J. Morrell, Pennsylvania; Alfred T. Goshorn, Ohio; E. A. Straw, New Hampshire; N. M. Beckwith, New York; James T. Earle, Maryland; George H. Corliss, Rhode Island; John G. Stevens, New Jersey; Alexander R. Boteler, West Virginia; Richard C. McCormick, Arizona; John Lynch, Louisiana; James Birney, Michigan; Charles P. Kimball, Maine; Samuel F. Phillips, North Carolina. *Secretary*, Myer Asch, Philadelphia.

On the 1st of June following, an act was passed creating the Centennial Board of Finance.

PRESIDENT—John Welsh, Philadelphia.

VICE-PRESIDENTS—William Sellers, Philadelphia; John S. Barbour, Virginia.

DIRECTORS—Samuel M. Felton, Philadelphia; Daniel M. Fox, Philadelphia; Thomas Cochran, Philadelphia; Clement M. Biddle, Philadelphia; N. Parker Shortridge, Philadelphia; James M. Robb, Philadelphia; Edward T. Steel, Philadelphia; John Wanamaker, Philadelphia; John Price Wetherill, Philadelphia; Henry Winsor, Philadelphia; Henry Lewis, Philadelphia; Amos R. Little, Philadelphia; John Baird, Philadelphia; Thos. H. Dudley, New Jersey; A. S. Hewitt, New York; John Cummings, Massachusetts; John Gorham, Rhode Island; Charles W. Cooper, Pennsylvania; William Bigler, Pennsylvania; Robert M. Patton, Alabama; J. B. Drake, Illinois; George Bain, Missouri.

Financial Agent—Hon. Wm. Bigler.

Engineers and Architects—Henry Pettit, Jos. M. Wilson, H. J. Schwarzmann.

Thus was called into being the organization which raised the money necessary for this mighty undertaking, and without whose energetic agency it might, in all probability, have been the merest vision. John Welsh and his coadjutors have held the magician's wand that conjured up Aladdin's Palace in Fairmount Park.

The Location of the Exhibition.

At a meeting of the Commission held in Common Council chamber, Independence Hall, March 11th, 1872, Mr. Atwood, of Wisconsin, offered the following, which was unanimously adopted:

Whereas, A conference has been had with the authorities of the city of Philadelphia (including the Park Commissioners), in accordance with the second section of the act creating this Commission, in regard to the site for the Exhibition: be it therefore

Resolved, That the site for holding the International Exhibition in 1876 be fixed at Fairmount Park, within the corporate limits of the city of Philadelphia.

The choice of a location for the Exhibition was fortunate in every respect. The Declaration of Independence was made in Philadelphia, in 1776, and it was there that the National Convention of 1787 perfected and adopted the Constitution under which the republic has attained its present greatness.

The claim of Philadelphia to be the scene of the Exhibition was sanctioned by her place and part in the Revolution. In a plain old brick structure in the heart of the city, built in 1734, the Declaration of Inde-

pendence was signed a hundred years ago. The chandelier used then, and afterwards by the Continental Congress, hangs there in its old place. The Liberty Bell, bearing the motto, "Proclaim liberty throughout the land, and to all the inhabitants thereof," and which proclaimed liberty on the first celebration of independence, July 8th, 1776, rests on a pedestal in the vestibule. To this pile Philadelphia, and indeed all Pennsylvania, point with the pride of Massachusetts at Bunker Hill, of New Hampshire at Concord, of New York at Saratoga, of South Carolina at the Cowpens. Here, too, close by, are the battle-field of Germantown and a hundred other neighborhoods connected by history and tradition with the outburst and the long struggle of the Revolution.

And then Philadelphia provided a site for the Exhibition buildings, the like of which could hardly be afforded by another American city. Fairmount Park, the great park of Philadelphia, a lower slice of which, of about 450 acres, has been assigned to the Centennial Commission, comprises 2740 acres. But one park in the world surpasses it in extent, the royal park of Windsor. Its natural beauties are stately heights, overlooking the city and distant towns; deep-wooded ravines, groves of century elms and oaks, immense meadows, which have been turned into lawns and commons; bosky undergrowths, and two beautiful streams, steeply banked with foliage, grass and flowers —the Schuylkill and the Wissahickon. Historical dwellings dot its surface. Robert Morris, the Jay Cooke and more of the Revolution, at his home on Lemon Hill, entertained his guests like a prince before his ruin. The Belmont mansion, the home, antecedent to and during the Revolution, of Judge Peters, Secre-

tary of War, stands converted, without much alteration, into a house of public entertainment. Covers are laid there for couples and parties, and on a window-pane, in one of the snuggest and smallest of the second-story chambers, is written with a diamond ring:

JOHN DIXON,
June 3d, 1769,
Took leave of Belmont.

The finest drive in the park, "Lansdowne," is named after the magnificent residence of John Penn, the last colonial governor of Pennsylvania.

The next important point, the location having been decided upon, was an estimate of the amount which would be required to carry out the intention of the Centennial Commission. The sum fixed upon was $10,000,000, as being, in their judgment, necessary for the purposes of the Exhibition.

In accordance with this estimate, and with a view to giving every citizen of every State an opportunity to become interested in and connected with this great National Exhibition, a quota was now established of a ratio of subscription for the several States, and every effort was made, through the public press, special circulars, and selected agents, to bring about such an interest as would lead to a popular subscription sufficiently large to absorb the capital stock, the ratio of each State being fixed as follows:

No.	State or Territory.	Population.	Quota in Shares.	Quota in Dollars.
1	New York	4,382,759	113,666	$1,136,660
2	Pennsylvania	3,521,951	91,341	913,410
3	Ohio	2,665,260	69,123	691,230
4	Illinois	2,539,891	65,871	658,710
5	Missouri	1,721,295	44,641	446,410

No.	State or Territory.	Population.	Quota in Shares.	Quota in Dollars.
6	Indiana	1,680,637	43,587	$435,870
7	Massachusetts	1,457,351	37,796	377,960
8	Kentucky	1,321,011	34,260	342,600
9	Tennessee	1,258,520	32,639	326,390
10	Virginia	1,225,163	31,774	317,740
11	Iowa	1,194,020	30,967	309,670
12	Georgia	1,184,109	30,710	307,100
13	Michigan	1,184,059	30,708	307,080
14	North Carolina	1,071,361	27,785	277,850
15	Wisconsin	1,054,670	27,353	273,530
16	Alabama	996,992	25,854	258,540
17	New Jersey	906,096	23,499	234,960
18	Mississippi	827,922	21,472	214,720
19	Texas	818,579	21,230	212,300
20	Maryland	780,894	20,252	202,520
21	Louisiana	726,915	18,852	188,520
22	South Carolina	705,605	18,300	183,000
23	Maine	626,915	16,258	162,580
24	California	560,247	14,530	145,300
25	Connecticut	537,454	13,939	139,930
26	Arkansas	484,471	12,565	125,650
27	West Virginia	442,014	11,464	114,640
28	Minnesota	439,706	11,404	114,040
29	Kansas	364,399	9,450	94,500
30	Vermont	330,551	8,573	85,730
31	New Hampshire	318,300	8,255	82,550
32	Rhode Island	217,353	5,637	56,370
33	Florida	187,748	4,869	48,690
34	District of Columbia	131,700	3,417	34,170
35	Delaware	125,015	3,242	32,420
36	Nebraska	122,993	3,190	31,900
37	New Mexico	91,874	2,383	23,830
38	Oregon	90,923	2,359	23,590
39	Utah	86,786	2,251	22,510
40	Nevada	42,491	1,102	11,020
41	Colorado	39,864	1,034	10,340
42	Washington	23,955	621	6,210
43	Montana	20,595	534	5,340
44	Idaho	14,999	389	3,890

No.	State or Territory.	Population.	Quota in Shares.	Quota in Dollars.
45	Dakota	14,181	368	$3,680
46	Arizona	9,658	250	2,500
47	Wyoming	9,118	236	2,360
		38,558,371	1,000,000	$10,000,000

Up to December 15th, 1875, the actual amounts subscribed for the purposes of the Centennial were as follows:

Total stock subscriptions (*reliable*)		$2,357,750
In which are included		
New Jersey	$100,000	
Delaware	10,000	
Connecticut	10,000	
New Hampshire	10,000	
Wilmington, Del.	5,000	
	$135,000	
Gifts, concessions, and interest		$230,000
Further receipts from concessions		100,000
Appropriation by Pennsylvania		1,000,000
Appropriation by Philadelphia		1,500,000
		$5,187,750
Amount still required to prepare for opening up to May 10th, 1876		1,537,100
		$6,724,850

By which it will be seen that the original estimate of $10,000,000 was found to be much more than sufficient for the necessities of the Exhibition.

The following nations appropriated the sums set against their names for defraying their own expenses at the Centennial:

Great Britain, with Australia and Canada (gold)	$250,000
France and Algeria	120,000
Germany	171,000

Austria	$75,000
Italy, (Government, $38,000; Chamber of Commerce, $38,000)	76,000
Spain	150,000
Japan	600,000
Belgium	40,000
Denmark	10,500
Sweden	125,000
Norway	44,000
Netherlands (ample provision).	
Brazil	150,000
Venezuela (all expenses).	
Ecuador	10,000
Siam	100,000
Argentine Confederation (owns all goods exhibited)	60,000

The financial crisis of 1873, and the difficulty of carrying out a working system through the agency of banks, rendered necessary the formation of the following Board of Revenue, with a view of operating through the assistance of voluntary auxiliary boards in different sections of the States and Territories:

CLEMENT M. BIDDLE, *Chairman*, Philadelphia; WILLIAM BIGLER, *Financial Agent*, Pennsylvania; EDMUND T. STEEL, AMOS R. LITTLE, JOHN WANAMAKER, DANIEL M. FOX, JAMES M. ROBB, JOHN BAIRD, Philadelphia; THOS. H. DUDLEY, New Jersey; JOHN CUMMINGS, Massachusetts; WILLIAM L. STRONG, New York; GEORGE BAIN, Missouri; C. B. NORTON, *Secretary*.

Chiefly through the labors of this Board the entire sum subscribed for carrying on the operations of the Commission was accumulated, but the difficulties which were surmounted in the accomplishment of this work can hardly be imagined, much less described.

These difficulties arose from various causes; the first one took the form of objection to the locality chosen for the Celebration, jealousy being, of course, the prime

mover in this opposition. Finally, however, it was conceded that the selection of Philadelphia as the scene of our Centennial Memorial was just, wise, and propitious. Other objections which we have not space here to dilate upon were met bravely and shown to be without foundation in fact.

Before leaving this branch of the subject, simple justice demands that the liberality of the State of Pennsylvania and the City of Philadelphia toward the Centennial Exhibition should be acknowledged. The amount appropriated by the State, directly for Centennial purposes, aggregates $1,015,000, and by the city, $1,575,000, showing a total contribution from these two sources of $2,590,000. In addition, the private subscriptions by citizens of Pennsylvania amount in the aggregate to $2,500,000 more, making a total direct contribution to the Centennial fund, from Pennsylvania alone, of more than $5,000,000.

As we have before mentioned, the suggestion made by the Pennsylvania Legislature, in their memorial to Congress, that "the Centennial Anniversary of American Independence should be celebrated in the city of Philadelphia," met with considerable opposition on the part of representatives from other localities, who affected to consider the claims of these for selection, in place of Philadelphia, as equally good, at least, with those of the latter city. But on June 16th, 1870, the Committee on Manufactures and that on Foreign Affairs visited Philadelphia, when arguments were adduced so unanswerable and so convincing in favor of the proposed location of the Centennial Exhibition in the capital of the Quaker State—the city where the Declaration of Independence, with its sounding rhetoric, had awakened such strange echoes in the Old World—

that they returned to Washington with a report unanimously recommending Philadelphia being made the scene of the proposed celebration.

Philadelphia possesses more relics of the past, more edifices around which hang a halo of history, than any other city in the Union, and we have thought it right to make here a brief mention of some of the most interesting.

The building which above all others attracts the attention of strangers, and one that has been most eagerly sought after during this year, is the State House of Philadelphia—"the Cradle of American Liberty."

Independence Hall.

This venerable edifice is rich with the incense of patriotism and heroic struggle, and no one can enter it without a feeling of reverence for the hallowed walls wherein sat that Congress, which, in 1776, issued the memorable Declaration of American Independence, that palladium of our nation's liberties.

We give two illustrations, one showing the building as it appeared in 1776, and the other as it is at present. It was designed by Dr. Kearsley, was commenced in 1729, and completed in 1734, the builder being Edmund Wooley.

The inner decorations remain as originally designed, and for the work of so early a time, are very fine; those of the main hall, indeed, consisting of a richly panelled ceiling and a heavy cornice supported by fluted columns, are exceedingly beautiful.

On the first floor of the main building, in the East Room, is Independence Hall, a shrine to every American, in which was adopted and signed the Declaration of Independence, and promulgated on July 4th, 1776.

The apartment retains its original appearance, and is decorated with quaint carvings, and with its wainscotted walls serving as a picture gallery of great American worthies. The table on which the immortal document was signed; John Hancock's chair; the old chandelier which was used by the Continental Congress still pendent from the ceiling; and other sacred relics are all objects of the deepest interest to visitors.

On the same floor, in the Western Rooms, is a museum of national relics, mementoes of the "times that tried men's souls." As for instance: the flag of the First Regiment Pennsylvania Militia, lost and recaptured at the battle of Brandywine; relics of the battle of Germantown; the original stamp imposed under the celebrated Stamp Act of Great Britain in March, 1765, which led to the Revolution; and many others which we have not the space here to enumerate.

The original steeple, being decayed, was taken down in 1774, and the present one put up in 1828.

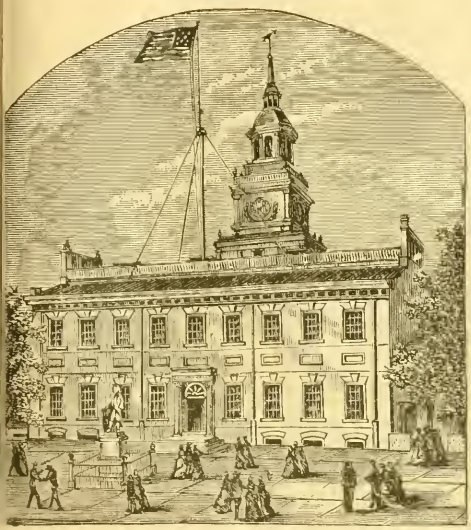
On a pedestal in the vestibule, surrounded by a net work of iron, is placed the famous Liberty Bell, bearing the motto, "Proclaim liberty throughout the land unto all the inhabitants thereof." It was cast and imported from England in 1752, purposely for the State House. but was cracked in testing it. It was recast, however. and suspended from the steeple, and on the afternoon of the memorable Fourth of July, 1776, announced. with iron tongue, the result of the momentous deliberations of Congress, by ringing out the joyful annunciation for more than two hours, its glorious melody floating clear and musical as the voice of an angel above the discordant chorus of booming cannon, the roll of drums, and the mingled acclamations of the people.

In the rear of the State House is Independence Square, which has undergone extensive improvement, and is now in a condition better fitting its character and its association with the historic Hall, than it has been for many years. This square derives its name from the fact that it was here, on the 8th of July, 1776, the Declaration of Independence was read by John Nixon amid the shouts of the people, who, roused to the highest pitch of patriotic enthusiasm, rushed into the court rooms, tore down the king's arms, burned them in public, and destroyed everywhere the insignia of British authority.

Birthplace of Liberty.

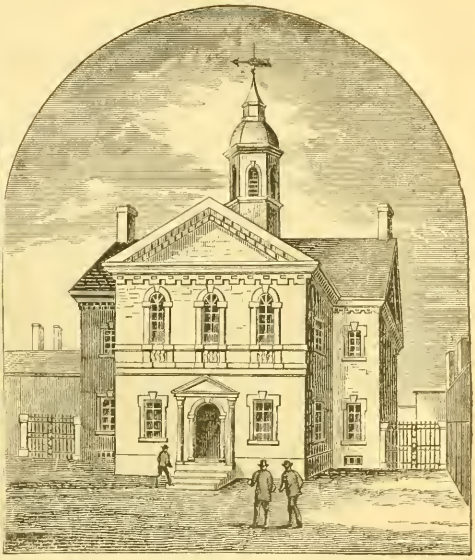
One of the most interesting and unpretentious edifices, and which should be dear to every American heart, is one still standing at the southwest corner of Seventh and Market streets, and now occupied as a business house, but in which the memorable Declaration of Independence, our famous Magna Charta, was drafted one hundred years ago by Thomas Jefferson. In those days the building stood outside of the thickly-settled portion of the city, in what was then called "The Fields." A garden enclosed by a brick wall occupied the site of the house which now stands on the corner.

In June, 1776, when all hope for reconciliation with England had faded away, a resolution was offered in the General Congress, by Richard Henry Lee, of Virginia, declaring all allegiance to the British crown at an end. This bold proposition was immediately followed by the appointment of a committee to draft a Declaration of Independence. This committee consisted of Benjamin Franklin, John Adams, Thomas Jefferson, Roger Sherman and Robert H. Livingston.



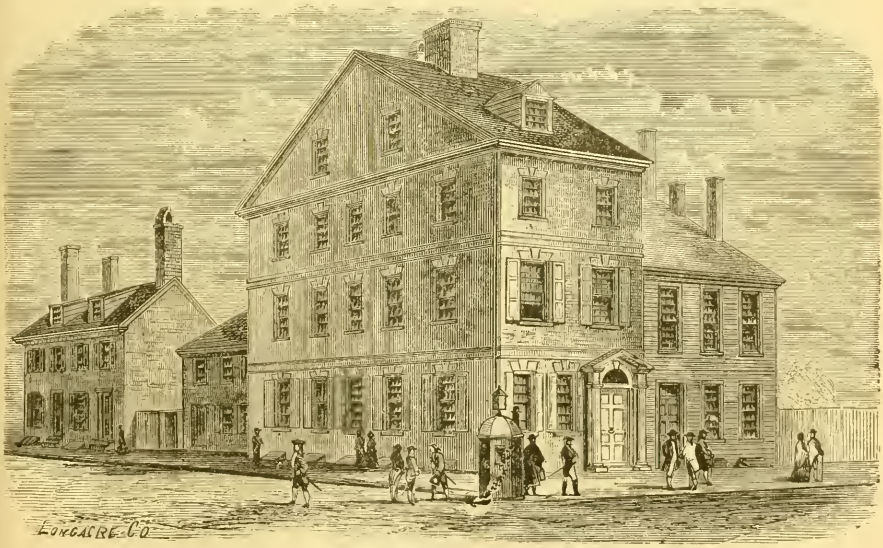
INDEPENDENCE HALL.

Where the Declaration was signed and the great Bell rung out the proclamation of Liberty.



CARPENTER'S HALL.

Where the first Continental Congress assembled



BIRTHPLACE OF LIBERTY.

Building in which the Declaration of Independence was written.

GIRARD COLLEGE.

THE PUBLIC BUILDINGS.

Jefferson, though the youngest member of the committee, was appointed chairman, and was requested by the others to draw out the instrument, which he did, and, with a very few verbal alterations by Dr. Franklin and Mr. Adams, it was adopted by the committee just as it came from his hand. On the 28th of June, 1776, the committee reported the Declaration to Congress, and on the Fourth day of July, 1776—an ever memorable day in the history of this country—it was formally adopted by Congress. This instrument forms an everlasting monument to the memory of Thomas Jefferson, and gives, by far, a wider range to the fame of his talents and patriotism than eloquent panegyric or sculptured epitaph.

Without exception, perhaps, the oldest edifice is

Penn's Cottage,

in Letitia Court, south side of Market street above Front, the tradition regarding which was for some time lost by the great mass of the population of Philadelphia.

This name, "Letitia's House," was given by the citizens because Penn deeded the house to his unmarried daughter, Letitia. It enjoys the reputation of having been the first cellar dug in Philadelphia. The material for the house was all sent out from England in charge of Colonel Markham, and was built before Penn arrived. It was on Penn's first visit, early in 1682, that he dwelt here. The finer work was taken from his palace at Pennsbury. Penn's instructions to his commissioner, of 30th of 9th month, 1681, says expressly, "pitch upon the very middle of the platt of the towne, to be laid facing the harbour, for the situation of my house," thus intimating the choice of Letitia Court, and his desire to have his house facing

the river, "as the line of houses of the towne should be."

After Penn, it was used by Colonel Markham, his deputy Governor, and afterwards for public offices. In 1700, when he used the "Slate House," corner of Second street and Norris alley, having a mind to confer something upon his daughter, then with him, he gave her a deed, 1st month, 29th, 1701, for all that half square lying on High (Market) street, and including said house.

If we would contemplate this house in its first relations, we should consider it as having an open area to the river, which here and there retained an ornamental clump of forest trees and shrubbery on either side of an avenue leading out to Front street, having a garden of fruit trees on the Second street side, and on Second street the "Governor's Gate," so called, opposite the lot of the Friends' Great Meeting. Its appearance now, crowded in upon by houses, makes it very difficult indeed to trace the landmarks.

Another edifice, scarcely less sacred than Independence Hall, is

Carpenters' Hall,

which stands to the south of Chestnut street between Third and Fourth streets, and is reached by a passage way from the street first named. This building was originally constructed for the Hall of Meeting for the Society of House Carpenters of Philadelphia, in 1770, and it was taken and used by the first Colonial Congress, which met in it September 5th, 1774, to deliberate on the incipient measures of the War of the Revolution. Here it was that Patrick Henry poured forth those passionate appeals for liberty which so electrified the colonies. It was in this hall that he made his memorable speech

in favor of war, and first uttered the words "Declaration of Independence," predicting the separation from the mother country, when others dared not think of it.

This building was afterwards used, for several years, as the first Bank of the United States. It then fell into use as an auction house, until a few years back.

The citizens of Philadelphia, who pass and repass it daily on this busy thoroughfare, seldom think of its former glory, as being the spot where the groundwork of our national independence was laid.

The Old Swedes Church,

which is still standing on Swanson street (so named from the celebrated Swedish family who once owned all the land in that part of the city), below Christian, is one of the most venerable edifices in America. The first church upon this site was erected in 1637, more than forty years before the arrival of Penn's colony, and served both for a place of worship and of defence, being constructed of logs, with loop-holes and the appliances of defensive warfare. The present brick edifice was built on the same site in 1700, of cruciform shape, the front of gallery ornamented with wooden cherubim brought over from Sweden.

Another sacred relic of colonial times is Christ Church, still standing on the west side of Second street above Market, and which was constructed at various periods of times. The western end, as we now see it, was raised in 1727, and having enlarged their means, they, in 1731, erected the eastern end. The steeple was elevated on or about the year 1754. The first church on this site was built of wood in 1695. When the present brick structure was erected, it was completely over the wooden structure and roofed in, the

congregation still worshipping in the small wooden chapel; when it was necessary to lay the floor in the present building, the inside building was taken away. At that time the bell to call the people was hung in the crotch of a tree on the sidewalk. Its chime of bells is among the oldest this side of the Atlantic. On the tenor is inscribed, "Christ Church, Philadelphia. Thomas Lester and Thomas Peck, of London, made us all." The years 1752–53 were very fruitful in expedients for adorning and beautifying the city. Several new improvements were started upon lotteries; among these was one of November, 1752, for aiding in raising a steeple for Christ Church. It was called "a scheme to raise £1012 10s., being half the sum required to finish the steeple to Christ Church, and to purchase a ring of bells and a clock." The lottery was drawn March, 1753, and was called "The Philadelphia Steeple Lottery." The steeple was finished November, 1754, at a cost of £2100, and the bells were purchased in England at a cost of £900; they were brought out freight free in the ship "Matilda," Captain Budding, and as a compliment to his generosity, as often as he arrived in subsequent years, the bells put forth a merry peal to announce their gratitude. When the British troops took Philadelphia, these bells, like others in the city, were removed to prevent them falling into the hands of the enemy and being cast into cannon. They returned with the patriots, and have remained to peal forth their music ever since. Washington was a regular attendant at Christ Church when President of the United States, and many of the heroes and patriots of the "times that tried men's souls" rest in its vaults.

Among the few souvenirs of our early history in which Philadelphia is so peculiarly rich is the "Treaty

Monument," a simple obelisk upon a granite pedestal, so insignificant that it can hardly be discovered, save by a sharp eye—marking the site of the old elm-tree, under which William Penn made his famous treaty with the Indians. This tree stood for more than a century, and was blown down in 1810. The monument stands on the east side of Beach street, north of Hanover, in an enclosure just large enough to hold it, and in the shade of a tall elm which may possibly be a lineal descendant of the one whose site it marks.

Another shrine, which thousands and thousands of patriotic visitors to Philadelphia have this year visited, is

Franklin's Grave,

which is in the graveyard of Christ Church, on the corner of Fifth and Arch streets. A section of iron railing in the brick wall on Arch street permits the visitor to look upon the plain slab which, in accordance with Franklin's wishes, covers all that remains of the philosopher-statesman and his wife.

After the removal of the seat of government to Washington, Philadelphia lost much of its political prestige, but none of its importance as a place of business. The commerce of the city grew rapidly during the early part of the nineteenth century, and its supremacy in this respect over all American rivals was unquestioned. Trade with the East and West Indies developed into prominence, and the accumulation of wealth by merchants was rapid and vast. Some of the names connected with this commerce are familiar to most readers, and one of them, by the magnificent charity and wonderful foresight of him who bore it, is so blended with Philadelphia that no sketch of the city could be complete without its mention.

Stephen Girard

came to Philadelphia in his youth, comparatively poor. He was a Frenchman by birth, but at an early age went to sea and followed it for many years. It was as captain of a ship that he first entered the Delaware, and he continued to make his voyages for some time after he had fixed upon this as his home. Finally he settled down in Philadelphia as a general trader, and by his almost supernatural sagacity and indomitable energy, accumulated the largest fortune ever, up to that period, gained by an American. He died in 1832, leaving all his property, with the exception of a few insignificant personal bequests, to the city. At that time his estate, so bequeathed, was estimated at several millions of dollars, and now it is probably worth more than fifty millions. A part of this estate was, by his will, to be devoted to the foundation of a college, which should accommodate not less than three hundred children, who must be poor, white male orphans, between the ages of six and ten years, and who are to be supported and instructed until they arrive at the age of sixteen, when they must be apprenticed to good trades or other useful avocations. To meet this requirement the city erected, on the site designated and bequeathed by Girard, consisting of forty-five acres of ground on Ridge road, a structure at a cost of two millions of dollars, which is one of the most beautiful buildings in America, and the truest specimen of Grecian architecture times.

Girard College.

The central or college building is 218 feet long, 160 wide, and ninety-seven high, and is a noble marble structure of the Corinthian order. The roof commands

a wide view of the city. In the room in the building known as "Girard's room" are preserved the books and personal effects of the founder. A statue of Girard stands at the foot of the grand stairway, and underneath the statue he is buried. The grounds contain a monument to the graduates of the college who fell in the civil war. Clergymen are not admitted, in accordance with an express provision made in his will.

The Academy of Natural Sciences has, during the present year, been moved into a handsome building at the corner of Race and Nineteenth streets; the architecture of which is that of the Collegiate Gothic, and the material used serpentine stone, with trimmings of Ohio sandstone.

The Society was founded March, 1812, "for the acquirement, increase, simplification and diffusion of Natural Knowledge," as the records tell us, by benevolent persons emulous to excel each other in carrying forward their projected work. The act incorporating the society is dated March 24th, 1817.

From its foundation the Academy has met weekly. The results of its labors are recorded in a journal (quarto), and in the Proceedings, octavo, which are exchanged with more than two hundred kindred societies at home and abroad.

The society possesses more than 22,000 volumes of scientific works, and vast collections of natural objects. The collection of birds and the collection of shells are unequalled in the world, and other departments of the museum are very full, though far from complete.

The Academy of Fine Arts,

whose new gallery, on Broad street, above Arch, is one of the most prominent buildings in the city—was founded in 1805, by the voluntary contributions of a

number of Philadelphians, and was incorporated in 1807, by act of Assembly. The aim of this institution, one of the worthiest and noblest in the great City of Brotherly Love, as set forth in its charter, is to improve and refine the public taste for works of art, and to cultivate and encourage our native genius by "providing elegant and approved specimens of the arts for imitation." Its first annual exhibition was held in 1811, and over five hundred specimens of the skill of both painter and sculptor were then displayed. For many years the academy was located in a modern Ionic building standing on the site of the present American Theatre, Chestnut street, above Tenth; but six years ago steps were taken to rear a larger building, and one more worthy the standing of the institution and its treasures, and the present edifice is the result of the efforts which were put forth. It is of a modified Gothic style, having a front of 100 feet on Broad street, and a depth on Cherry street of 258. The principal front is two stories high, ornamented with encaustic tiles, terra-cotta statuary and light stone dressings, the wall being laid in patterns of red and white brick. Over the main entrance there is a large Gothic window, with some tracery. The Cherry street front is of similar materials and relieved by a colonnade supporting a series of arched windows, back of which will be a transept with a pointed gable. The building has galleries for casts from sculpture, life-class rooms, lecture-rooms, and retiring rooms on the first floor; while upon the second is located the grand gallery, seventy-five by forty-two feet; the "Gilpin" gallery (containing a hundred thousand dollars' worth of art treasures, bequeathed by the late Henry D. Gilpin), ninety-five by forty-two feet, together with a number of smaller

exhibition rooms. The general appearance of the building conveys a fine idea of the florid Venetian style. The art collections of this academy are the most valuable in this country, comprising the masterpieces of Stuart, Sully, Neagle, Benjamin West, Allston and Wittkamp. Its marbles and fac-similes are very fine and many in number. Its gallery of casts from the relics of antiquity is especially instructive. The academy is now under the supervision of gentlemen who have always been lovers and patrons of art, and has the promise of great prosperity and success.

The University of Pennsylvania,

with its cluster of beautiful buildings, forms a most conspicuous object in West Philadelphia.

This institution, which now exhibits such marked prosperity and is making such rapid strides of progress, originated in and grew out of an early attempt at liberal education in the old Province of Pennsylvania. A school where Latin, English and Mathematics had been taught had been in progress for some time previous; but it was not until the 13th of July, 1753, that a charter was granted, incorporating the "Trustees of the Academy and Charity School in the Province of Pennsylvania." Two years later, the demand for higher education continuing to increase, a new charter was granted, adding a Collegiate Department to the already prosperous Academy and Charitable School. The first commencement of the new college was held in 1757, when a class of seven young men were graduated. From this time the college increased in prosperity and numbers, attracting students from different parts of the country, and even from the West Indies, until in 1763 nearly four hundred individuals

were receiving instructions in its various departments. Soon after the breaking out of the Revolution, however, the legislature of Pennsylvania, suspecting the loyalty of the college, abrogated its former charters, appointed a new Board of Trustees, conveyed all the property into their hands, added, out of confiscated estates, an endowment of £1500 a year, and changed the name of the institution to the one which it now bears. This occurred in 1779.

It was first located on Fourth street, below Arch, where it remained till the year 1800, when the building on Ninth street which had been erected for the residence of the President of the United States, when it was expected that Philadelphia would be the capital of the country, was purchased for the use of the University. From that time until 1872 this building was the home of the institution. The old building having become altogether inadequate to its wants, the present magnificent structures of serpentine marble were erected and occupied in 1872. They form one of the handsomest groups of college buildings in the United States.

The University is divided into Academical, Collegiate, Medical and Law Departments, and among its Faculty are numbered some of the most distinguished men in the State. The junction of Thirty-sixth street, Darby road and Locust street, was selected as the best location for the new buildings of the University. The one for the accommodation of the Department of Arts and Science is one of the most conveniently arranged college buildings in the country. It consists of a main central building with connecting eastern and western wings, which are completed by towers. It extends, exclusive of towers, bay windows, etc., 254 feet in

length, 102 feet 4 inches in breadth, with an additional projection of its central building 21 feet 10 inches beyond the wings. The design is in what is termed the Collegiate Gothic style; the material used is Lieperville stone for the basement, with base courses of Hummelstown brown stone. The walls above are serpentine marble, with cornices, gables, arches, etc., of Ohio stone. The entrance porch is of Franklin stone, with arch supported on polished red granite columns, with encircled capitals of Ohio stone. The windows of chapel and gables are decorated with geometrical tracery. The pointing is done with red mortar, and this, with the green color of the serpentine, and the relief afforded by the Ohio stone, gives the building an exceedingly rich appearance.

The cost of the entire building, exclusive of the special fittings required for the different laboratories, museums, cabinets, and the furniture, was $235,910.46.

The students in these two departments are under a common government and discipline, and are in constant association with each other. The instruction, however, in each department is in charge of a distinct faculty, and both the objects of that instruction and the method of imparting it differ essentially.

The Law Department has its lecture-room in the building of the Department of Arts and of Science. The Department of Medicine is located in a building situated on one side of the square devoted to various uses in connection with the University. It is larger and more commodious, as well as more elegant, than any other building in America devoted to a similar purpose. The arrangements for the convenient accommodation and instruction of students have been carried out in accordance with plans based upon long experience.

In the basement are the laboratories; on the first floor, two large lecture-rooms; on the second a general museum and an amphitheatre for six hundred students; and on the third, rooms for the study of operative surgery and dissection. The Lecture and Dissecting Rooms; the Museum and Cabinet, including the Wistar and Horner Museum, founded nearly one hundred years ago, and which is unequalled for the number and variety of its specimens of the normal and morbid anatomy of every part of the human body; the Chemical and Physical Apparatus, the most extensive private collection in the country; the Library, containing upwards of three thousand medical works, accessible to advanced students and graduates under appropriate regulations; and numerous other departments are all so constructed as to excel all previous accommodation for a medical school.

The immediate neighborhood of the University to its own hospital and the Philadelphia Hospital, at both of which the clinical instruction of the students is chiefly given, forms another and quite peculiar advantage of this institution.

The Hospital of the University of Pennsylvania is an elegant and commodious edifice, constructed according to the best established principles of hospital architecture, provided with all the appliances pertaining to such institutions of the first class, is adjacent to the new Medical Hall, and forms an integral portion of the Medical Department. It is situated on the south side of Spruce street, between Thirty-fourth and Thirty-sixth streets, directly south of the building in use by the collegiate and scientific departments of the University.

The style of architecture of the building is of the same character as that of the Departments of Art and

Science, and in harmony with the new hall of the Medical Department—the three buildings forming a group that unitedly constitute the University of Pennsylvania.

The hospital comprises in design a central building with pavilions. In the centre building, which is angular in form, its greatest width being 88 feet 4 inches, by a depth of 131, are located on the basement and floor a lecture-room, with covered seats for 150 students; linen and splint rooms, a laboratory; the general kitchen, from whence the food is distributed throughout the upper stories by means of dumb waiters; scullery and closets; and servants' dining-rooms, store-rooms, etc.

The Public Ledger Building,

On the corner of Sixth and Chestnut streets, is one of the sights of the city, and through the kindness of Mr. George W. Childs, thousands of visitors to the Centennial Exhibit had an opportunity of inspecting one of the most perfectly appointed newspaper offices in the country. It is an imposing brown-stone structure, five stories high, with a Mansard roof.

The Masonic Temple

Forms one of the most imposing and striking adornments of Broad street. It is built of granite, dressed at the quarry, and brought to the temple ready to be raised at once to its place; so that what was said of Solomon's temple may be said with almost equal truth of this: "There was neither hammer nor ax nor any tool of iron heard in the house while it was building."

It is built in the Norman style of architecture, 250 feet long, 150 feet wide, with a side elevation of ninety feet above the pavement. A tower 230 feet high rises at one corner.

We must make a brief mention of the celebrated

United States Mint,

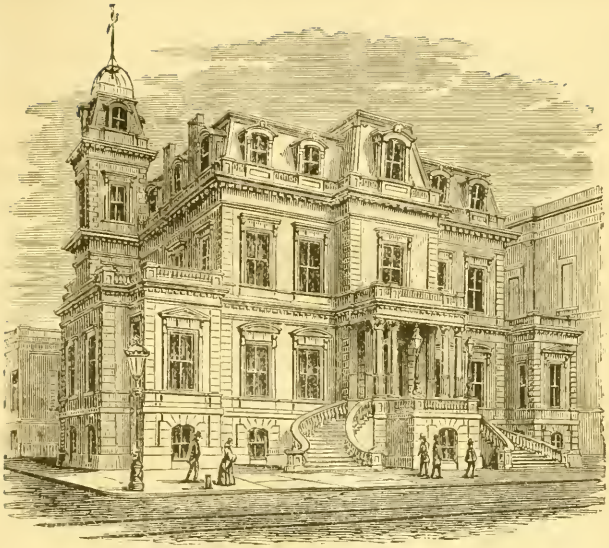
which stands on Chestnut street, above Thirteenth street. This building was erected in 1829, pursuant to an act of Congress enlarging the operations of the government coining, and supplementary to the act creating the Mint, which was passed in 1792. The structure is of the Ionic order, copied from a temple at Athens, of brick, faced with marble ashlar, with a graceful portico. The beautiful and delicate processes and contrivances for coining, as well as the extensive numismatic cabinet, are very interesting, and well worth seeing.

The New Public Buildings,

now being erected on what was once Penn Square, at Broad and Market streets, have elicited so much astonishment and interest from the many who have passed them during the past six months, that they deserve notice. It will be an enormous structure—486½ feet long by 470 wide, four stories high, and covering an area of nearly 4½ acres, not including a court-yard in the centre 200 feet square. The central tower will be 450 feet high. The exterior walls are to be of white marble, and those facing the court-yard of light blue marble.

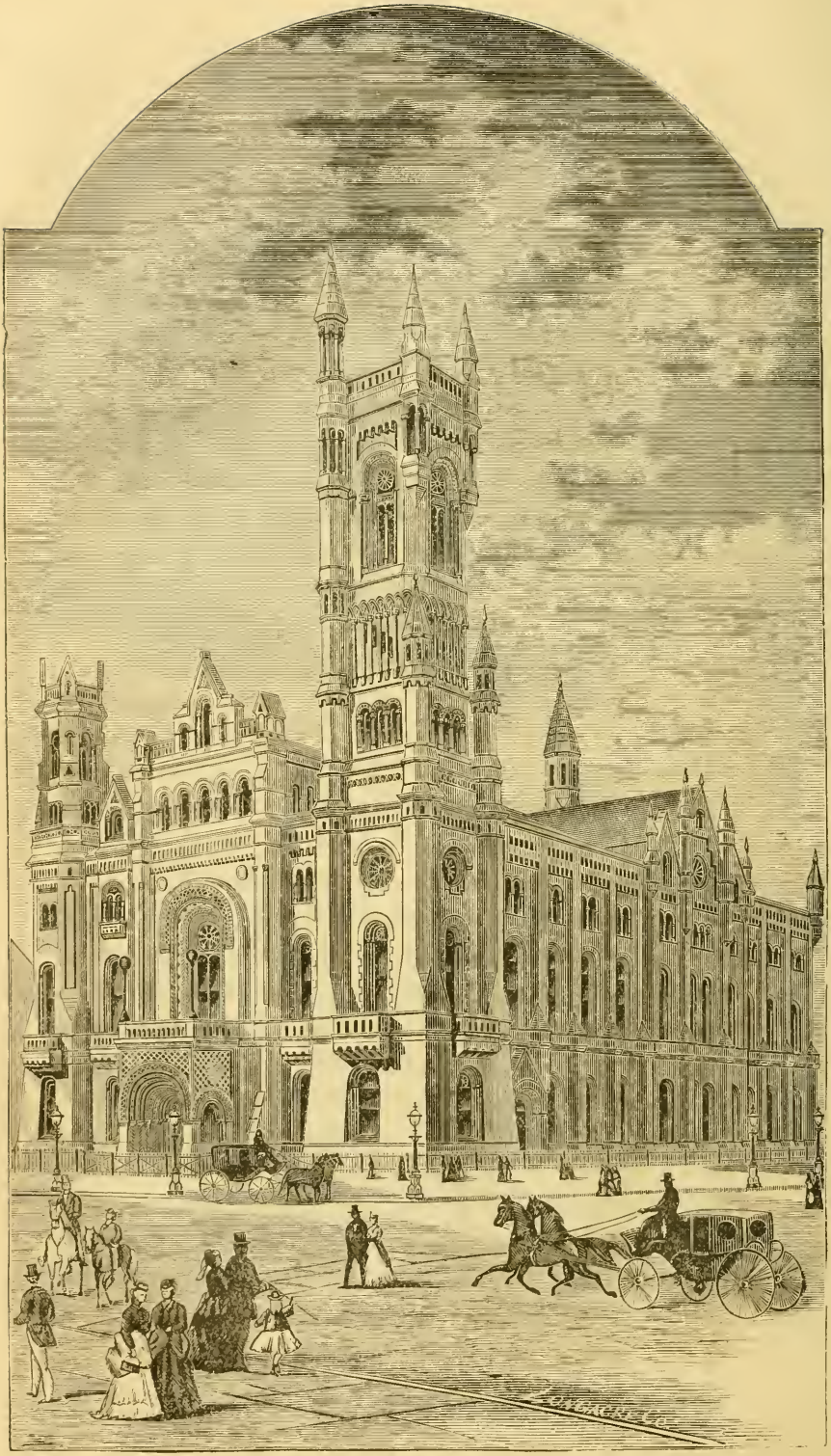
Union League Building

is located on Broad street, and, from its ornate style of architecture, is one of the principal adornments of that noble avenue. It is of brick, in the French Renaissance style, with façades of granite, brick and brown stone.



UNION LEAGUE.

PUBLIC LEDGER BUILDING.



MASONIC TEMPLE, BROAD STREET, PHILADELPHIA.

CHAPTER III.

OPENING CEREMONIES, MAY 10, 1876.

FOUR years after the first organization was effected in preparation for the Centennial Exhibition, and less than two years from the time when the work was commenced upon the buildings on the Lansdowne plateau, converting that beautiful portion of the most beautiful of parks into a magnificent city devoted to art, to industry, and to patriotism, Philadelphia became the focus toward which were directed the thoughts of all the people of this land, if we may not say of all the civilized world. May 10th, 1876, beheld the flower and the first fruition from the seed planted by patriotism, filling the hearts of those who had toiled so long and so earnestly, with pride and exultation. The marvellous Exhibition whose gates were opened on that ever memorable day, more than repaid all the toil and labor, the sacrifice and endurance, that at last brought it to completion, and the ceremonies of its dedication worthily marked the opening day of our great Centennial festival. The bright May sun shone down upon such a pageant as our country has seldom known —upon the Park, in all its fresh spring loveliness; upon the great palaces of art and industry, of bewildering variety and magnitude, and upon a crowd of enthusiastic men and women greater, beyond doubt, than was ever assembled on this continent before. The representative men of the nation were gathered

there, the leaders in every branch of public and of private influence, and the representatives, too, of almost every civilized nation upon earth, all met to do honor to a free nation's birthday festival; and it must have been a dull spirit that was not stirred as the strains of noble music arose upon the summer air, and the floating flag announced the formal opening of the festival.

For months Philadelphia had been anticipating the 10th of May in the Centennial year. The day dawned in an outburst of patriotic ardor. The busy labor of the flag and decoration makers, public and private, saw the light the day previous. The city was literally enveloped in bunting—enwrapped in the flags of all nations. The stars and stripes found the English jack, the French and German tri-colors, the Austrian and Russian eagles, the elephant of Siam, the Chinese dragon, the sun of Japan, and the emblems of all the world aiding it in celebrating the Centenary.

From pole and halyard, in festoons and clusters, they were flung to the Centennial breeze. How many square miles of silk and bunting waved in and over, around and through Philadelphia on that day, it will be difficult to calculate. Everybody gave vent to joy with a flag, and the universality and remarkable character of this patriotic outburst in bunting, silk and decorative art, was one of the most striking features of the day. The preparations for the display began on Tuesday, and, despite the lowering weather, the decorations fulfilled their part thoroughly. No feast or carnival of Europe or the Orient ever showed brighter decorations.

The day opened with clouds and rain. It was a sore disappointment, but could not be helped. "Old Probabilities" had done his best for the previous twenty-

four hours in predicting clear weather, but the elements would not obey. Patriotism, however, after having been wrought up to the pitch displayed in Philadelphia, is not to be dampened by rain. At sunrise the bell on Independence Hall sounded the alarm that the great day had come. The peal continued a half hour, being taken up and spread over the city by all the bells and chimes, waking up the people who had not already begun the flag decorations. This was the formal announcement of the beginning of the Centennial holiday, and, to add to the display, the shipping in the harbor also ran up flags at sunrise. Thus opened the day.

At seven o'clock crowds were gathering at the Exhibition gates impatient to pass, though admittance had been ordered for nine, and in the city, at the local railroad stations, along the Centennial car routes, at the rendezvous of the military and in all the hotels, the bustle of hasty departure was already appreciable. The next hour brought lighter hearts, for the gentle rain growing steadily gentler, finally ceased altogether; the cloud curtain overhead slowly drew aside, and between, in a bright blue sky-way, the tardy sun shone forth dazzlingly. Then the streets everywhere grew suddenly populous, the horse cars jammed and the military jubilant. Shortly after the gates were opened to the public, and for hours the stream of visitors constantly increased. As they passed in, convenient avenues led them into the partially paved thoroughfare between the Main Building and Memorial Hall and up to the scene of the ceremonies. There they awaited good-naturedly the official party and the programme. Meanwhile the guests of the Commission and their escort were assembling in the city, the civic bodies at

Independence Hall, whence they took carriages, at nine o'clock, for the grounds, and the foreign dignitaries at their hotels.

Through the mud and the drizzling rain the various regiments then in the city, composing the National Guard of Pennsylvania, marched early to the place of assembling on South Broad street. Previous to the first trumpet-blare, Governor Hartranft and his brilliantly-accoutred staff appeared at Broad and Walnut streets, and a few minutes after, at about eight o'clock, the signal for the start was given. Out Walnut street proceeded the rows of glistening bayonets; tastefully-decorated residences, flying bunting, and a cheering multitude sending a thrill through the heart of many a patriotic looker-on. The head of the line had scarcely arrived at the residence of George W. Childs, Walnut street, near Twenty-second, when President Grant stepped out upon the door-step, followed by the members of his Cabinet. The loud and prolonged huzzas of the swarming multitude the President greeted with numerous bows. Accompanied by his escort, the First City Troop, seventy-five men, under the charge of Lieutenant Snowden, he then took a position in the line. He was seated, together with Governor Hartranft and Secretary Fish, in a carriage drawn by four gray horses. Secretaries Bristow, Taft, and Robeson, and Postmaster-General Jewell, followed. The Boston Cadets, 125 in number, marched by next in regular columns and with steady tread. Governor Rice, mounted, though in plain attire, and his staff next followed, the Boston Lancers, 150 mounted men, each carrying a red flag attached to a lance, prancing after. Governor Kellogg, of Louisiana, and staff, appeared next. Then marched by the National Guard of Penn-

sylvania, Major-General John P. Bankson commanding, the commands appearing in the following order:

Black Hussars, Captain Kleinz, fifty men; Washington Troop, of Chester county, Captain Matlack, fifty men; Keystone Battery, Captain Poulterer, with fifty men and four pieces and caissons; Second Brigade, General Thayer; Navy Yard Band; United States Marines, 100 men, from League Island station, Captain C. H. Wells commanding; Fifty sailors from the United States steamship Congress; Americus Cornet Band; Third Regiment National Guards, Colonel Ballier, 300 men; Sixth Regiment Band; Sixth Regiment National Guards, Colonel Maxwell, 330 men; McClurg's Liberty Cornet Band; State Fencibles, Captain Ryan, 102 men; Excelsior Band; Gray Invincibles, Captain Jones, escorting the Delaney Guards of West Chester, Captain Hood, and numbering altogether 100 men; Second Regiment National Guards of Pennsylvania, Colonel Peter Lyle, 375 men, and accompanied by their band; Beck's Band of forty pieces; First Regiment National Guards of Pennsylvania, Lieutenant-Colonel J. Ross Clark, 550 men; Easton Grays, Captain Stitzer, forty men, and accompanied by a band; Weccacoe Cornet Band; Weccacoe Legion, Captain Denny, fifty men; Centennial Drum Corps in Continental uniform; Washington Grays, Lieutenant Lazarus, forty men; Cadets Pennsylvania Military Academy, Chester, numbering 100, and commanded by Lieutenant Barrett, Fifth United States Artillery; Eleventh Regiment, Colonel Tencate, 200 men.

After entering the Exposition grounds the larger portion of the troops formed *en masse* between the Main Exhibition Building and Machinery Hall, but several commands were detailed to line and guard the passage-way from the grand stand to the Main Building.

The cavalry was not allowed to enter the grounds, but formed in line on Lansdowne drive and saluted the Presidential party as it entered Memorial Hall. The Keystone Battery was stationed at George's Hill, and assisted in the cannonade with which the inaugural ceremonies were concluded.

The space reserved for holding the formal opening ceremonies was the large area bounded by the Main Building on the south and by Memorial Hall on the north. Memorial Hall stands upon a broad terrace, the front portion of which is paved with flagstones. Along the front of the hall and covering part of this pavement was erected a platform capable of accommodating 4000 people. That portion of the platform in front of the centre of the hall was square in shape, with a semi-circular stand projecting from the front, and placed directly across the avenue leading from the Main Building to Memorial Hall. This stand was erected for the accommodation of the Emperor and the Empress of Brazil and their suite, the President of the United States and Cabinet, and those persons most immediately concerned in the conduct of the ceremonies.

From the ends of the pavilions, on the eastern and western corners of the building, the platform diverged from the east and west line in a southwesterly and southeasterly direction, thus giving it the general appearance of a parallelogram with square projections at the corners. The seats on this platform all looked toward the south, facing the northern side of the Main Building, and with their backs toward Memorial Hall. The front of the central stand was covered with a large United States flag, across which was draped, in honor of the presence of the Emperor of Brazil, the green and yellow folds of the Brazilian standard. At the two corners of the entrance to the stands were displayed the flags of Great Britain and the United States, and to the right and left of the stands, respectively, the standards of France and Germany. In front of the balustrade, extending above the cornice of Memorial

Hall, were placed handsome vases filled with a profusion of rare and beautiful plants. Immediately in front of the central stand were placed seats for the representatives of the press, of whom there were a great number.

Over against the great platform and facing it was erected an inclined platform capable of accommodating one thousand persons. It adjoined the north line of the Main Building, and was occupied by the grand orchestra and chorus. This platform was arranged with tiers of seats, one over another, and was raised sufficiently high from the ground to permit the passage of the procession under it.

At eight o'clock a number of invited guests had arrived, and by nine o'clock there was a very general sprinkling of people over the space between the Main Building and Memorial Hall. At ten o'clock the stands and open space between them were thronged with people, and in a few minutes after ten the assemblage had become so dense that it was practically impossible to make one's way from point to point without the assistance of the police. All the available space on the platform and terrace was soon occupied to its utmost capacity, and people began to climb up to all points in the vicinity from which views of the scene could be obtained. Groups of men and boys were perched upon the bronze statues representing "Pegasus led by the Muses," standing on either side of the approach to Memorial Hall, and every inch of space on the statues and on the backs of the horses was eagerly grasped for. Indeed, so great was the eagerness to obtain a place that two men seated themselves one between the ears of each of the horses. Groups of people were also congregated on the roofs of the Main Building, Memorial

Hall, Photographic Hall, the north annex to the Main Building, Machinery Hall, and every other accessible elevation in the vicinity.

Viewed from the grand stand, the immense assemblage of people, covering acres of ground, had a most impressive appearance.

Among the distinguished persons who now arrived and passed along to the grand stand, and who received the most applause, were Dom Pedro II., Emperor of Brazil, and the Empress. The arrival of the imperial pair was heralded all along the passage-way, the orchestra playing the "Hymno Brazileira Nacional." The Emperor was dressed in a plain suit of black, with a silk hat, and wore no decorations of any kind. The dress of the Empress was a rich lavender silk, *en traine*, with satin bonnet and delicate lace shawl. The royal pair, attended by their suites in full uniform, repeatedly acknowledged their appreciation of the welcome tendered them by bowing to the cheering multitudes, the Emperor occasionally removing his hat; and finally, after ascending the steps to the platform, facing round, and with the utmost grace and modesty saluting the assemblage. With his wife, he was then conducted to a seat in the centre of the platform, immediately to the right of the chair reserved for the President of the United States. Generals Sherman and Sheridan, and Governor Rice, of Massachusetts, were greeted with hearty cheers. By a very thoughtful arrangement, which was carried out with a happy effect, the representatives of this and most of the other nations, directly interested at the Exhibition, were conducted to the platform during the performance of their respective national airs by Theodore Thomas' grand orchestra of 150 musicians.

1. The Washington March.
2. Argentine Republic. Marche de la Republica.
3. Austria. Gott erhalte Franz den Kaiser.
4. Belgium. La Brabanconne.
5. Brazil. Hymno Brasileira Nacional.
6. Denmark. Volkslied den tappre Landsoldat.
7. France. La Marseillaise.
8. Germany. Was ist des Deutschen Vaterland.
9. Great Britain. God save the Queen.
10. Italy. Marcia del Re.
11. Netherlands. Wie neerlandsch bloed.
12. Norway. National Hymn.
13. Russia. National Hymn.
14. Spain. Riego's Spanish National Hymn.
15. Sweden. Volksongen (Bevare Gud var Kung).
16. Switzerland. Heil dir Helvetia.
17. Turkey. March.
18. Hail Columbia.

Upon the conclusion of the national airs the President of the United States, accompanied by Presidents Hawley and Welsh, of the Commission and Board of Finance, and the members of the Cabinet, made his appearance on the rostrum, and met with a hearty greeting. Mrs. Grant, escorted by Colonel Fred. Grant, was also on the stand. Then, upon a signal by General Hawley, the orchestra performed the Centennial Grand March, composed by Richard Wagner, which received at its close an applause that was almost rapturous. All noise now became hushed, and the venerable and eloquent Bishop Simpson arose with uncovered head, his example being followed by all on the platform, the men in the standing multitude also removing their hats, and besought the Divine blessing upon the work in the following prayer:

Almighty and everlasting God, our heavenly Father, Heaven is Thy throne and the earth is Thy footstool. Before Thy majesty

and holiness the angels veil their faces, and the spirits of the just made perfect bow in humble adoration. Thou art the Creator of all things, the Preserver of all that exist, whether they be thrones or dominions or principalities or powers. The minute and the vast, atoms and worlds alike attest the ubiquity of Thy presence and the omnipotence of Thy sway.

Thou alone art the Sovereign Ruler of nations. Thou raiseth up one and casteth down another, and Thou givest the kingdoms of the world to whomsoever Thou wilt. The past with all its records is the unfolding of Thy counsels and the realization of Thy grand designs. We hail Thee as our rightful Ruler; the King eternal, immortal and invisible, the only true God, blessed forever more.

We come on this glad day, O Thou God of our fathers, into these courts with thanksgiving and into these gates with praise. We bless Thee for Thy wonderful goodness in the past, for the land which Thou gavest to our fathers, a land veiled from the ages, from the ancient world, but revealed in the fulness of time to Thy chosen people, whom Thou didst lead by Thine own right hand through the billows of the deep, a land of vast extent, of towering mountains and broad plains, of unnumbered products and of untold treasures.

We thank Thee for the fathers of our country, men of mind and of might, who endured privations and sacrifices, who braved multiplied dangers rather than defile their consciences, or be untrue to their God, men who laid on the broad foundations of truth and justice the grand structure of civil freedom.

We praise Thee for the closing century, for the founders of the Republic, for the immortal Washington and his grand associates; for the wisdom with which they planned, and the firmness and heroism which, under Thy blessing, led them to triumphant success. Thou wast their shield in hours of danger, their pillar of cloud by day and their pillar of fire by night. May we, their sons, walk in their footsteps and imitate their virtues.

We thank Thee for social and national prosperity and progress, for valuable discoveries and multiplied inventions, for labor-saving machinery relieving the toiling masses, for schools free as the morning light for the millions of the rising generation, for books and periodicals scattered, like leaves of autumn, over the land, for art and science, for freedom to worship God according to the dictates of conscience, for a Church unfettered by the trammels of State.

REV. MATTHEW SIMPSON, BISHOP M. E. CHURCH.

DOM PEDRO,
EMPEROR OF BRAZIL.

HON. JOHN WELSH,
PRESIDENT BOARD OF FINANCE.

Bless, we pray Thee, the President of the United States and his constitutional advisers, the Judges of the Supreme Court, the Senators and Representatives in Congress, the Governors of our several Commonwealths, the officers of the army and navy, and all who are in official position throughout our land. Guide them, we pray Thee, with counsels of wisdom, and may they ever rule in righteousness. We ask Thy blessing to rest upon the President and members of the Centennial Commission and upon those associated with them in the various departments, who have labored long and earnestly, amidst anxieties and difficulties, for the success of this enterprise.

May Thy special blessing, O Thou God of all the nations of the earth, rest upon our national guests, our visitors from distant lands. We welcome them to our shores, and we rejoice in their presence among us, whether they represent thrones or culture or research, or whether they come to exhibit the triumphs of genius and art in the development of industry and in the progress of civilization. Preserve Thou them, we beseech Thee, in health and safety, and in due time may they be welcomed by loved ones again to their own, their native lands.

Let Thy blessing rest richly upon this Centennial Celebration. May the lives and health of all interested be precious in Thy sight. Preside in its assemblies. Grant that this association in effort may bind more closely together every part of our great Republic, so that our Union may be perpetual and indissoluble. Let its influence draw the nations of earth into a happier unity. Hereafter, we pray Thee, may all disputed questions be settled by arbitration, and not by the sword, and may wars forever cease among the sons of men.

May the new century be better than the past. More radiant with the light of true philosophy, warmer with the emanations of a world-wide sympathy. May capital, genius and labor be freed from all antagonism by the establishment and application of such principles of justice and equity as shall reconcile diversified interests and bind in imperishable bands all parts of society.

We pray Thy benediction especially on the women of America, who for the first time in the history of our race take so conspicuous a place in a national celebration. May the light of their intelligence, purity and enterprise shed its beams afar, until in distant lands their sisters may realize the beauty and glory of Christian freedom and elevation. We beseech Thee, Almighty Father, that

our beloved Republic may be strengthened in every element of true greatness until her mission is accomplished by presenting to the world an illustration of the happiness of a free people, with a free church, in a free State, under laws of their own enactment, and under rulers of their own selection, acknowledging Supreme allegiance only to the King of kings and Lord of lords. And as Thou didst give to one of its illustrious sons first to draw experimentally the electric spark from heaven, which has since girdled the globe in its celestial whispers of "Glory to God in the highest, peace on earth and good will to men," so to latest time may the mission of America, under Divine inspiration, be one of affection, brotherhood and love for all our race. And may the coming centuries be filled with the glory of our Christian civilization.

And unto Thee, our Father, through Him whose life is the light of men, will we ascribe glory and praise, now and forever. Amen.

The grand chorus then sang the Centennial hymn, written by John G. Whittier, and set to music by John K. Paine, of Massachusetts.

Centennial Hymn.

Our fathers' God! from out whose hand
The centuries fall like grains of sand,
We meet to-day, united, free,
And loyal to our land and Thee,
To thank Thee for the era done,
And trust Thee for the opening one.

Here, where of old, by Thy design,
The fathers spake that word of Thine
Whose echo is the glad refrain
Of rended bolt and falling chain,
To grace our festal time from all
The zones of earth our guests we call.

Be with us while the New World greets
The Old World thronging all its streets,
Unveiling all the triumphs won
By art or toil beneath the sun;
And unto common good ordain
This rivalship of hand and brain.

Oh! make Thou us, through centuries long,
In peace secure, in justice strong;
Around our gift of freedom draw
The safeguards of Thy righteous law,
And, cast in some diviner mold,
Let the new cycle shame the old!

At the close of the hymn, of which only the first three and last verses were sung, the formal transfer of the Centennial buildings to President Hawley, who received them on behalf of the commission, was made by Mr. John Welsh, President of the Board of Finance, in the following speech:

Mr. President and Gentlemen of the United States Centennial Commission: In the presence of the government of the United States, and of the several distinguished bodies by whom we are surrounded, and in behalf of the Centennial Board of Finance, I greet you.

In readiness at the appointed time, I have the honor to announce to you that, under your supervision and in accordance with the plans fixed and established by you, we have erected the buildings belonging to us, and have made all the arrangements devolving on us necessary for the opening of the "International Exhibition." We hereby now formally appropriate them for their intended occupation; and we hold ourselves ready to make all further arrangements that may be needed for carrying into full and complete effect all the requirements of the acts of Congress relating to the Exhibition.

For a like purpose we also appropriate the buildings belonging to the State of Pennsylvania and the city of Philadelphia, erected by us at their bidding, to wit: Memorial Hall, Machinery Hall and Horticultural Hall. These and other substantial offerings stand as the evidence of their patriotic co-operation. To the United States of America, through Congress, we are indebted for the aid which crowned our success.

In addition to those to which I have just referred, there are other beautiful and convenient edifices, which have been erected by the representatives of foreign nations, by State authority, and by

individuals, which are also devoted to the purposes of the Exhibition.

Ladies and Gentlemen: If in the past we have met with disappointments, difficulties and trials, they have been overcome by a consciousness that no sacrifice can be too great which is made to honor the memories of those who brought our nation into being. The commemoration of the events of 1776 excites our present gratitude. The assemblage here to-day of so many foreign representatives uniting with us in this reverential tribute is our reward.

We congratulate you on the occurrence of this day. Many of the nations have gathered here in peaceful competition. Each may profit by the association. This Exhibition is but a school; the more thoroughly its lessons are learned, the greater will be the gain, and, when it shall have closed, if by that study the nations engaged in it shall have learned respect for each other, then it may be hoped that veneration for Him who rules on high will become universal, and the angels' song once more be heard:

"Glory to God in the highest,
And on earth peace, good will towards men."

Before beginning and again upon closing his address, Mr. Welsh was favored with prolonged cheering. President Hawley said:

Mr. President, of the Centennial Board of Finance: The Centennial Commission accepts the trust with grateful and fraternal acknowledgment of the great services of the Board of Finance.

Mr. Dudley Buck, of Connecticut, then ascended the musical platform, the members of the chorus rose to their feet, and the Centennial Cantata, written by Sidney Lanier and set to music by Mr. Buck, was rendered.

Then followed the presentation of the Exhibition by Joseph R. Hawley, President of the Commission, to the President of the United States. His appearance was the signal for three thundering cheers and a tiger, which was appropriately acknowledged by the General,

who proceeded with the following address—the only one loud enough to be heard with satisfaction:

MR. PRESIDENT: Five years ago the President of the United States declared it fitting that "the completion of the first century of our national existence should be commemorated by an exhibition of the natural resources of the country and their development, and of its progress in those arts which benefit mankind," and ordered that an exhibition of American and foreign arts, products and manufactures should be held, under the auspices of the Government of the United States, in the city of Philadelphia, in the year eighteen hundred and seventy-six. To put into effect the several laws relating to the Exhibition, the United States Centennial Commission was constituted, composed of two commissioners from each State and Territory, nominated by their respective governors and appointed by the President. The Congress also created our auxiliary and associate corporation, the Centennial Board of Finance, whose unexpectedly heavy burdens have been nobly borne. A remarkable and prolonged disturbance of the finances and industries of the country has greatly magnified the task, but we hope for a favorable judgment of the degree of success attained. July 4th, 1873, this ground was dedicated to its present uses. Twenty-one months ago this Memorial Hall was begun. All the other one hundred and eighty buildings within the enclosure have been erected within twelve months. All the buildings embraced in the plans of the commission itself are finished. The demands of applicants exceeded the space, and strenuous and continuous efforts have been made to get every exhibit ready in time.

By general consent the Exhibition is appropriately held in the City of Brotherly Love. Yonder, almost within your view, stands the venerated edifice wherein occurred the event this work is designed to commemorate and the hall in which the first Continental Congress assembled. Within the present limits of this great park were the homes of eminent patriots of that era, where Washington and his associates received generous hospitality and able counsel. You have observed the surpassing beauty of the situation placed at our disposal. In harmony with all this fitness is the liberal support given the enterprise by the State, the city and the people individually.

In the name of the United States you extended a respectful and

cordial invitation to the governments of other nations to be represented and to participate in this Exhibition. You know the very acceptable terms in which they responded, from even the most distant regions. Their commissioners are here, and you will soon see with what energy and brilliancy they have entered upon this friendly competition in the arts of peace.

It has been the fervent hope of the commission that, during this festival year, the people from all States and sections, of all creeds and churches, all parties and classes, burying all resentments, would come up together to this birthplace of our liberties to study the evidence of our resources, to measure the progress of an hundred years, and to examine to our profit the wonderful products of other lands; but especially to join hands in perfect fraternity and promise the God of our fathers that the new century shall surpass the old in the true glories of civilization. And furthermore, that from the association here of welcome visitors from all nations there may result not alone great benefits to invention, manufactures, agriculture, trade and commerce, but also stronger international friendships and more lasting peace.

Thus reporting to you, Mr. President, under the laws of the government and the usage of similar occasions, in the name of the United States Centennial Commission, I present to your view the International Exhibition of 1876.

The President's Address.

An opportunity such as that afforded on this occasion for American citizens to behold the men to whose intellectual force, business tact and indomitable energy, is owing the consummation of that grand triumph which they were then congregated to celebrate, had never presented itself before, and, as a natural consequence, a grateful people could not let this one slip without giving vent to the feelings of their hearts. General Hawley retired to his seat amid deafening cheers and clapping of hands. Then came the event that all so curiously and impatiently awaited, the speech of the President of the United States. As soon

as he arose the members of the Cabinet and others followed his example, and their cheers were taken up by the multitude, whose applause, this time to the Chief Magistrate, was almost as great as that received by Presidents Welsh and Hawley. Taking some manuscript from his coat-tail pocket, the President of the United States, with modest demeanor, and still more modest tone of voice, proceeded to read his speech:

MY COUNTRYMEN: It has been thought appropriate, upon this Centennial occasion, to bring together in Philadelphia, for popular inspection, specimens of our attainments in the industrial and fine arts, and in literature, science and philosophy, as well as in the great business of agriculture and of commerce.

That we may the more thoroughly appreciate the excellencies and deficiencies of our achievements, and also give emphatic expression to our earnest desire to cultivate the friendship of our fellow-members of this great family of nations, the enlightened agricultural, commercial and manufacturing people of the world have been invited to send hither corresponding specimens of their skill to exhibit on equal terms in friendly competition with our own. To this invitation they have generously responded; for so doing we render them our hearty thanks.

The beauty and utility of the contributions will this day be submitted to your inspection by the managers of this Exhibition. We are glad to know that a view of specimens of the skill of all nations will afford to you unalloyed pleasure, as well as yield to you a valuable practical knowledge of so many of the remarkable results of the wonderful skill existing in enlightened communities.

One hundred years ago our country was new and but partially settled. Our necessities have compelled us to chiefly expend our means and time in felling forests, subduing prairies, building dwellings, factories, ships, docks, warehouses, roads, canals, machinery, etc., etc. Most of our schools, churches, libraries and asylums have been established within an hundred years. Burthened by these great primal works of necessity, which could not be delayed, we yet have done what this Exhibition will show in the direction of rivalling older and more advanced nations in law,

medicine and theology, in science, literature, philosophy and the fine arts. Whilst proud of what we have done, we regret that we have not done more. Our achievements have been great enough, however, to make it easy for our people to acknowledge superior merit wherever found.

And now, fellow-citizens, I hope a careful examination of what is about to be exhibited to you will not only inspire you with a profound respect for the skill and taste of our friends from other nations, but also satisfy you with the attainments made by our own people during the past one hundred years. I invoke your generous co-operation with the worthy commissioners to secure a brilliant success to this International Exhibition, and to make the stay of our foreign visitors—to whom we extend a hearty welcome—both profitable and pleasant to them.

I declare the International Exhibition now open.

At the conclusion of the President's remarks, which was at exactly 12 o'clock, at a given signal the American flag was run up on the staff at the highest peak of the Main Exhibition Building.

At the conclusion of this ceremony, which was accompanied by a salute of artillery of 100 guns on George's Hill, the assemblage commenced to disperse, some towards one building, and some to another, according as they wished to obtain a more favorable position to see the dignitaries on some portion of the route travelled by the procession, or, despairing of that, to witness the displays in the various buildings. It took a long time, nearly an hour, before the large platform in front of Memorial Hall was emptied, and the space between it and the Main Building was sufficiently cleared to obtain an unobstructed passage.

The ceremonies being concluded amid the plaudits of the multitude, the line of march was taken up for the Main Exposition Building. Chief Marshal Dixey called off the order of the procession as follows:

President Grant, the Empress of Brazil and Mr. Alfred T. Goshorn, Director General.

The Emperor of Brazil and Mrs. President Grant.

The Brazilian Minister, Senor Borges, and wife.

Colonel Fred. D. Grant and Mrs. Waite.

Chief Justice Morrison R. Waite.

Hon. T. W. Ferry, The President of the Senate.

Joseph R. Hawley, President of the United States Centennial Commission.

John Welsh, President of the Centennial Board of Finance.

Daniel J. Morrell, Chairman of the Executive Committee of the Commission.

John L. Campbell, Secretary of the Commission.

Frederick Fraley, Secretary of the Board of Finance.

The Cabinet.

The Supreme Court of the United States.

The Diplomatic Corps.

The Foreign Commissioners of the Exhibition.

The United States Centennial Commission.

Chiefs of Bureaus of Administration.

The Centennial Board of Finance.

Henry Pettit and Joseph M. Wilson, Engineers and Architects of Main Building and Machinery Hall.

H. J. Schwarzmann, Architect of Memorial Hall and Horticultural Hall.

James H. Windrim, Architect of Agricultural Hall and the United States Government Building.

Richard J. Dobbins, Contractor Main Building and Memorial Hall.

Philip Quigley, Contractor Machinery Hall and Agricultural Hall.

Aaron Doane, Contractor Government Building.

The Board of the United States Executive Department.

The Women's Centennial Executive Committee.

The Fairmount Park Commission.

The Governors of the States and Territories.

The Senate of the United States.

The House of Representatives.

The General of the Army and Staff.

The Admiral of the Navy and Staff.

The Lieutenant-General of the Army and Staff.

The Vice-Admiral of the Navy and Staff.
The General Officers of the Army and Staffs.
The Rear-Admirals and Commodores of the Navy and Staffs.
Officers of the Army and Navy.
Military and Naval Officers of Foreign Governments.
Consuls-General and Consuls of Foreign Governments.
Judges of the United States Courts, and Officers of the United States Executive Bureaus.
Officers of the United States Coast Survey.
Officers of the Naval Observatory.
Officers of the Smithsonian Institution.
The Board of Judges of Awards of the Exhibition.
The Supreme Court of Pennsylvania.
The Legislature of Pennsylvania.
The Judiciary of Pennsylvania.
The Board of State Supervisors of Pennsylvania.
The State Board of Pennsylvania.
The Mayor of Philadelphia.
The Mayors of Cities.
The Select and Common Councils of Philadelphia.
The State Centennial Boards.
The Women's Centennial Committees.
The Advisory and Co-operating Committees and Boards of the Commission.
International Regatta Committees, and Committee of the National Rifle Association.
Officers of the City Department of Philadelphia.

The Presidential party was flanked on both sides by a platoon of City Troopers, who also did duty along the line of the procession. The cortege entered the Main Exposition Building at the north entrance—the President and Governor Hartranft receiving the enthusiastic applause of the multitude as they passed through the open space between the platform and the entrance door. Passing along the centre transept of the building, the party soon reached the nave, stopping as they did so, at the head-quarters of the French Commission, where the Delegate and Resident Commissioner were

presented by Director-General Goshorn to President Grant.

Following the northern and easterly direction the departments of Switzerland and Belgium were next reached, and the same ceremonies were gone through with.

The beautiful building erected for the Brazilian exhibit was next arrived at, and here the party stopped for a few minutes. The Emperor, Dom Pedro, and his Empress were saluted by the Commissioners in charge, who came forward and kissed the hands of both imperial personages.

At the Department of the Netherlands, to the east of that of Brazil, the usual introductions were gone through with, the soldiers drawn up in line in front of it, saluting the President as he passed.

The Department of Mexico was next passed, and its Commissioners presented to the President.

At this point the procession left the nave and, taking the next easternmost cross avenue, went on to the south avenue. Here it passed through the greater portion of the United States exhibit. Arriving at the centre transept it passed along it to the nave, leaving to the left the German head-quarters, where the officers of the commission who were in waiting were presented to the President. Next the Austrian Department was inspected, and then the procession made a detour to the north, taking in the exhibits of the English colonies, Canada, India, Australia, New South Wales, Victoria and New Zealand, commissioners from each of which were in front of their respective departments as the party passed by.

Returning to the nave, the English Department was reached, and here the President passed some minutes

in conversation with Colonel Sanford and Professor Archer, the English Commissioners. Norway and Sweden were the next departments passed on the right hand side of the line, whilst to the left the departments of Austria and Russia were brought to the President's notice. In front of the Department of Spain, on the same side of the nave, the entire Spanish Commission stood in a body, with the Spanish Engineers drawn up in line behind them. There a short stop was made, the President engaging in conversation with several of the Commissioners. Denmark was next passed, and then the procession came to a halt in front of the Departments of Turkey and Egypt.

Here another detour was made, and the departments of the Sandwich Islands, Portugal and Tunis, situated in the extreme southwestern end of the building, were visited, and their Commissioners presented to the President. Retracing its steps to the nave, the procession passed the Departments of Japan, China, Peru, Chili, and the Argentine Republic, on the left hand, and the Italian exhibit on the right hand, leaving the building by the western main entrance. As one by one the several foreign departments were passed, and the Commissions in charge presented to the President, these latter fell into line in the rear of the Diplomatic Corps, their handsome court costumes or picturesque national attire giving additional brilliancy to the suite following in the wake of the President.

Crossing Belmont avenue, through the military drawn up on both sides with presented arms, the procession entered Machinery Hall, where all was stillness prior to their coming, and surrounded the great Corliss engine. The President of the United States, the Emperor of Brazil and George H. Corliss then ascended

the platform of the mammoth motor. The President having taken hold of the valve-lever of one engine and the Emperor of that of the other, both gave the turn simultaneously; steam was on; the great walking-beams began to ascend and descend; the engine was in motion; eight miles of shafting and hundreds of machines of all descriptions were in operation, and the International Exhibition of 1876 was at that instant thrown open to the world.

After leaving the great engine the procession moved straight down the main avenue in a westerly direction, passing on its way the several foreign departments. Meanwhile all the machinery in the vast building had begun running, and the din and clatter of the hundreds of machines, united with the music of the bands without and the ringing of the chimes within, made it a confusion of sounds long to be remembered. When the western end of the building was reached, the procession passed out, and the President with his party got into carriages and were driven off to the city.

The procession then broke up, the Emperor and Empress of Brazil and suite going up toward the lake and visiting the buildings in that vicinity, and the rest of the distinguished guests and visitors going their several ways.

After the conclusion of the grand ceremonies attending the opening of the Exhibition, the Women's Pavilion was opened with very simple ceremonies. The time was made to accommodate the Empress of Brazil, who was to take an important part in the opening.

With the exception of a few members of the Women's Centennial Committee, and employés, no persons were allowed in the building until after the

arrival of Mrs. Gillespie, President of the Committee, with the Empress. Long before this time a large concourse of people, largely composed of ladies, surrounded the building, vainly trying to obtain entrance.

In the building, besides the manufactured articles on exhibition, there were looms of various kinds for weaving silk and wool, and skilled women were in attendance to use them. They were run by a six-horse power Baxter engine, which was to be set in motion by the Empress.

On the arrival of Mrs. Gillespie and the distinguished lady at the southern entrance, the two walked through the building, followed by the other ladies of the Empress' suite and members of the Women's Committee. Mrs. Gillespie conversed in French with the ladies, explaining the objects of interest as they passed. On reaching the rear of the building the Empress pulled a golden cord, connecting with the engine, and the machinery at once commenced to move and the looms to clatter. The party returned to the entrance, and there met Emperor Dom Pedro II., who had been on a tour of observation over the grounds. He then inspected the place, and the ceremony was over.

HEMLOCK GLEN.

FAIRMOUNT PARK.

WISSAHICKON NEAR CHESTNUT HILL.

VIEW OF PHILADELPHIA FROM FAIRMOUNT PARK.

CHAPTER IV.

DESCRIPTION OF FAIRMOUNT PARK—PRINCIPAL BUILDINGS OF EXHIBITION.

FAIRMOUNT PARK, at Philadelphia, is the most extensive, and in natural advantages the most attractive, among the pleasure-grounds of Europe and America.

It borders and includes the Schuylkill river for a distance of over seven miles, and the Wissahickon, a tributary stream, for a distance of over six miles. It begins at Fairmount, a point on the Schuylkill distant about one and a half mile from the Centre Square of the city, and terminates at Chestnut Hill, on the Wissahickon, a distance of nearly fourteen miles.

Of the two principal sections of this park, the one bordering the Schuylkill contains 2,240 acres. The one bordering the Wissahickon contains 450 acres. The entire park comprises nearly 3,000 acres.

Fairmount takes its name from this part of the public grounds, where the water-works and the oldest of the present reservoirs are situated. This was the original Fairmount, and embraced but a few acres between the present Spring Garden street bridge and the water-works.

Fairmount Water-Works and the surrounding landscape have been famous for their beauty for several generations, and objects of attraction to visitors from all parts of the country. From the Fairmount basin a

fine view of the Schuylkill river and the park grounds may be obtained. On the river above the dam are the steamboat landings, on a plateau near which is

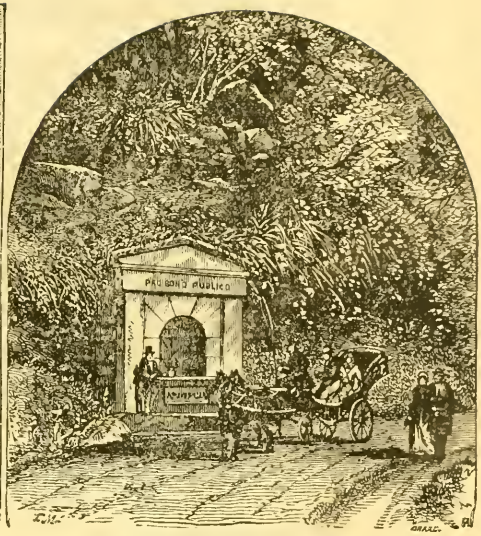
The Lincoln Monument.

This fine bronze was modelled by Randolph Rogers, in Rome, and cast at Munich. Its entire cost was $33,000, and the ceremonies of the unveiling, in the presence of 70,000 persons, took place on September 22d, 1870, the anniversary of the Proclamation of Emancipation. The martyred President is represented sitting in a cushioned chair holding in his right hand a quill pen and in his left a scroll—the immortal proclamation. The face is an excellent likeness and the posture is easy and natural. The figure is colossal in size, measuring nine feet and six inches in height, and if represented standing, in the same proportion, would be eleven feet high. It is raised upon a granite base, upon the sides of which appear these inscriptions: "To Abraham Lincoln, from a grateful people," on the south face; on the east, "Let us here highly resolve that the government of the people by the people and for the people shall not perish from the face of the earth;" on the north, "I do order and declare that all persons held as slaves within the States in rebellion, are and henceforth shall be, free;" and on the west face, "With malice towards none, with charity towards all, with firmness in the right as God gives us to see the right, let us finish the work we are in."

Lemon Hill

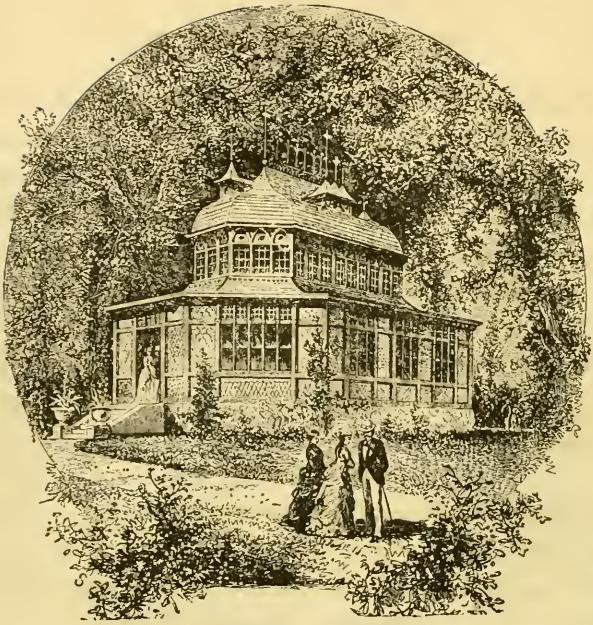
Is the hill north of Fairmount, and within easy walking distance. At the base of the hill are handsome flower-beds; on the river bank are the beautiful stone boat-

WISSAHICKON DRIVE.



FOUNTAIN IN THE PARK.

CHESTNUT STREET BRIDGE.



MONKEY HOUSE
ZOOLOGICAL GARDEN

BEAR PITS, ZOOLOGICAL GARDEN.

houses belonging to the clubs composing the "Schuylkill Navy," and the level ground back of the Mansion House is one of the great playgrounds of the park. The "Mansion," now used for refreshment purposes, is on the site of the country-seat occupied by Robert Morris during the Revolution. North of the Mansion House are many objects of interest, including the log cabin which was the head-quarters of General Grant at City Point, Virginia, during the long siege of Petersburg.

The East Park

Is the common name of the grounds on the east bank of the Schuylkill above Girard avenue. The Schuylkill Water-Works are located a few paces north of Girard avenue. The great storage reservoir, a fine play and parade ground, Rockland, the place to which the children are taken on free excursions, and many fine old mansions, one of which once belonged to and was occupied by Benedict Arnold, the traitor, are in the East Park.

The West Park

Includes the Zoological Garden, Lansdowne, George's Hill, Belmont, and Chamouni, extending from the dam at Fairmount to the Falls of Schuylkill. It is finely wooded, and contains many beautiful ravines, through which rivulets of water run down to the Schuylkill. The Centennial Buildings are located on Lansdowne Terrace; and on the river bank, above Belmont, is a small cottage which tradition says was once occupied by Thomas Moore, the poet.

The Zoological Gardens.

These celebrated gardens are situated in a part of the park property formerly known as "Solitude," on the

Schuylkill river. The grounds are well shaded by trees of a century's growth. The places of interest are the Carnivora-House, the Monkey-House, the Aviary, the Fox Pens, the Wolf-Pens, the Raccoon-House, the Prairie Dog Village, the Elephant and Rhinoceros Houses, the Rabbit-House, the Eagle-Aviary, the Deer Enclosure, the Bison-Sheds and the Bear-Pits. The collection of birds and animals is the finest in this country.

The portion of the park on which the Centennial Exhibition was held contained 450 acres; it extended from this point to George's Hill and Ridgeland, embracing two tracts, Lansdowne and Belmont; the first, Lansdowne, is bounded by the river, Elm avenue—the park's southern boundary—George's Hill, and the Belmont tract. It is a plateau known as the Lansdowne Plateau, and a second plateau lying north and westward—Lansdowne Terrace, separated by a ravine from the other.

These grounds were formally transferred by the Park Commissioners to the Commissioners of the International Exhibition on the 4th day of July, 1873; and the Proclamation of the Exhibition made by order of the President of the United States.

The grounds on which the Exhibition was held were enclosed within a close board fence nine feet high and 16,000 feet, or near three miles, in circuit, within which was an area of 236 acres. The walks and drives through these grounds had a total length of seven miles, while five and a half miles of narrow-gauge railway, operated by steam, surrounded and intersected them, affording rapid and cheap facilities of communication between the principal buildings and points of attraction.

MAIN EXHIBITION BUILDING.

ART GALLERY.

We will now proceed to give a description of the principal buildings which were erected for the Centennial Exhibition. It will necessarily be but a very brief one, however, as they have been described so often, and seen by so many hundreds of thousands of our readers, that any detailed account would only be tedious.

The Main Building.

This stupendous structure was located along the southern border of the Exhibition grounds, extending east and west 1880 feet in length, and north and south 464 feet in width. The height in the interior, from the floor to the louvre, was seventy feet. The building was of wood, iron and glass. In the centre of each side was a grand entrance, on each of the four corners a tower seventy-five feet high, and in order to obtain a central feature for the building as a whole, the roof over the central part, for 184 feet square, was raised above the surrounding portion, and four towers, forty-eight feet square, rising to 120 feet in height, were introduced at the corners of the elevated roof. From these towers, and from promenades which connected them near their summits, a magnificent view of the city and country was afforded. The building cost $1,600,000, and had a floor space of 21.47 acres.

Machinery Hall.

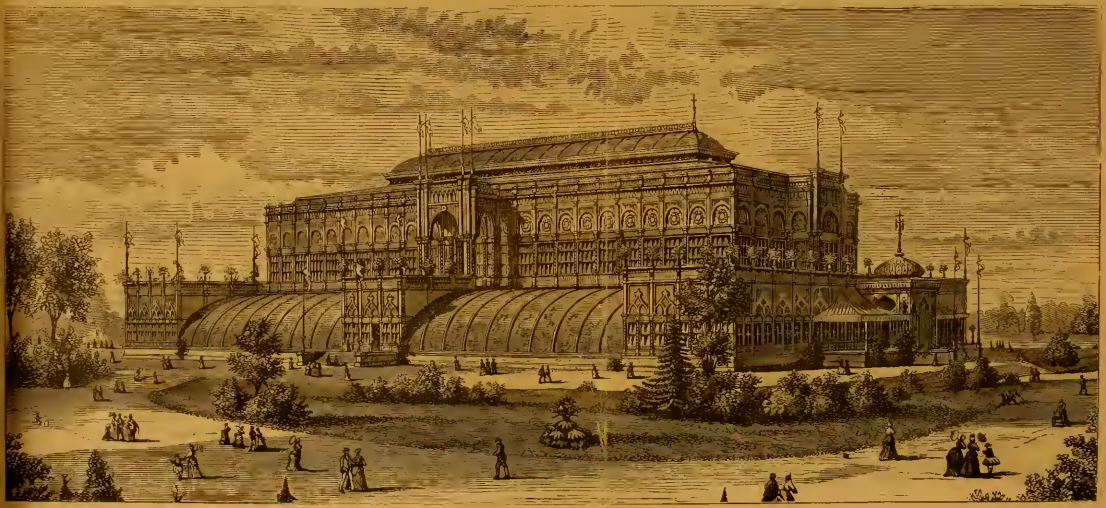
This structure, the next in size to the Main Building, consisted of a main hall, 1402 feet long and 360 feet wide, with a wing on the southern side 208 by 210 feet. It was composed of a superstructure of wood and glass upon a foundation of massive masonry. The entire floor space was about fourteen acres. It was located 550 feet west of the Main Building, and the

distance from the eastern end of the latter structure to the western end of Machinery Hall was nearly three-fourths of a mile. There were a number of annexes to the building, the most important of which was a structure about two hundred by ninety feet in size, in which the best kinds of saw-mill machinery were exhibited in practical operation. Machinery Hall cost $792,000, and its exhibits embraced mining, chemistry, working of metal, wood and stone, spinning, weaving and sewing, printing and making books and paper, power generators, hydraulic and pneumatic apparatus, railway, plant and rolling stock, aerial, pneumatic and water transportation, etc., all of which will be found fully described hereafter.

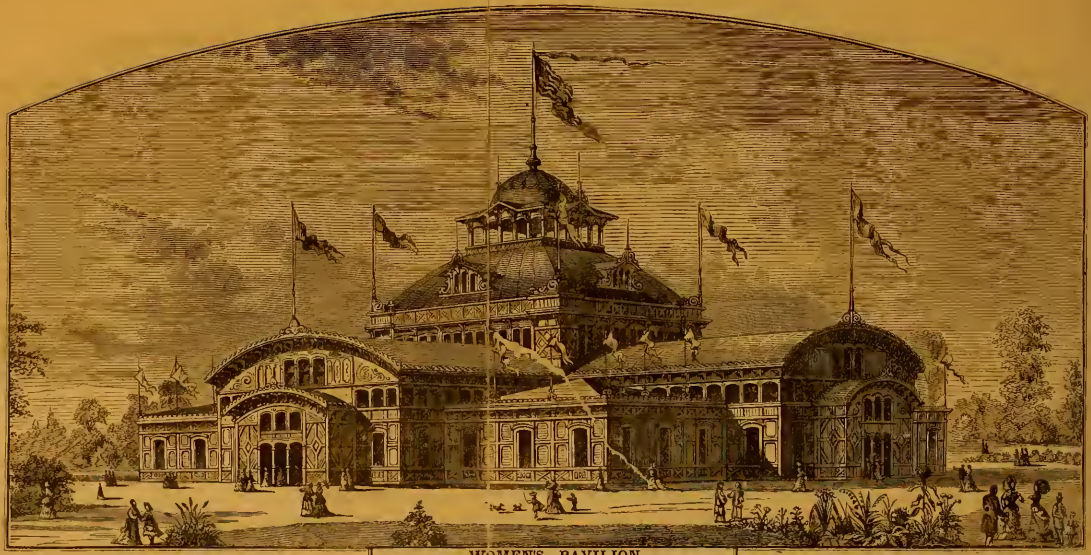
Agricultural Hall.

This building was located on a commanding elevation near the northern extremity of the triangular plot forming the Exhibition grounds. It presented a novel combination of materials, mainly wood and glass, and consisted of a long nave, crossed by three transepts, each composed of truss arches of the Gothic form. The ground-plan was a parallelogram, 540 feet by 820 feet, covering about ten and a quarter acres. Steam-power was supplied for the use of agricultural machinery, and there were a number of very extensive annexes for the display of pomological exhibits, wagons and carriages, and machinery for which there was no room in the main structure. In connection with the agricultural department were extensive stock-yards at the crossing of Belmont avenue over the Pennsylvania Railroad, for the exhibition of horses, cattle, swine, sheep, poultry, etc., of which descriptions are given in a separate chapter. Agricultural Hall cost $300,000. Its exhibits

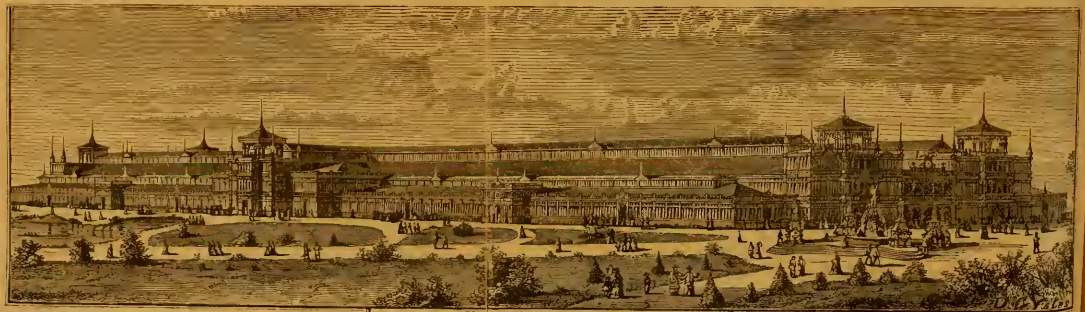
AGRICULTURAL HALL.



HORTICULTURAL HALL.



WOMEN'S PAVILION.



MACHINERY HALL

were classified into agricultural and forest products, pomology, land and marine animals, fish culture and apparatus, animal and vegetable products, textile substances of vegetable or animal origin, machines, implements and processes of manufacture, agricultural engineering and administration, and tillage and general management.

Horticultural Hall.

This was an extremely ornate and commodious structure, located on a terrace bordering the Schuylkill river. It was erected by the city of Philadelphia, at an expense of $251,937, and like Memorial Hall, now that the Centennial is over, remains in permanence as an ornament of Fairmount Park. The building was of the Moorish style, 383 feet long, 193 feet wide and seventy-two feet high. Its chief materials, externally, were iron and glass, supported by fine marble and brick work. Surrounding the edifice were parterres of flowers and plants, artistically arranged, with fountains playing amidst them, reviving with their moisture the luxuriant growth. Promenades extended in all directions through these beds of verdure and perfume. The exhibits within and without the building embraced ornamental trees, shrubs and flowers, hot-houses, conservatories, graperies, and their management; garden-tools and accessories of gardening, and garden designing, construction and management. The interior of this hall possessed an Arabian Nights' sort of gorgeousness. On the eastern and western extremities were vestibules, restaurants, reception rooms, etc. An ornamental stairway at the western end led up to the gallery, which ran all around the building at the height of twenty feet from the floor, from which was had a view as entrancing as a poet's dream.

Perhaps the gem of the whole of the big buildings, as far as decoration is concerned, was the Horticultural Hall. The appearance of the exterior is very attractive, but the interior is a marvellously beautiful triumph of decorative art. The color charms without dazzling the eye, and when the building was filled with shrubs and flowers, a perfectly enchanting *coup d'œil* greeted the visitor. It is admirably arranged in every way for the purpose for which it is destined. Even the cultivated taste of skilled Paris artisans who visited the Exhibition was impressed with the beauty of the scene around Horticultural Hall—first, by the beautiful design of the building itself, and next with the exquisite arrangement and utilization of the landscape around it.

Memorial Hall and Annexes.

The most imposing and substantial of all the Exhibition structures was Memorial Hall, built at a cost of $1,500,000 by the State of Pennsylvania and the city of Philadelphia. It was placed at the disposal of the Commission, to be used during the Exhibition for the display of sculpture, paintings in oil and water colors, engraving and lithography, photography, industrial and architectural designs, models and decorations, ceramic and vitreous works, and mosaic and inlaid executions. Now that it has so nobly served its purpose, and that the Grand World's Fair is over, it is designed to make it the receptacle of an industrial and art collection similar to the famous South Kensington Museum at London. The design of the building is modern Renaissance. It stands on a terrace 122 feet above the level of the Schuylkill, is on a line parallel with and 200 feet north of the Main Building. It is built of granite, is 365 feet long and 210 feet wide, and has a

dome of glass and iron, the summit of which is 150 feet above the ground. It covers one and a half acres of ground. Immediately in the rear of the building was the Art Annex, a temporary but fire-proof building, affording as much exhibiting space as Memorial Hall itself. The entrance to Memorial Hall is through an ornate vestibule into the central rotunda, both of which were devoted to the display of statuary. At each side are two large galleries and several smaller ones, the main galleries of which were occupied by the United States and Great Britain on one side and France and Germany on the other.

The buildings thus briefly sketched embraced an exhibition space of forty-eight and a half acres, while other public and private edifices, erected directly for the purposes of the Exhibition, increased this space to seventy-five acres. This exceeded the area of the London Exhibition of 1862, fifty-one acres; of the Paris Exhibition of 1867, thirty-four and a half acres; and of the Vienna Exhibition of 1873, twenty-five acres.

Grand and imposing as these five Main Exhibition buildings were (and the general verdict of all who saw them is that they were faultless in design and perfect in construction), they were yet but centres in which the principal features of the Exhibition, classified under the five distinctive headings of Manufactures, Machinery, Fine Arts, Horticulture and Agriculture, were grouped. Five other edifices were erected which were properly classified as public to distinguish them from the numerous buildings constructed by nations, States and individuals for special uses and special exhibits. Of these the

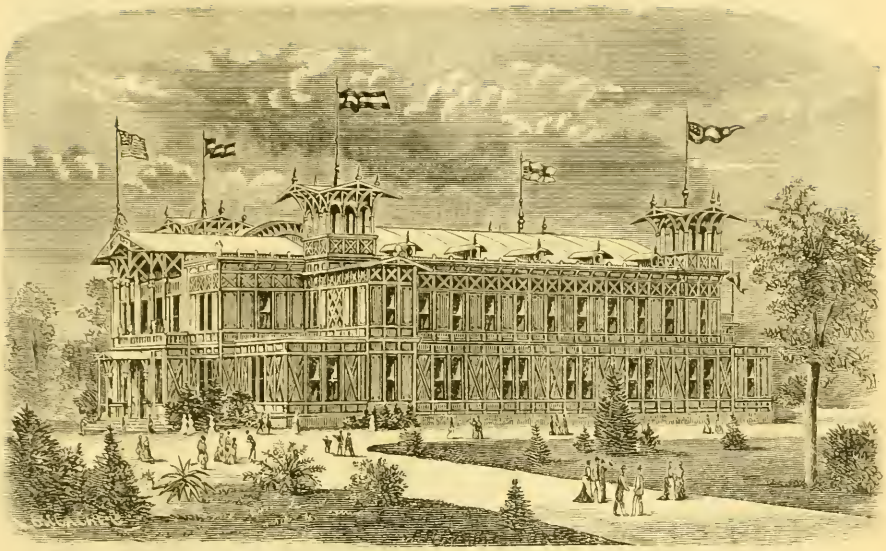
United States Government Building,

Erected by the General Government, was one of the most striking within the Centennial enclosure. It was 500 feet in length by 360 feet in width, covering an area of more than four acres, while its immediately contiguous grounds, utilized for exhibition purposes, increased this space to seven acres. The exhibits made by the government, in and around this edifice, will be found under their proper head.

The Women's Pavilion

Was a very neat and tasteful edifice, in the form of a Maltese cross, 208 feet by 208 feet. It was emphatically what its name implied—a Women's Pavilion—originated and paid for by the women of America, and devoted to the exclusive exhibition of the products of woman's art, skill and industry. The remaining public edifices, all of which were tasteful specimens of architecture, were the Judges' Pavilion, 152 by 113 feet, containing ten committee rooms, four private rooms for the use of the Exhibition Judges, and two large halls; the office of the Centennial Board of Finance, and the office of the Centennial Commission.

The other edifices erected in the grounds were 160 in number, and were dotted on all portions of the broad space, presenting a variety of design that added materially to the general attractiveness of the scene. The States of Pennsylvania, New Jersey, New York, Ohio, Indiana, Illinois, Michigan, Wisconsin, New Hampshire, Connecticut, California, Massachusetts, Arkansas, Delaware, West Virginia, Kansas and Colorado, each had its special building for the accommodation of its citizens.



JUDGES' HALL.

GOVERNMENT BUILDING.

UNITED STATES POST HOSPITAL.

CHAPTER V.

UNITED STATES EXHIBITS—GOVERNMENT BUILDING.

THE chief executive officer in charge of the exhibits in the Government Building was Lieutenant Henry Metcalf, of the United States Ordnance Corps, whose office was at the right of the main entrance. Each of the subordinate departments was in charge of an officer specially detailed for that purpose. The War Department and Treasury Department occupied the northeastern portion of the building; the Navy Department the southeastern, in conjunction with the Post-office Department; the Department of the Interior and Agricultural Department the southwestern; and the Smithsonian Institution the northwestern. These departments were subdivided into sections, each in charge of an officer who had special supervision over the details of that section.

The Signal Service Bureau.

In the War Department the first section which claims our notice, because of its operations being brought home to us daily, was the Signal Service Bureau, in charge of Lieutenant Grugan. The principal part of this exhibit was a signal station, or weather-observer's station, fully equipped and in operation, with recording instruments, telegraph wires, a printing press and full corps of observers.

This very important branch of the Government service has been, to a very great extent, the creation of General Albert J. Myer, Chief Signal Officer, U. S. A., who is now familiarly known as "Old Probabilities," who, though he does not "regulate the weather," does regulate the carrying of umbrellas and overshoes. Indeed, he received the thanks of a prominent brother officer in charge of the opening ceremonies on the 10th instant, for ordering up, under the most discouraging circumstances, the few hours of sunshine which rendered those services so enjoyable.

General Myer was in command of the Signal Corps during the war, a corps which rendered very important services in communicating information across districts where it would have been impracticable for the United States Military Telegraph Corps to have run its wires. At the close of the war, however, there was little left for this corps to do, the Telegraph Corps was abolished, having only a quasi military status; and General Myer was called upon to organize a system of daily weather reports in connection with his Signal Service Corps. This his studies and tastes admirably fitted him for, and the work was begun.

Records had long been kept at all the military stations, and much of the groundwork of a correct system had been already prepared. The Smithsonian Institution, too, had, with limited means and volunteer observers, developed the science of foretelling the weather and tracing the course of storms to a greater extent than any other organized effort had ever done. The weakness of all methods, however, had been in the fact that volunteer observers, though enthusiastic, could not be relied upon; for, to suit their own convenience, or through unintentional neglect, the observa-

tions were not made at the proper moment, or were made by unskilled persons.

General Myer started out with the principle that the observers should be not only qualified, but should be under strict military discipline. In this way only could reliable data be obtained. He therefore accepted none but enlisted men for observers, and these were first instructed in their duties before being put into service.

Observing stations were established at all the important cities in the Union, and at every sea and lake port which was accessible by telegraph. Many other important seaports have since been reached by a coast line of telegraph, built for the purpose by this department. At these stations observations are made three times in the twenty-four hours, at intervals of eight hours, all being made at the same instant of time. The results of these observations are sent immediately by telegraph, by the operators connected with the signal office, to the office of General Myer, at Washington, and from these data skilled officers make up the "Probabilities" for each locality, which are so universally consulted by the readers of the morning papers before they venture over their thresholds. The predictions and the reports from all the stations are telegraphed to each station. The observers note, first, the state of the barometer; second, the state of the thermometer; third, the humidity of the atmosphere; fourth, the rainfall; fifth, the direction and velocity of the wind. For this purpose each office is provided with a barometer, a thermometer, a wet and dry bulb thermometer, a rain-gauge, and an anemometer.

The display at the Government Building was intended to show a signal station with all these appli-

ances, and with many others which are now in use, or being tested at the office of the Chief Signal Officer. The above named instruments, as exhibited, are all self-registering, and make a record fuller and more accurate than any made by human observers. They are all of American invention, and are principally by gentlemen connected with the service.

Lieutenant Gibbon's barograph or self-registering barometer is the usual syphon-shaped mercurial barometer, in the short leg of which an iron float rests upon the column of mercury. The slightest change in the level of the column makes this float rise or fall, and its motion is communicated by a cord running over a pulley to the circuit-breaker of an electro-magnet. The armature of the magnet communicates its motion to a pen which dots the surface of a cylinder moved slowly by clockwork, thus registering the slightest change and the exact moment of its occurrence. The paper with which the surface of the cylinder is covered is ruled to cover a space of fourteen days, and as each paper is removed it is filed away as a permanent record of that period of time. Foreman's barograph is in its leading characteristics like the one above described, and has also an attachment which automatically prints in figures each change of one-thousandth of an inch.

Hough's thermograph is a self-registering thermometer. It consists of a syphon tube, the short leg of which is expanded into a larger tube with a closed end. In this short leg is placed alcohol, which is confined there by a column of mercury in the longer leg, which is open at the top. The thermometer operates by the contraction and expansion of the spirits by cold or heat, raising the column of mercury as the spirits expand and letting it sink as it contracts. Upon the surface

of the mercury is a float, which rises and falls with the column, and by a very delicate apparatus operates a circuit-breaker of an electro-magnetic circuit. This again, as in the case of the barograph, is made to record the changes on a revolving cylinder.

A marine barograph is constructed much like the one first described, except that the tube containing the mercury is made of iron instead of glass. It has an attachment to hang it up by, which keeps it always in a perpendicular position.

Eccard's Evapograph is an instrument for determining the amount of moisture in the atmosphere, and registering the result. This is determined by the rapidity with which water exposed to the atmosphere will evaporate. The instrument is an open cylindrical vessel filled with water, resting upon a delicate scale; as the water evaporates the vessel is lightened and rises, the slightest change being sufficient to operate the circuit-breaker of an electro-magnet which, as in other instruments, records the changes on the cylinder moved by clockwork. The motion, of course, is always upward, as evaporation continually goes on with greater or less rapidity.

Gibbon's electrical rain and snow gauge records in like manner the depth of the rain or melted snow which falls in any given time. A receiver is situated on the roof of the building, the area of the upper section of which is a certain number of times as great as the base of the cylinder of the instrument with which it is connected by a tube. Upon the water in the lower cylinder is a float, which, as it rises, communicates its motion by an electro-magnet to the recording apparatus as before described.

Eccard's rain gauge dispenses with the electro-mag-

net, the float communicating its motion by a counterpoise to the clockwork. This is a very simple and effective instrument.

Gibbon's Anemograph measures and records the velocity and direction of the wind. Upon the roof of the observing station four hemispherical cups, placed vertically on horizontal arms, catch the slightest movement of the air and cause the arms to revolve a certain number of revolutions, equalling in the distance travelled one mile of distance travelled by the wind, closes an electric circuit, and an electro-magnet records the same on a revolving cylinder. This cylinder, moving by clockwork, should there be no movement of the magnet, will cause the pencil to make a long, straight line; with a high wind the record is frequently made, and the line is broken up into longer or shorter sections, corresponding with the velocity of the wind. The direction is indicated on another cylinder. There are four magnetic circuits connecting with the four points at the weather-vane corresponding with the four points of compass. Once in four minutes the clockwork makes a record, and that record is made by the pen of whichever circuit the weather-vane has at the time closed. Eccard's Anemograph dispenses with the electric circuit, and makes its record on the cylinder by entirely mechanical means. The weather-vane in turning revolves the rod to which it is attached, which communicates its motion directly, or by gearing, to the pen, without the intervention of an electro-magnet.

The above-described instruments are thought to be the most reliable of any invented, and are in every respect the most simple in construction. The anemograph, or wind instrument, is perfectly satisfactory; and Eccard's barograph, or self-registering barometer,

is the most perfect and simple of any yet invented. The limited appropriations made to the department make it impossible to introduce these wonderful and almost intelligent instruments into all the offices. The only recording instrument used in all offices is the simplest form of anemograph, which notes the velocity of the wind. The barometers, thermometers, rain gauges and humidity thermometer are all read by the eye of the observer at stated times, with the possible liability to errors either of the eye or hand, and the entire lack of a record of the time intervening between the observations.

The publication branch of the office was also equipped and in operation in this display. Each morning a chart was printed showing the results of the observations taken at 7.35 A. M., with the prophecies concerning the weather for the day. The observers sent their reports by telegraph to the chief signal officer in Washington in cipher, for the double purpose of securing accuracy in the transmission and brevity in the despatch. These reports were translated, and "Old Probabilities" forecast the weather from these data. General Myer himself sometimes did this, and his predictions were generally verified; Lieutenant Craig, Lieutenant Dunwoody and Professor Abée usually performed this work, each taking his turn for one month, while the others were assigned to other duties, such as the verification of the prophecies from the returns received at a later date, and editing the publications made daily, weekly and monthly, of the phenomena observed. In the daily bulletin is the synopsis of the reports, the probabilities and the verification or failure of the prophecies. The weekly bulletin gives a résumé of the observations of the week, noting

the commencement and progress of storms, their duration and other circumstances connected with them. The monthly bulletin is of a similar character, becoming more general in its nature. Reports are also received by mail from similar organizations in various parts of the world, and by means of these the whole route of a storm can frequently be tracked from its inception in the Rocky Mountain range, where the greater number originate, to where they leave our shore, and, crossing the Atlantic, break on the western coast of Europe, traversing that continent to a greater or less extent. Many reports are sent in by masters of vessels, and thus an almost connected account of any remarkable storm is obtained. In fact, it is hoped that, with proper support, the time is not far distant when vessels will be specially commissioned to take these observations in mid-ocean.

The charts printed at the various stations each day are posted in conspicuous places for the benefit of seafaring men and others, and their predictions are the guide to outward-bound vessels. In fact, the skipper who should take out his craft from an Atlantic port after the danger signal had been raised and the bulletin had informed him that a cyclone had started up the coast, would be regarded as a most reckless man to have charge of a vessel.

It may be interesting to know how the data received point out the course of a storm. Long experience has shown that certain conditions of barometer and thermometer produce certain or nearly certain results. For instance, by taking a weather chart and drawing a line through all of the stations where the barometer is lowest, and drawing another line through all the stations with highest barometer, it will be observed

from the arrows showing the direction of the wind that they all point from the latter line to the former line, or area of low barometer. These low or high barometer areas move usually a little to the north of east, and, with two observations as a basis of calculation, their velocity can be readily determined. Occasionally two or more low barometer areas or storm centres will unite in one grand storm. Observations have shown that the cyclones which start from the West Indies take one of two routes, or divide and pass over both. They come northward to the southern coast of Florida, then follow the Gulf Steam northward, or dash westward through the Gulf of Mexico, or divide at that point and go both ways.

These daily charts are not alone valuable to the navigator, but are distributed for the benefit of the farmers. At a post-office distributing station, like Philadelphia, the midnight report is printed and goes out in the early morning mails to every post-office, where it can be received early enough to be of service. These charts are hung up in the post-offices, and are consulted with much interest. The signs of the coming weather, which are usually looked for in the horns of the moon, in the dew upon the grass, in the pigs carrying straws, in the wind "backing round," and other mysterious and ambiguous methods of getting up a wise prophecy, are now looked upon with deserved contempt in the rural districts, and the prophet who uses them is verily without honor in his own country.

Light-House Service.

One of the first needs of a commercial country is to make traders to her coasts reasonably secure against disasters by pointing out dangerous places along those

coasts; hence the light-house service is generally as old as the government which establishes it. When light-houses were first built on the American coast is not definitely ascertained, but nearly all the principal Atlantic ports had each a light-house a century ago. They seem to have been built by the local authorities until 1789, when those already built were ceded to the General Government.

The Light-House Board is a part of the Treasury establishment, but its composition is of a mixed character. It consists of two officers of the Navy, two officers of the Engineer Corps of the Army, two civilians, and a secretary, who is also a naval officer. The exhibit was in charge of Lieutenant Paul, and was situated near the northern end of the Government Building. The eye was at once attracted in passing by the beautiful display of lanterns, of which one large rotary one of the first class created great curiosity in those unfamiliar with such subjects. The general shape of these lanterns is much like an exaggerated pineapple, the lenses and prisms representing the scales.

The uninformed observer usually turned away with the impression that these prisms were merely for the sake of ornament. On the contrary, their shape, their size and position have been determined by the best skill of the optician, and each individual triangular piece of glass performs its special duty of receiving and transmitting the rays of light from the lamp.

These pineapple-shaped lanterns utilize every ray of light from the lamp, both by reflecting and refracting them, and send them all out in straight, parallel lines. The central lens receives all the diverging rays which strike it, and sends them out like the round headlight of the locomotive. Arranged above and below it are

triangular prisms, each of which receives its quota of rays, which it sends on the same route as those from the lens. All the rays, however, which strike a prism are not refracted—that is, do not pass through the glass; some of them are reflected from the surface, and these also are utilized, as they are sent off at such an angle from the glass that they take the same route as those which were refracted. The result of such a combination of rays is to make one vast beam of light, which can be seen at a great distance. Some of the lights on the Atlantic coast can be seen for twenty-eight miles.

The question may very likely be asked, why cannot a light of that character be seen at any distance? If the rays were perfectly parallel, no doubt it could, but the fault is not with the light, but because of the vision being obstructed by intervening objects. Were there no headlands, but the level surface of the water, the distance at which the light could be seen would depend upon the height of the tower. The curvature of the earth, which is quite perceptible at the sea-shore, interposes an obstacle to unobstructed vision, and a light upon a tower 150 feet high would be cut off at a distance of about twenty-six miles.

The lanterns are divided into six classes, the class being determined by the distance of the lamp from the surrounding lenses. The farther these latter are from the lamp the larger they must be. First-class lights are those which are placed on headlands running farthest out to sea. They are placed on high towers, and are the first lights seen by the mariner when he approaches a coast. These of course have the largest lamps. Second order lights are similar in construction but on a smaller scale. The smaller lights than those

first named are used in narrow seas or passages, on the courses of rivers, or at their outlets, where they empty into a bay or gulf.

Some lights are fixed, others are revolving or flash lights. The former class are intended to send a beam in a particular direction, or are in a cylindrical lamp which shines equally well in all, though not with so great brilliancy. The revolving, or flash lights, are represented in the Exhibition by the lanterns before described. It may have occurred to the reader that a vessel on first perceiving a light on approaching a coast, might, if not entirely certain of her reckoning, be misled by it, thinking it to mark the entrance to a different harbor. The flash light makes a variety which perfectly indicates its locality to the mariner. As has been before described, the parallel beam of light is seen only in the line of its route; as the lantern revolves the direction of this beam is continually changed, so that the light, at one instant bright, in the next disappears, and is not again seen until the revolution brings the next set of lenses to bear upon the vessel. The length of time elapsing between these flashes affords a means of identifying the locality; thus some lights flash at intervals of sixty seconds, others at thirty, and others at ten. The large lamp which revolved in the Exhibition showed a face quite as frequently as ten seconds.

The lamp is made to revolve by clockwork, which runs by a weight suspended in the tower. The works require winding every four or five hours, and the watchman who falls asleep endangers the shipping in his vicinity; for by the stopping of these revolutions his flash-light becomes a fixed light, or no light, and thus misleads the mariner. To guard against unfaith-

ful watchmen a system of daily reports has been adopted by which each light-keeper acts as a check upon his neighbors. The lights are so near each other on our coasts that each keeper may see three or four, and should he fail to see all these lights his report must show the hour of such failure. He cannot know the cause. Should his own light fail he reports the cause, and the two reports will show the faithfulness of the keepers.

The lamps are of peculiar construction, and are the invention of Mr. Funck, who had charge of that special department. Those for the three largest sizes are what are called fountain lamps—that is, the reservoir is above the lamp, with which it connects by a tube. The burners are of the argand pattern, and are four in number, one within the other. The oil, which, by its weight, furnishes an abundant supply, is conveyed to each burner by a separate tube, and when in too great supply overflows the top of the wick and falls into a reservoir, from which it is pumped into the supply reservoir by a force-pump.

Lard oil is used in all the large lamps and mineral oil or petroleum in the smaller sizes.

There are also floating lamps which can be anchored over any dangerous shoal. On the western rivers, especially on the Mississippi, where the channel changes daily, the new channel must be marked daily. For this purpose a small lantern is hung upon a stake, and hence the name "stake-light." Each day the keeper in charge of these lights sounds the channel and removes his stakes.

The Light-House Board have now in service 953 lights, as follows: First order, forty-six; second, twenty-eight; third, sixty-seven; fourth, 190; fifth, 125; sixth, 179; reflector lights, thirty-eight; stake lights, 280.

Fog Signals.

There are also fifty-three fog signals. These were exhibited northwest of the building, near Belmont avenue. One consisted of a large bell, tolled by clock-work; the other was a siren, or steam fog-horn, which was set up and used to announce the opening and closing of the Exhibition grounds. When it sounded there was no mistaking the hour. Those who were in the fog about the time of day could immediately take their bearings; those who were in its immediate vicinity were not left in doubt for an instant, and people twenty-five miles away listened to the song of the siren with a feeling not unmixed with awe.

The instrument was one of a class which Professor Joseph Henry, of the Board and of the Smithsonian Institution, has labored long to perfect, and this was the most effective of its class. The steam is forced through two revolving discs, pierced with round holes. The discs are placed close together, and revolve in opposite directions. Steam passes only at the instant when two holes are opposite each other, and the current is thus continually interrupted, the rapidity of the interruptions giving the pitch to the horn. Intervals of any definite duration can be made between the blasts of the horn, and thus any particular fog-horn's locality may be identified. It may be mentioned that vessels are supplied with lists of all the light-houses and fog-signal stations, with their peculiarities.

Other methods of indicating shoals or concealed rocks were shown in the display of buoys of different kinds which were exhibited at the same place. The can buoy is made generally of boiler iron. It is shaped like a cone, and the buoy is anchored point downwards.

It weighs about 3300 pounds, and has a sinker which weighs nearly as much. This is called a first-class buoy, and is painted black.

A nun buoy is a double cone, placed base to base, and painted red. Its position is always on the starboard side. The black can buoy is on the port side. Black stripes on a nun buoy mean that the obstruction is shallow water; a white stripe on a can buoy means deep water.

We next come to the exhibit made by the Naval Department, which occupied the southeast end of the Government Building, and was classified under eight separate heads, viz.: Ordnance, Steam Engineering, Construction and Repair, Yards and Docks, Medicine and Surgery, Equipment and Recruiting, Provisions and Clothing, Hydrography, including details of Arctic Exploring Expeditions, Astronomical and Naval Observations. These were each represented by display of the distinct manufactures implied in their titles; the design being to illustrate systematically the definite objects and workings of each section in its immediate relation to the United States Navy.

Naval Ordnance.

Commencing in the order of the above category, the first collection was that of naval ordnance. Considering the transitional aspect presented by the various forms and methods of all artillery, this must not be regarded as a complete display of what is now in use, but it accurately represented the various armaments of our own ships and the manner of putting up ordnance and its appendages on shipboard since the first authorized gun was discharged in the Revolutionary contest by Commodore Abraham Whipple.

On the elevated earthwork around the left side of the main entrance to the building a battery had been set up, which included a fac-simile of a monitor turret, and although this was constructed of light plates, and the interior of wood, yet it was perfect in form and every other respect, being made after the plans of Captain John Ericsson, of New York. The only apertures by which an entrance could be effected were the port-holes, but the exertion was amply repaid by an examination of the contents.

There were two 15-inch guns, each about 17 feet long, weighing respectively 43,618 lbs. and 43,610 lbs., without the carriages. One of the guns was mounted on Ead's carriage, by which it was run out and otherwise regulated by steam. The other was on the Ericsson carriage, and was worked by hand-power, taking the united efforts of four men to direct its movements. After a gun has been fired and drawn in, a large swinging "false port" immediately closes the aperture, and renders the turret once more secure from stray shots. These illustrate the two methods now in vogue in our monitors.

Outside the turret were arranged the standard cored, solid, shrapnell and canister shot used for the guns within. Next were the following guns: an 8-inch rifled gun altered from a smooth bore, and weighing 17,275 lbs., mounted on the new pattern iron pivot carriage; a 9-inch smooth bore gun, weighing 9,186 lbs., mounted on the Marsilly iron carriage; one 8-inch smooth bore of the same style, weighing 6,478 lbs.; one 11-inch smooth bore, weighing 15,844 lbs., mounted on the rather clumsy Grice wooden carriage; one 60-pounder rifled Parrot gun, weighing 5,390 lbs., on the new ordnance carriage for pivot or broadside, and used

for both; one 100-pounder gun of same sort, weighing 9,757 pounds, mounted on Ericsson's patent iron pivot carriage, the advantage of which is that one man can run this great weight in and out with ease; one 11-inch smooth bore, mounted on the Ericsson iron carriage; one 32-pounder smooth bore gun, weighing 4,560 pounds, mounted on iron broadside carriage; one 20-pounder brass rifled boat howitzer and one smooth bore of the same calibre; one new pattern rifled Cochrane gun; one Moody breech-loading gun and a gun carriage of Ward's design, and a light one for a 12-pounder. There were also exhibited three specimens of old-fashioned carronades used in the war of 1812. Under each of the above guns were arranged the various death-dealing projectiles for them, including solid shot, shell, grape, shrapnell and canister.

Gatling Guns.

Entering the building, the first objects which struck the attention of the visitor were the Gatling guns or mitrailleuses. There were two of these shown, which, on close observation, proved slightly different. The gun was composed of six barrels, a hand-crank causing them to revolve about a central axis parallel to their bores; as each barrel came opposite a certain point, a self-primed, metal-cased cartridge falling from a hopper, was pushed into the breech by a plunger, where it was exploded by the firing-pin. The machinery was simple, and not liable to get out of order, and the gun can fire 200 shots a minute, with long range and precision. The weight of the Gatling gun is about 1000 pounds, and is therefore very great compared to that of the charge, so there is little or no recoil, and when once pointed it requires hardly any adjustment. The dis-

tinction between the two on exhibition was in the form of the hopper. That first designed was permanent and of a circular form, and being of light material, a good blow would render it useless. But the newly designed hopper obviates this difficulty. It is a single case, and as soon as the charges in it are expended, it is replaced by a fresh one, of which a large stock is carried in the ammunition boxes. We shall now make some comparisons with other guns in the collection having many or revolving barrels, in order to appreciate the rapid strides made in this direction of late years.

The first was an old Billinghurst battery, which was used during the civil war. It was composed of twenty-five parallel barrels, which, being fixtures, do not scatter the shot like the Gatling. Another for like comparison was a De Brame gun, which consisted of six revolving chambers and one barrel having an open rifled twist to give direction to the ball.

Then there was also a light, revolving Nugent gun, worked with a crank and lever, intended for the bow of a gunboat. Having six chambers and one barrel, the rapidity of firing heats the latter very much, so two spare barrels are sent with each gun, and can easily be changed.

We next come to ordinary breech-loading guns for boat service. Prominent among those exhibited was a small iron gun obtained from Alvarado, Mexico, which was cast about the year 1490, and used by Cortez in his conquest of that country. It was very primitive in form, and the method of loading it was by lifting out by hand a heavy weight from the breech, kept in place by a side wedge. Turning from this we may examine the light three-inch brass howitzers, with the intricate French system of breech-loading and elevating, or a

more serviceable one still, in the form of a twelve-pounder Dahlgren gun, with the old style of elevating apparatus, which is less liable to derangement than any other.

Small Arms and Relics.

The array of small arms was very interesting, and showed old flint, rifles and carbines, pivot guns, musketoons, muskets, sabres, bowie-knives, cutlasses, broadswords, revolvers, pistols and frogs, from the revolutionary times to the more improved Martini-Henry breech-loaders and sabres of to-day.

There were indeed relics of historical interest enshrined in this Government Building. In a case by themselves were the old cutlass, boarding armor and helmet used by Captain John Paul Jones on the Bonhomme Richard, while the identical flag which floated from the fore-top of that gallant ship formed an appropriate drapery around the portrait of her commander on a pillar close by. Again, there were an old musket, tomahawks, bowie-knives and pikes taken by divers from the wreck of the monitor Keokuk, off Charleston. There was also a case containing hand grenades, pistols, all in pieces, to illustrate the many parts of which they are composed.

Projectiles.

The array of projectiles for all these guns was indeed a formidable one. Dahlgren's hollow shot varies in size from twenty to a hundred and fifty pounds; shell from twelve to fifty pounds, and steel bolt shot from thirty to a hundred and fifty pounds. There were the shot, shell, shrapnell and canister for smooth and rifled bore guns of all the best makes and inventors, including

Holroyd, Parrot, Schenkl and Sawyer, Stafford, Smith, Emery and Ganster; and to show the interior of these projectiles was a table, on which were arranged all classes of shot in sections, some fired at iron targets, others of tempered steel, wrought-iron, cast-iron and cored. In another case were nearly all the pieces of a shell which were collected after it had exploded.

Gunpowder was represented in every conceivable form, from the very fine musket powder to the pebbles for big guns, some of which were an inch in diameter. We noticed that these pebbles were of various shapes—octagonal, hexagonal, grape and square. They were made from fine powder, pressed, and experiments are constantly being made at the experimental battery at Annapolis, to test the efficiency of the various kinds and forms.

Torpedoes.

The torpedo is a machine for destroying hostile shipping, pontoon bridges, etc., through the agency of subaqueous explosions. The germ of the device is to be found in floating powder vessels, which were first used at the siege of Antwerp in 1585, but the name "torpedo" was first applied to the machine by Robert Fulton about the year 1800. Fulton's system included four classes of torpedoes: buoyant mines, held in place by anchors, and provided with a mechanical device by which explosion ensued when they were struck by a vessel; line torpedoes, exploding by clock-work; harpoon torpedoes, to be attached to the enemy's vessel by a harpoon shot from a gun, and then to be exploded by clock-work; and lastly, "blockship" torpedoes, to be carried on spars projecting from a peculiar kind of vessel, and exploded by contact with the enemy.

By a description of the different kinds of torpedoes exhibited in the Government Building, the reader can judge what improvements have been made in this direction during the last seventy-six years.

The collection was divided into three distinct classes, viz., the movable or automatic, towing and spar torpedoes. There were three specimens of the movable class, the Lay, Ericsson, and the Fish, of which the most perfect and important was the Lay. The motive power of this is carbonic acid gas, and the machinery is governed and the helm is steered by electricity. It explodes, however, by contact only, with three percussion fuses on the head. The head or nose of the torpedo contains the explosive charge of 300 pounds of powder, or 75 pounds of dynamite. In the second section of the interior were three flasks, containing the carbonic acid which generates the gas, and a tube carries the gas from this to the machinery at the other end. The third or middle section contained a roll of two miles of wire which pays out from the torpedo itself; in the fourth or last section was the engine or steering apparatus. When experimenting with it recently at the torpedo station, Newport, R. I., they sent it out to sea for one mile and a half, thus proving it to be the best and most successful ever made. While running out, the torpedo is submerged several feet, but its course is traced by small guide-poles and flags thereon, and it is steered or stopped by the electrical connections on the shore.

The next was an Ericsson torpedo, of which the motive power is pneumatic pressure. The nose part contains the charge of two hundred pounds of powder. There are diving fins, to regulate the depth of submersion, and the machinery is all inside. The peculiarity

of the power of propulsion is in two screws—one having a direct and the other a back action—revolving in opposite directions and giving the propelling power ahead, while the rear propeller neutralizes the "backlash" of the other on the rudder. The engine for this is of course an air-pump, the air being forced through a pipe, to which is screwed the hose, and this is wound round a reel which pays out as the torpedo moves forward. The great objection to this is the weight and bulk of the engine and hose-carriage, and the torpedo can only be sent out a few hundred yards.

Next to this was the "fish" torpedo, the power of propulsion of which is thirty atmospheres. It has a revolving screw and fins to regulate the depth of submersion. It only explodes on contact; there is no means of steering it, but it is simply launched forward in the direction of the object of attack. If it should fail to strike, it would continue in its course until the motive power was exhausted and would then sink.

Several spar torpedoes were exhibited. These were one hundred-pounders and seventy-five-pounders, shown both closed and opened. In connection with this class was the model of a boat specially designed for them; the spar torpedoes attached, and the method of using them was clearly shown. They were exploded by means of Farmer's dynamo-electric machine, of which several were exhibited, together with pneumatic batteries, circuit closers for submarine mines, torpedo fuses, whole and in section, and an electric pedestal and key-board by Lieutenant Bradford, U. S. N.

Steam Engineering.

The Bureau of Steam Engineering came next in order, and included marine engines and their appurtenances,

none of which were built expressly for the Exhibition, but were simply selected from stock and erected with a view of showing, as nearly as possible under the circumstances, the position in the ship occupied by the engines. By this display an accurate idea could be formed as to how low in a wooden gunboat or iron-clad vessel, engines of this class have to be placed in order to avoid injury from shot or shell.

It made altogether an unique and interesting display of its class, and was well worthy of careful examination and study.

Preserved Specimens of Animals.

This collection embraced some of the finest specimens of the wild animals of North America which could be obtained. It occupied a position at the eastern end of the section, and near the exhibit of the Springfield Arsenal. The bison or buffalo of the plains was represented by three fine specimens—one large bull and two cows.

North of these was a gigantic specimen of the white polar bear, with wide open mouth, made of carved and painted wood. Its coat was pure white, with the exception of one small spot on the right shoulder. The great breadth of chest, enormous limbs and long, sharp claws, fully bore out this animal's reputation for strength and ferocity. A little to the south was a grizzly bear from the Rocky mountains, which was inferior in size and ferocity of appearance only to its Arctic neighbor. Near the southwestern end of the section was a group of smaller bears, embracing some very handsome specimens of the black bear, cinnamon bear and brown bear. The collections of ungalata, or horned animals, was very complete, and embraced

specimens of the North American elk, barren and woodland carribous (belonging to the stag family), male deer, Virginia deer, peccary, mountain goat, moose, prong horn antelope, big horn sheep and moose. Among the fissipedia (those animals which have separate toes) were specimens of pumas, jaguars, ocelots, lynxes, wolves, foxes, fisher cats, martens, minks, wild cats, wolverenes, skunks, otters, sea otters, bears (already described), raccoons, ferrets, sables, badgers, wolves, beavers and yaragundi. The rodents included specimens of squirrels, prairie dogs, marmots, beavers, porcupines, rabbits and gophers (rodents found in the Mississippi valley and along the Missouri river).

We must not omit among the exhibit in the Navy Department one of the most interesting. We refer to the

Display of Flags.

There were two of the old pine tree flags and a grand union flag of 1776, union national flag of 1777—the latter was a white flag with an anchor, and the word Hope on it, the field was blue, and had thirteen white stars; another union national flag, with stars and stripes, of 1795; union national flags of 1815, 1818 and 1876; also our union jack of to-day. Next were arranged the commodore's blue, broad pennant from 1776 to 1860, red pennant from 1776 to 1876, and white pennant of the same date; also the flag officer's blue, red and white flags from 1858 to 1866; a rear admiral's blue flag, a rear admiral's red flag (these with two white stars), and a rear admiral's white flag (two blue stars), from 1866 to 1869. An admiral's and vice-admiral's flags during the same years were also shown —the former was blue, with four stars in centre, and the latter with three stars. The flag of the Secre-

tary of the Navy was also shown. It was blue, with a white anchor and four stars in the centre. In addition to these was a complete series of officers' flags, pennants and signals of to-day, the name of which was appended to each. In the

Ordnance Department

Was seen in practical operation all the rifle-making machinery which the Government Armory at Springfield, Mass., could crowd into the limited space. The skilful men operatives beginning with the round bars of steel and the long blocks of black walnut, turned out complete the handsome weapons of death almost as rapidly as the latter could be made to end human lives. The plain strip of walnut was applied to the lathe, and in three minutes and fifteen seconds was perfectly gun-shaped; then to the borer, which prepared it for the lock in one more minute. It was then a finished stock. To enumerate all the other machines used before coming to the gun-barrel, including the gang-driller for boring out the receiver, the miller for milling the same, the firing-pin and tang-screw machines, would be attempting too much in this space. All of them are of gigantic strength, and yet their construction is as fine as that of a watch. There must be no irregularity in their operation, not even to the extent of the one-thousandth part of an inch. The barrel was bored out by three or four augers of different and regularly-increasing size. One of these guns, a Springfield breech-loading rifle, was wrought upon by no less than 550 different operatives before it was perfect. These manage 1,200 machines, and the number of guns which they can turn out in a day of eight hours is about 400. The bayonet-grinder attracted hundreds about him. The bayonet

having been wrought into nearly perfect shape, he took and applied it to a fine-grained grindstone, making 1,500 revolutions per minute. The next feature was cartridge-making. Nine women were employed at this, there being as many different machines, and through these must go the constituents that finally come out a cartridge. There is the cutter and cupper, which cuts the copper plates into circular pieces as large as a silver half-dollar, and then punches them through a hole, shaping them like a cup. Several other cupping machines, differing only in the diameter of the hole, each in turn takes the cup and lengthens it, until finally it is headed in another machine, has the fulminated cap inserted in another, the charge in another and the bullet in the last. Bullet-making was also carried on. At frequent intervals throughout the section stood stuffed figures of soldiers, fully uniformed, bearing arms and representing the variations in the dress of United States artillerymen from the colonial times until the present day. Some of these were so life-like that not a few visitors mistook them for the guards of real flesh and blood who stood stock still guarding the exhibits, and applied to them for incidental information. The walls at the rear of the section were covered with cases filled with guns and bayonets of all patterns, from the primitive oddities to the most elaborate; also with bottles containing all varieties of gunpowder, and also the constituents of that article, showing it in its various stages of manufacture. There were pistols and revolvers enough to arm the Russian soldiery, and of so many different, odd and pretty styles that all the tastes on earth could make gratifying selections.

Then were shown a battery of Whitworth guns, presented by loyal Americans in Europe to the United

States government in 1861; an enclosure formed by six 6-pounders, presented to the government by Lafayette, used as posts and connected by heavy chains, within being models of gun plants and cannon forges, illustrating the whole process of cannon-making, from the forging together of wrought-iron rings to the rifling operation; samples of bloom iron used in constructing the Hitchcock gun; pyramids of formidable-looking columbiads, hand-grenades, grape, canister and shot from the six up to the one-thousand pounder—some for breech-loaders and others for muzzle-loaders; heaps of chain, bar and other shot labelled "rebel," and noted for its raggedy, slaughterous appearance; cavalry forge-carts, with all the conveniences that could be expected from a blacksmith-shop on wheels; ambulance, baggage and battery wagons and battery forges; models of all kinds of heavy guns and mortars, and also the heavy guns and mortars themselves; mountain howitzers, their carriages and also ammunition chests—all on pack saddles just as they are carried over mountains or bad roads on the backs of mules; stuffed, uniformed figures of cavalrymen on the backs of papier-maché horses; the mortal and stuffed remains of the famous trotter George M. Patchen, hitched to a carriage containing a Gatling gun; a Hotchkiss revolving cannon (for field use, discharging eighty rounds of shells or canister shot per minute), and a section of oak which stood inside the intrenchments near Spottsylvania Court House, and was cut down by musket balls in an attempt to recapture the works previously carried by the Second Corps, Army of the Potomac, May 12th, 1864. Outside the building were scores of mounted and unmounted cannons and mortars of all sizes, the most remarkable being a

20-Inch Rodman Gun,

Weighing 115,000 pounds, which throws a 1080-pound ball, and requires a charge of 200 pounds of powder.

The United States Fish Commission, in conjunction with the Smithsonian Institution, made a very interesting exhibit in the Government Building, illustrating in a very complete manner

The Fishery Resources of this Country.

It was made under the joint supervision of Professor S. F. Baird, who is connected both with the Smithsonian Institution and the Fish Commission, and Mr. G. Brown Goode, Assistant Curator of the National Museum. Much time and labor were spent in procuring, within the limited time allotted, as complete a representation as possible of the fishes found in American waters.

To this end they obtained a number of photographs, drawings and plaster casts of fish, together with fish preserved in ice, as also a very complete and interesting collection of fishing vessels, boats, etc. (life-size and models), apparatus and dories used in whale fisheries, nets, traps and pounds, prepared specimens of aquatic animals, other products of the waters, and economical applications of some of these products.

On an upright partition near the specimens of fishing boats was exhibited a beautiful collection of sea-weeds from deep sea soundings and from the surface. They were preserved on card-board and framed, and comprised some very rare and pretty specimens colored in beautiful tints, from the palest pink and green to the richest purple. Extending from east to west was a double line of partitions on which were arranged the

admirable collection of plaster casts of fish specially prepared for the Smithsonian Institution, together with specimens of fishing tackle. The northern wall was occupied by a very large and fine collection of photographs of fish.

The plaster casts were by far the most interesting portion of the fishery exhibit. These casts were obtained in the following manner: The artist of the Smithsonian Institution, Mr. J. H. Richard, first copies in water colors the fish fresh from the water. Plaster casts are then taken from the fish, and the casts are painted in imitation of the water colors. This is done with the greatest minuteness, each scale being painted separately. It is claimed that these specimens are much more accurate representations of the living fish than preserved specimens would be, since the color of the living fish is often not retained after death.

The models, however, are colored from paintings of the fish made while it is still alive. There were 408 of these models, all arranged on screens placed at regular intervals.

The United States Geological Survey.

In the Government Building, at the extreme western end, were located the exhibits of the United States Geological Survey, in charge of Professor F. V. Hayden. It will be remembered that several parties were sent out into the far Southwest during last summer for the purpose of exploring the country on the Pacific slope, which abounds in pre-historic mural remains. The results of these explorations during the years 1874 and 1875 were here shown by means of photographs, models, drawings, maps, charts and publications. There were two models by Mr. W. H. Jackson, photographer

of the survey, measuring about three feet by two and a half feet, representing a portion of an ancient cave ruin in the Rio de Chelly, Arizona. The entire village, as discovered by the party, was 550 feet in length, and consisted of seventy-six rooms on the ground floor, and in places rose to a height of twenty feet or more, covering three stories. One of the casts was a faithful copy, in miniature, of the southern end of the town, showing about 100 feet, or one-fifth of the original settlement. The buildings were built of blocks of stone, the walls in some places being two feet thick, all situated under a recess formed by the receding rock, about fifty feet above the dry wash of the Rio de Chelly. The second cast was the same as the first, restored to its probable original state, and tiny men and women were to be seen at their daily work, grinding corn, carrying water, etc. This has been reconstructed after the manner of the houses now occupied in Arizona and New Mexico by the Moqui and Pueblo tribes.

There were two other very interesting models of isolated ruined structures. The one represented a cliff-house discovered in the Canyon of the Rio Mancos, in the extreme southwestern corner of Colorado, which was situated in a perpendicular bluff some 800 feet above the valley. The fourth cast was a reproduction of an ancient circular tower which was found in the same district. Below these ruins, in cases, were collections of very ancient glazed pottery and implements, obtained from the ruined buildings and graves. The walls of the Geological Survey department were decorated with some of the largest and finest photographs ever taken in the Rocky mountains. They were originally photographed on plates twenty by twenty-four inches in dimensions. Maps showing the topographical

and geological features of the explored West were exhibited on upright screens, the largest of which was seventeen feet in length. The west end of the building had been constructed for the insertion of transparencies or photographs on glass, and these were of much interest, as being some of the largest views of the kind to be found. They were principally pictures of the ancient ruins of Arizona, Utah and Colorado, and views of the geyser basins of the Yellowstone.

Naval Observations and Arctic Relics.

The exhibit made by the Naval Observatory, and that of Arctic relics, made in connection with it, were the most interesting in the department. The observatory was represented by a large number of photographs and heliotypes of the telescopes in the observatory at Washington, and of works performed with their assistance, including results obtained by means of the great twenty-six-inch refractor, which was mounted in 1874, and which is the largest refracting telescope in the world; by its famous chronometers (Negus, of New York, and Bond, of Boston, makers), and by a newly invented apparatus for determining what is technically called personal equation, or, in other words, for adjusting the variations found in astronomical observations made by different persons possessed of different powers of vision and also of different temperaments.

The observatory having for some time past been intimately connected with Arctic expeditions, and Rear Admiral Davis, Superintendent of the Naval Observatory, being engaged in preparing an official narration of the expedition of the Polaris, a design was formed and carried out for a collection of

Relics of Arctic and Antarctic Explorers.

In a high glass show-case, fourteen feet square, standing near a fine bust of Kane, were shown, on one side, the prismatic compass, transit, sextant and other instruments used by that intrepid navigator near the frigid wilds of Western Greenland; drawings and paintings of Arctic scenery and animal life, executed by himself, and the flag of the Advance, the ship in which he made his second voyage; the three other sides of the case contained relics of the expeditions of Hayes, Hall and Bradford; the flag that Wilkes took on his Antarctic expedition in the ship Peacock, the same flag being taken by Kane, Hayes and Hall, also, on their Arctic voyages; relics of Sir John Franklin's expedition, including portions of his vessel secured by Captain Hall in his second expedition and brought back by him then, together with relics of Parry's voyage; the journals kept by Hall in his Polaris expedition, and a fac-simile of the sledge made for Captain Hall by "Esquimaux Joe."

Department of the Interior.

The exhibition offered by the Department of the Interior was the most curious in the Government Building. It occupied about one-seventh of the entire floor-space in that structure, and was devoted mainly to Indian specimens. The glass along the sides of the building forming the southwestern corner, or that in which the display was located, was colored in representation of wild and picturesque scenery in the region between the Rocky and the Sierra Nevada mountains. The geological formation of noted peaks, plateaus and valleys of that region was illustrated by means of

topographical plaster work, variously colored. Captain Jack, Split Oak, Dull Hatchet, Clumsy Moccasin and other famous Indian braves were here in all the glory of life-size papier-maché and stuffing, streaked on the face with red paint, and wearing the head-dress of feathers so familiar to everybody that studied "history with picters in."

The Esquimaux.

The little, puckered-mouth, pug-nosed Esquimaux, with his slight sprinkling of a moustache and "goat," was also exhibited. Arm-in-arm with him, and still more diminutive than himself, was his wife. Both were dressed in the white bearskin garment, which is hood and coat combined. With the exception of their faces there was between every portion of their bodies and the outside air a thickness of several inches of non-conducting substance, and it is wonderful how they stood a Philadelphia Fourth of July. Proceeding along the passages bounded on both sides by glass show-cases were seen, in the latter, vessels of plaited willow, resembling baskets, but having the interstices filled with cement, so as to hold water, arrow-heads varying in size from the bulk of a three-cent silver piece to half that of a man's hand, made of copper, sand-stone, flint, iron or stones of pretty colors, and bows and arrows of sizes differing to suit all, from the little, naked, prospective warrior, who is made to practise against a target, up to the veteran over the door of whose tent hang the scalps of fourscore pale-faces. The medicine man's rattle was also shown. With this magic apparatus the red-skinned physician rattles the demon of sickness out of patient and out of camp. It sometimes happens, however, that the rattle proves inefficacious,

but this signifies that the patient is loathsome in the eyes of the Great Spirit, and not that the medicine man is a hoax.

Patent Office.

To describe the display in this department would be to name all the patent duplex, back-acting, cylindrical, concavo-convex tooth-pincers, mowing-machines and other inventions that have sprung into existence since 1836, the year in which the Patent Office, with all its contents, was destroyed by fire. There were 5,000 models here, representing the most improved patent of all inventions made in the United States since that time. They were admirably classified, and if a man wanted to find a model of a certain stove he had only to look in the division of "heat;" if he wanted that of a certain reaper, he would have found it in the division of "agriculture," and so on. In connection with these models, relics of revolutionary heroes were exhibited. There were, for instance, the blue swallow-tail coat worn by General Jackson at the battle of New Orleans, in 1815; the blue coat and yellow home-spun pants and vest worn by Washington when he resigned his commission at Annapolis, in 1783; Washington's tent-poles, camp-plates, mess-chest and household furniture; a set of porcelain presented by Lafayette to Martha Washington; embroidery and other work executed by that lady, and the war saddle of Baron de Kalb.

The Department of Agriculture.

This occupied the western side of the southern projection of the Government Building, and was classified under five distinct heads, viz.: Chemistry, Natural History and Economic Museum, Microscopy, Botany, and Statistics.

The collection of the chemical division consisted of soils, rocks, marls, fertilizers, agricultural and horticultural products, and materials manufactured from them. The object was to show as far as possible in this way the history of soils, and their formation by disintegration and decomposition of rocks; marls, including the green-sand, calcareous and phosphatic, from different ages; natural fertilizers and their application in manufacture of artificial fertilizers; the agricultural and horticultural products, the value of which depends upon their chemical composition, and their utilization by means of economic methods involving chemical processes.

The specimens of vegetable products were all arranged in the cases with reference to that stage of the process of manufacture from which they were taken, in such a manner as to illustrate clearly the changes through which the raw material must pass to render it fit for market and consumption.

The Natural History and Economic Museum

Comprised a collection of all the injurious, beneficial and edible insects of the United States; a very large collection of birds; a most complete and well-arranged display of domestic poultry, chiefly of American origin; about 800 samples of American grain, collected from every State in the Union, showing the difference between the same varieties in different parts of the country; and many other very valuable items which our space will not permit us here to dilate upon.

The Internal Revenue Bureau.

This important branch of the government, though one of the youngest, made an exhibit which, though

not a large one, had many objects of interest. One of the handsomest was a design, elegantly framed, composed of all the varieties of revenue stamps issued by the department. The combination of colors was well conceived. A leading tobacco firm had sent in all the different styles in which tobacco is put up, appropriately stamped, while another firm sent in a collection of beer and whiskey barrels, with the stamps which each must carry. These two products, being the most heavily taxed and being those from which the most revenue is obtained, monopolized the majority of styles of stamps and formed a large portion of the exhibit.

The Printing Bureau

Made a very pleasing exhibit of currency printed by the government, including a collection of notes which took the premium at the Vienna Exhibition.

One of the greatest objects of interest in the Government Building was to be found among the postal exhibits in the Post-office Department, viz., the

Centennial Envelope-making Machine.

The flat piece of paper was placed in at one end, and drawn through the intricate machinery, receiving the stamp, and being gummed and folded, passed out at the other end a complete envelope, ready for use. As every twenty-fifth envelope passed into the tray awaiting its reception, the next envelope slipped automatically a little out of the regular line, in order to mark the divisional number to be included in each package.

So beautiful and regular was this piece of mechanism in its every movement, that it seemed as if it were endowed with life and understanding, and, indeed, the best mechanics could not make by hand envelopes with anything like its precision.

The rapidity of the work may be judged from the fact that, on an average, twenty-five thousand envelopes were made a day by this machine, without taxing its capacity in the least.

Among the exhibits in this department were fine specimens of all the different varieties of stamps, stamped envelopes, mail bags, topographical maps of the various post routes, and all the principal blanks, bound in book form, used by the department. Other interesting exhibits were Franklin's old ledger account when he was postmaster, and a model showing the patent mail-catcher used in the fast mail trains, which pick up the letter bags at the stations while the train is running at full speed.

Connected with the United States Government Building, and at one end of it, was located the

Centennial Post-office,

Than which there was hardly any one department of the Exhibition of more practical value to visitors. There were employed at the office ten regular carriers and six clerks, and four mail wagons which arrived and departed every hour of the day. The Centennial Post-office only delivered matter addressed to persons within the grounds; all other letters or papers for the city being sent either to Station B, West Philadelphia, or to the regular city office.

This department in the Government Building was a complete working office, illustrative of the United States postal service, and foreign orders for any part of Great Britain, Germany, Switzerland or Canada were obtainable the same as at the down-town office, while registered letters were despatched for any part of the civilized world.

On the west side of the building was a complete exhibit of the United States fast mail lines, this important service being illustrated by two distributing cars adopted by the department. Here were seen all the details of post-office work, from receiving and stamping a letter to its final start for its destination. In these cars seven clerks were kept constantly employed in distributing the mail for all points outside of the city, and, in addition to the letters and papers despatched at the Centennial Grounds, they distributed all circulars mailed from the main office. In these cars visitors became familiar with all the details of the fast mail service, for here were seen working models of the cars used on the New York and Chicago and New York and Pittsburgh lines, and here could also be examined all the minutiæ of transporting the United States mails.

In the first car was a crescent-shaped apartment for papers, which were thrown into slanting pigeon-holes and thence conducted to the sacks. Next to this was an octagonal apartment, containing 2000 boxes, into which packages for different routes and larger towns and cities were thrown. All these packages were signed with the name of the clerk who put them up, and if a mistake occurs the clerk is made responsible for it. It will be seen from this that all employés are obliged to be correct, and, as a consequence, letters, papers, packages and postal cards are seldom delayed at a station even for an hour.

CHAPTER VI.

UNITED STATES EXHIBITS—MACHINERY HALL.

IN this building was one of the finest exhibitions of sewing machines and fancy needle-work probably ever seen together. The merits of the different machines are too well known to need mention here, so, with the exception of a single one, we shall speak of the displays made by each company alone, without any reference to the machines themselves. The new machine was called

"Little Wonder,"

And well it deserves its name. With the exception of a little handle on top of the left end of the table, and which connects underneath with the feeding device, the machine is evidently of common make. The operator takes this little handle in the left hand and turns it back and forth, and by this means the feed is turned in any direction desired, and out from the needle the most intricate embroidery can be made as rapidly as the most common work. All that the operator has to do is to form a pattern in his mind, and then turn this little handle back and forth, and the machine lays the work on with an accuracy that is almost mathematical. How much practice it takes to do this we cannot say, but the ladies who ran these machines appeared to scarcely give their work a second thought, and yet they wrote and embroidered as if they were running straight seams.

Wheeler and Wilson

Had quite a large space, and had their machines enclosed in elegant frames, and as a sample of what the machines will do, showed a large case of boots and shoes and other leather work fancifully embroidered. The

Weed Company

Had not such a fine exhibition of frames, but displayed a large picture of the battle of Bunker Hill, that was worked entirely by one of their machines, and took the operator forty-five weeks to finish. The

Wilson Company

Had a fine large exhibit, both of machines and samples of work beautifully embroidered with vines and flowers, in many different colored silks.

In order to show the wonderful difference between what their machines are now and when they were first patented, the model that was used when Mr. Howe applied for his first patent was taken from the Patent Office, at Washington, and placed on exhibition by the

Howe Company.

The machines, as first made, were very small, and were intended to be screwed to the top of a table and operated entirely by hand. The fly-wheel and treadle are a later application, and were never dreamt of at that time. Instead of the needle being straight and working vertically up and down, in this model the needle was curved and secured to an arm, or lever, so as to pass into the work from the side, the work being held in exactly the opposite position from what it is now. Attached to some of the modern machines are arms that are attached to the needle-bar,

and which have a palm-leaf fan secured to one end. As soon as the needle-bar begins to work up and down, the fan is set in motion and fans the operator fast or slow, according to the speed of the machine.

The Singer Company

Was not represented in this hall, but had built one of the finest buildings on the grounds, just back of the annex to Memorial Hall. In one room were a large number of machines, and show-cases filled with dresses that were enough to drive an ordinary woman crazy. The second room was fitted up very elegantly as a parlor, and was free to all visitors. To Singer more than any other inventor is due the perfection to which the modern machines have been brought. Inside of ten days after he heard of Howe's success in sewing by machinery, he invented his first machine, made a model, and applied for a patent. He took Howe's imperfect idea, and produced really the first really practicable sewing machine that was ever made.

One of the most attractive objects was to us, as well as to thousands of others, a machine for

Rifling Gun-Barrels,

Exhibited by the Pratt & Whitney Company. Every one remarked upon the easy and graceful motion of this machine, the stroke being unusually long for any piece of machinery of the size. The machine, though simple in construction, was effective enough in its work. In the first place there was a double rack and pinion, the rack working up and down in a slide on an inclined plane. This rack and pinion were adjustable for different spirals or the twists of the rifling in the barrels. The slide carrying the rack and pinion was worked

backward and forward by a connecting rod, the length of which was also adjustable to the length of the barrel to be rifled. At either end of the barrel a rotary oil pump, worked by a rack and pinion, was attached. These pumps discharged at each stroke of the rifling, and the oil, in addition to acting as a lubricator, washed off any chips, etc. The motions of these pumps, and indeed of all other parts of the machine, with the exception of those concerning which we have already spoken, were communicated through a connecting rod from a single cam. This rod not only worked the pumps, but the feed of the rifling and the partial revolution of the barrel, the last motion being regulated in extent according to the number of grooves to be rifled —one revolution to the whole number of grooves— four, six or eight, as the case may be. The rifling was done by means of a cutter or scooper inserted in the side of the lower end of the rifling rod; the spiral motion to the rod being given by the pinion working on the rack in the slide of the inclined plane. The spiral motion was continuous in both the forward and back action of the rod, the feed of the rifling—that is, the gradually increasing depth of the grooves—being provided for by a simple but very ingenious contrivance. A long and very slightly tapering wedge, of about eight inches in length, was inserted in the rifling rod at the back of the cutter. As this wedge just touched the automatic feeder at every stroke, and the feeder was always gradually but surely advancing, the wedge was driven a hair's breadth farther into the rifling rod at every stroke, while the taper of the wedge, at the same time, very slightly forced out the cutter at each stroke, thereby insuring a gradually increasing depth of the rifling in the grooves.

An exhibit which was always surrounded by a crowd of curious visitors was the

Type-Casting Machines

Of the Johnson & MacKellar type foundry. These small but thorough working machines turned out metal letters with extraordinary rapidity; in the case of some of the letters at the rate of 120 a minute, indeed, as fast as the workman in charge of the machine could turn the crank-handle. The machine seemed to act simply enough, and to be marvellously compact and comprehensive. At the top there was a reservoir of molten lead, and at the bottom the type fell, letter after letter, with every click of the machine, into a trough which conducted it at once to a receiving-box. The metal, which was principally composed of lead, tin, and antimony, was kept in a fluid state by a small furnace immediately underneath it. In the centre of the reservoir there was a force-pump which, at every turn of the crank, injected sufficient metal into the mold every time it came up to receive the charge, an action of remarkable regularity and precision. On being fully charged, the mold flew back, its steel jaws swiftly opened, and the type was shot out into the trough leading to the receiving box. The body of the type was formed in the mold. The letters on the face of the type were formed in a copper matrix, which was held at the back of the mold by means of a spring.

When the type came from the mold a small jet of metal, called a gate, was found to be attached to the lower end of it. They were taken in hand by boys who broke off the gates, after which they were polished on two sides on circular stones till they attained the smoothness and finish of plate glass. The type was

then set up, with the face up, on wooden sticks about three feet long, care being taken to keep all the various letters, punctuation signs, etc., separate. "Dressing" was the next process through which the type passed. The dresser placed the type on a steel rod, which he locked firmly in his bench, and then cut a groove just where the gate had been broken off. More polishing was afterward done, and the face of the type was carefully examined with the aid of a magnifying glass, and all defective letters rejected. The type was then paged in square galleys of about seven pounds each in weight, and they were ready for immediate use, or for sale. All type passes through five processes before it is used; with the exception of small t's and j's, and double f's, which have to pass through six processes before they are ready for use.

The Lockwood Envelope Machine

Was another great source of public attraction, and after seeing the very perfect and interesting machinery for making envelopes by the million, exhibited by the Lockwood Manufacturing Company, one may well exclaim, "What becomes of all the envelopes?"

The paper from which the envelopes are cut is fed into the machine from large rolls after the fashion of newspapers which are printed from the web, the web in the case of the envelopes, however, being kept slack. On being drawn into the machine by rollers the paper is caught between two springs, which keep it always in the centre, but have sufficient expansive power to allow any inequalities in the edges of the paper to pass. The paper then passes under six knives hanging from a cross-head frame, which has an up and down motion, which cut the corners for folding, etc., before it comes

under the operation of the creasers. Two of these creasers turn over the side edges ready for pasting, and the third makes the crease which is to form the bottom edge of the envelope. The edges of the envelope next pass under two small and narrow rolls which are governed by cams. The rolls, being fed with paste from tubular reservoirs above, paste the edges of the paper where desirable, the action of the cams causing the rolls to jump the parts where no paste is wanted, or rather where its absence is necessary.

Passing on, the half-made envelope is struck by a second set of knives, three in number; of the first two, one cuts off the unnecessary edge of the overlap, and the other cuts out the shape of the cover. The third knife, which is heavy and blunt, catches the envelope at the creased line, which is to form the inside of the bottom edge, and drives the envelope down between two rollers, in passing through which the envelope is folded, and the side edges are firmly pasted together. The envelopes are caught in endless tapes, which are carried by a series of slowly-revolving wheels. Each envelope laps closely over the one behind it; thus the only portion of all the envelopes which remains exposed is the three-eighths of an inch of the inside edge of the cover, which has to be gummed so that the envelope can be sealed when it is used. These tapes carry the envelopes round one large wheel forty inches in diameter, and thirteen smaller ones, each thirty inches in diameter, these wheels over which the envelope passes on its back being cut out so as not to interfere at all with the drying gum.

As the envelopes pass over the large wheel they are struck by a flat revolving brush, which is fed with gum-arabic from a roller revolving in a reservoir, and which

transfers it to the envelopes, gumming some half a dozen of them at each revolution. Immediately above, the envelopes pass under a fan which has an exceedingly rapid revolution, the action of which thickens the gum and gives it a great tendency to harden and dry quickly on the paper. And then the envelopes go on their long and slow journey round the thirteen smaller wheels, being perfectly sound and dry before they reach the last one, and entirely complete with the exception of folding over the gummed cover. On leaving the last wheel the envelopes pass into a machine which performs this very service, and then slides them over plates into brass boxes placed at intervals around a revolving carriage-plate, in which they are automatically counted. On its way to the boxes the envelope passes, as we have said, over a plate. This plate has two holes in it, in which two expanding punches work with a vertical motion. If an envelope skips, the punches descend through the holes; but as no expansion takes place, they return without having added to the count.

When, however, an envelope is on the plate, the punch expands and the pressure depresses the plate. The plate has a connecting rod governing a shaft, to an arm of which a panel, working in a ratchet, is attached. The depression of the plate thus reacts on the panel, and tooth by tooth, at every stroke of the arm, the ratchet revolves. The ratchet, however, has a heavy dog attached to it, opposite its twenty-fifth tooth, and the machine is so arranged that when twenty-five envelopes have passed between the plate and the expansion punches, the dog shall strike in passing the cog of the vertical shaft which carries the revolving carriage, on the plate of which the brass envelope boxes

are placed, and give just a sufficient turn to bring the next box into position. As fast as the envelopes are removed from the brass boxes the ordinary fastening is bound around them, and they are packed away in large boxes. Fully 120 envelopes can be made in one minute, the average daily product being 60,000. This machinery, which is the invention of Mr. D. J. Ferry, attracted vast crowds of people, mechanics among the number, who seemed to be fascinated by its automatic working powers.

In the same section was the

Gumming and Folding Machine for Envelopes,

Exhibited by Samuel Raynor & Co., of New York. In this machine the envelopes were not cut out from the web; they were cut out previously by steel dies, after the fashion of paper collars. The shaped envelopes were placed on packages on a bed-plate. Over this plate was the gummer, a die on a revolving shaft, the shaft working on two supports, with a vertical motion. As the shaft revolved, the die, on the upper motion of the guides, came in contact with a roller covered with gum, and on the downward motion it came in contact with the edge of the upper cover of the envelope with which it corresponded in shape, and transferred the gum to the envelope. Immediately after the gumming a second die, or "picker" as it is called, which is suspended from a cross-head supported by two vertical guides with an up and down motion, fell with a blow on the corresponding edge of the lower cover, and gummed it; the flat edge of the die, nearly an eighth of an inch thick, "picking" up the envelope and detaching it from the pack so as to allow it to be carried by nipping guides over an opening, with a pressure plate

below, when it was caught by a plunger the exact size of the body of the envelope, and was creased and thrust down on to the pressure plate below. On the return of the plunger, pressure-shapes from all four sides folded over the laps and the covers, pressing and pasting the two laps and the lower cover firmly together, but leaving, of course, the upper cover free.

The envelope is then completed with the exception of drying the gum on the upper cover. This was done by a contrivance which struck one more favorably than the numerous wheels of the Lockwood machine, inasmuch as it was exceedingly compact and occupied comparatively little space. It is this: on the retirement of the pressure-shapes the envelope was shot by a spring into a trough, from which it slid between four spiral screws about three feet long. There were two sets of these screws, the first having a downward working, and the second an upward working thread. The envelopes passed slowly down, and on reaching the bottom were carried by a plate, working backward and forward, over to the upward working screw. The journey down and up occupied about ten minutes, the two sets of screws carrying about 600 envelopes at once. The Raynor machine will gum and fold 30,000 envelopes a day. It was certainly one of the most compact machines we ever saw, and it did its work thoroughly and without a hitch. A young girl can give it all the attendance and attention it requires. All she has to do is to supply the machine with shaped paper, remove the envelopes as they accumulate at the top of the spiral springs, and see that the gum reservoirs are kept charged.

Elaborate Wood-turning.

Of the hundreds of curious mechanical operations in Machinery Hall, one of the most interesting was that of fancy wood-turning, which was exhibited near the centre of the main aisle. Like the manufacture of fancy glassware, this kind of wood-turning depends for its excellence almost solely upon an educated eye and muscle guiding the few simple tools that are used. The turning-lathe was operated by a belt connected with the shafting of the Corliss engine. The finer the work required the more rapid the revolution of the lathe must be. Fixed firmly in the pulley, perpendicular to its centre, was a horizontal steel spindle where the wood to be turned was fastened. If a chalice was to be made the wood was cylindrical, and while it was in rapid revolution the machine, with a gouge having a semi-circular edge, hollowed out the cup, making the chips fly. He then held a chisel against the convex surface of the cylinder, shaping the outside of the chalice almost while one could say Jack Robinson, the chips darting off like electric sparks. A wooden chalice, having a cylindrical ring of less diameter than either the base or the bowl, was formed by leaving a circular disc fast to the standard when shaping the outside of the chalice. The cylindrical ring was then magically shaped and freed from the standard by a narrow-edged gouge. Many persons were puzzled to know the process of making chalices and other articles composed of different kinds of wood, varying in color and yet apparently turned out of one piece. This was done by gluing the different woods together to form the cylinder and then operating as before.

Illustrative of the silk manufacture in the United States we must make special mention of the

Nonotuck Company's Silk Machinery,

As affording another of those complete displays of processes which go such a long way to educate the masses, and which formed such an overwhelmingly important feature of our late International Exhibition.

To begin with, the skeins of raw silk, just as they came from China or Italy, were strung upon winders for the purpose of being wound on to bobbins. This was a very simple process and done on very simple machinery; the only mechanical aid of any consequence being a reciprocating cam, which gave a lateral motion and distributed the strand of silk equally over the bobbin. These bobbins were then transferred to the "doubling" machine, on which any number of threads, from three up to ten, are wound together. But this machine involved one or two very pretty movements. As in the case of the winder, the equal distribution of the combined thread on the bobbin was regulated by a reciprocating cam, but a very neat attachment also stopped any one bobbin the moment one of the threads making the combined thread snapped. Immediately under the bobbin on which the threads were jointly wound there was an arm rising from the balance-frame. In the event of one of the threads snapping, the guide through which it ran, and which was only supported by its tension, fell back against the balance-frame. Its weight was sufficient to displace the frame and bring forward the arm; and the arm, having an elevation, raised the bobbin and unshipped it, at once stopping its revolution. By this ingenious arrangement the main thread was kept

of one continuous size without any trouble, because it could not run on without the companionship of all the minor and component threads. On being taken from the doubling-machines, the bobbins were placed on the "spinner," which gave the various threads a sufficient spin to make a strand in the process of unwinding. The bobbins then went to the "twisting" machine, on which the threads from three of them were firmly spun and twisted together to make what is called machine-twist silk, but from only two bobbins to make sewing-silk. Both kinds of silk were twisted twice, but with this great difference—machine-twist was first twisted to the right and then to the left, while sewing silk was first twisted to the left and then to the right. The silk was then rewound into skeins, and after being washed in strong soap suds was dried and stretched. The length of these skeins was regulated with great nicety by an ingenious adjustment.

An eccentric drove a ratchet wheel with a dog on it, and the adjustment caused the dog to strike the shipper and stop the winding machine the moment the desired length of silk had been wound into the skein. The silk was now ready for the dyer, and after being dyed was again wound in bobbins preparatory to "spooling." The spooling machine had a feed shaft with a right and left hand thread on it and a half nut on either side. This arrangement gave an easy and regular direct and reverse lateral motion to the guide, the spool remaining stationary; the length of silk wound on to the spool was regulated by a binder and a strap attached to a weight, both being governed by a treadle. The operator knew exactly how many times the guide should travel right and left to fill the spool. By pressing the treadle, the weight below the shaft was raised

and released the strap from the shaft, while at the same moment, and equally governed by the treadle, the binder—which was a small wheel—pressed the belt against the shaft, causing it to revolve.

The moment the spool was full the operator ceased to press the treadle, the binder released the belt, and the strap, attached to the weight below, fell on the shaft and stopped it instantly. The same arrangement enabled the operative to stop the revolution of the shaft in case of accident to the spool or thread, as the machine cannot run unless the foot is pressing on the treadle, and the moment the pressure ceases the machine comes to an instantaneous stop. One of these spooling machines will wind 110 dozen of spools a day; and some conception of the extent of the Nonotuck Company's business may be gained from the fact that they have no less than sixty of these spooling machines in constant operation in their factory, where they employ over six hundred hands. Only one thing has to be done to render the spools ready for the silk. It is to stamp their two ends with the brand and the name of the company. This was done by one of the prettiest and most perfect little pieces of machinery in the hall, and the stamping of the colors into the wood obviates the falling off of printed labels, as is sometimes the case with cotton spools, from insufficient gumming in the labeling machine.

The spools were fed from a trough, through a hollow post, into the stamping machine, an arm pushing them one by one as they came out at the base of the post into a groove, where they were caught and held in position by a small weight; the spool at the same time pushing back a spring. Two spools were in the grooves at one time; the one receiving its first and the other its

second stamping simultaneously. At either end of the spools were two dies, one inked with red and the other with blue ink. These dies pressed upon the spools simultaneously, impressing the name of the company in one color, and, on the second impression, the brand in the other color. The outer spool was then released by the momentary rising of the weight, and the spring against which it was pressing kicked it out into a basket. The groove bed revolved, bringing the inner spool to the outside and a new spool into the place of the inner one, the operation being repeated *ad infinitum*. As the dies sprang back from the spools they took a quarter turn upward, which brought them under the inking rollers; the rollers being inked and moving in a similar manner to those in a job printing press. There were four composition rollers to each ink reservoir and pair of dies. The whole stamping machine was divided into two parts, each the counterpart of the other, and turned out the stamped spools at the rate of 120 a minute. One machine will stamp 70,000 to 80,000 spools a day, sufficient to fill ten ordinary flour barrels.

Grapple Dredging Machine.

In Machinery Hall the American Dredging Company of Philadelphia exhibited one of their grapple dredging machines, an illustration of which we give, together with one showing the patent grapple used.

This machine is adapted to excavating material ranging from loose rock or gravel, sand and clay to ordinary river silt, in depths varying from three to twenty-five feet; to elevating the material so excavated to heights up to twenty feet above the surface of the water, or fifteen feet above the level of the deck of the

dredge; and to depositing the material directly from the dipper, to the right or left hand, at pleasure, without change of machinery, at distances within thirty feet from the side of the dredge, according to the length of the boom used.

The machine is also adapted to the excavation of channels of rivers, the deepening of docks, slips and basins, depositing the material therefrom in lighters or scows at its side, or on piers where the spaces are too contracted to admit the lighters alongside, or when it is desired to fill the piers.

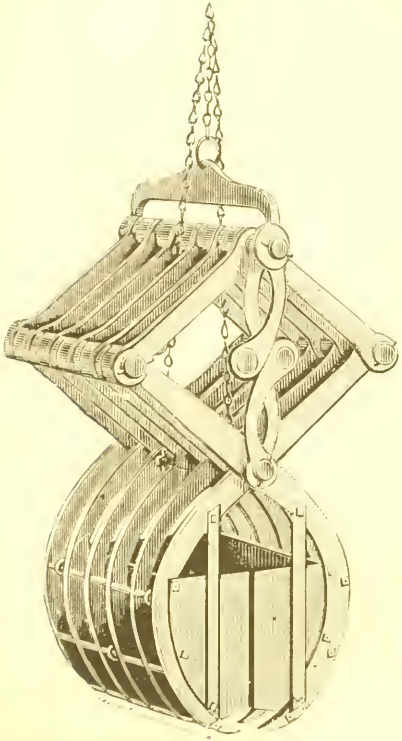
The hull measures fifty feet in length, twenty-one feet in width, six feet six inches in depth of the hold. The engine has two cylinders, each ten inches in diameter, sixteen inches stroke of piston, operating one main shaft, on which are placed two sets of Weston's patent disc frictions.

This dredge has a capacity of at least one thousand cubic yards per day of ten hours, in ordinary river silt, in depths not exceeding thirty feet, and in cuttings of six feet or more in thickness.

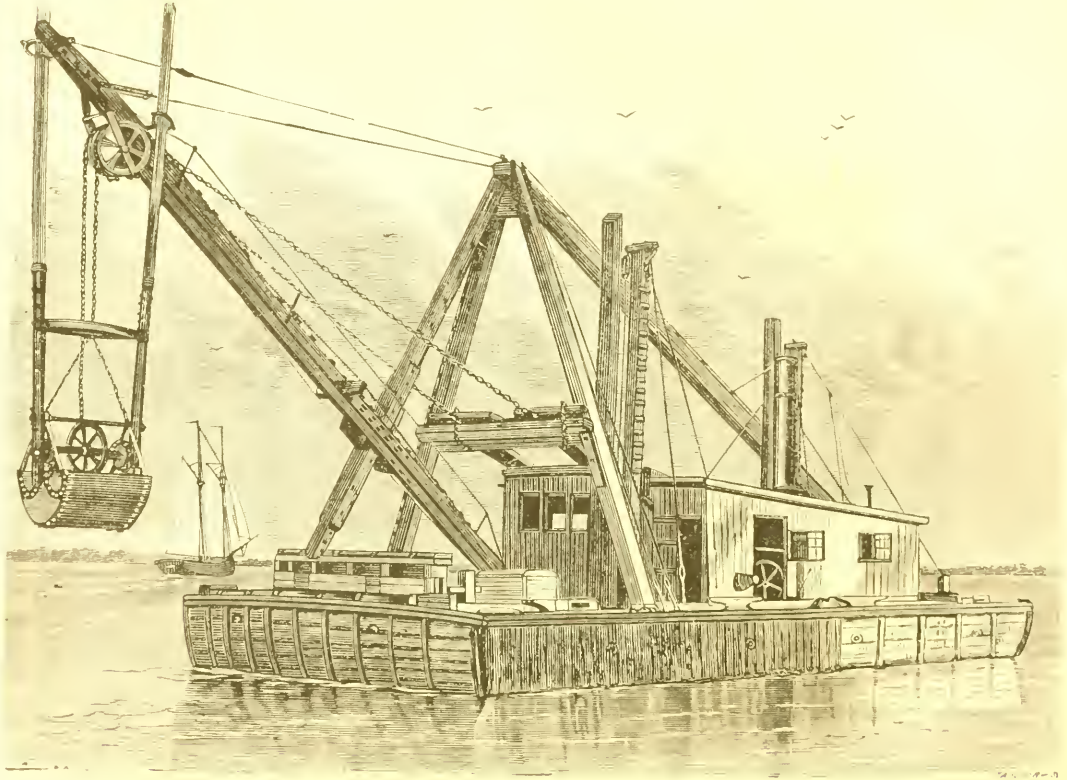
For operating in compact clay or boulders, or for breaking up wrecks or cribbing, or drawing piles, etc., a special grapple, such as is shown in accompanying illustration, is used.

Patent Gunpowder Pile Driver.

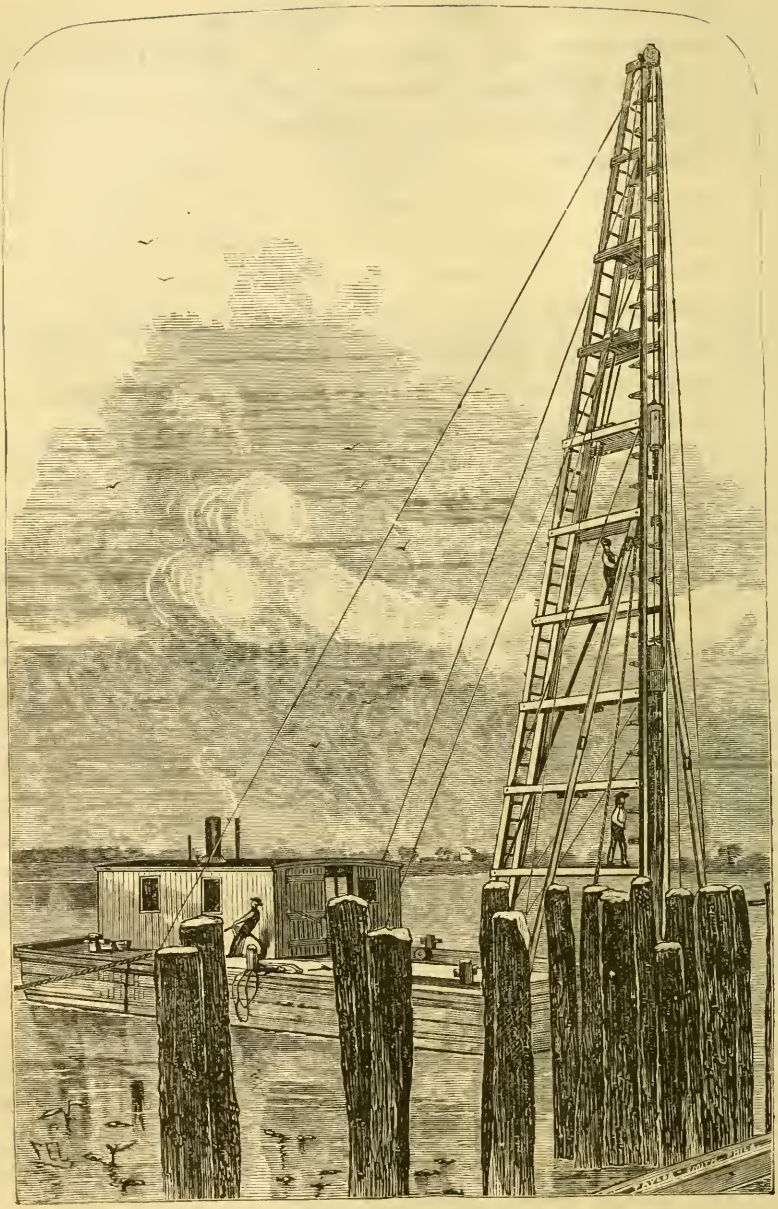
This powerful machine, also exhibited by the American Dredging Company, of Philadelphia, and an illustration of which accompanies, has been in practical and successful operation four years, and been found most economical and efficient. By it, a pile forty feet long and fourteen inches in diameter may be forced its entire length into firm ground, in one minute, by



PATENT GRAPPLE FOR DREDGE.



GRAPPLE DREDGING MACHINE.



PATENT GUNPOWDER PILE DRIVER.

the successive explosions of cartridges composed of an ounce to an ounce and a half of common blasting powder, without the slightest injury to the pile; obviating entirely the necessity of banding the head of the pile, before it is driven. There is no blow or concussion, as between solid substances, in the application of the force to the pile; the power is transmitted to, and acts upon the pile through the medium of an intervening stratum of air; and hence it partakes of the character of hydraulic pressure, applied with suddenness and rapidity, *forcing* the pile into the ground, instead of *pounding* it down, as by the old process.

It is easily operated by the working-crew of an ordinary steam pile driver; greater penetration is secured, with much greater ease than by that process; no banding nor protection whatever is required for the pile heads; no loss of any portion of the pile is occasioned from its injury, and the pile is infallibly guided "home" without assistance, with a saving of time and avoiding all risk of injury to workmen in this respect; while the rapidity of its action, coupled with the enormous pressure of its "blows," is believed to be unequalled by any other process.

Manufactures of Glue, Curled Hair, etc.

Among the many manufactures, which are a great public benefit, inasmuch as they make valuable waste products which otherwise might become a cost to the community to remove, by producing articles therefrom which add to the comfort of mankind and the progress of the arts and sciences, the manufacture of glue, gelatine, curled hair, etc., takes a leading rank. There was a very handsome display, at the Centennial Exhibition, by Baeder, Adamson & Co., of Philadelphia, a

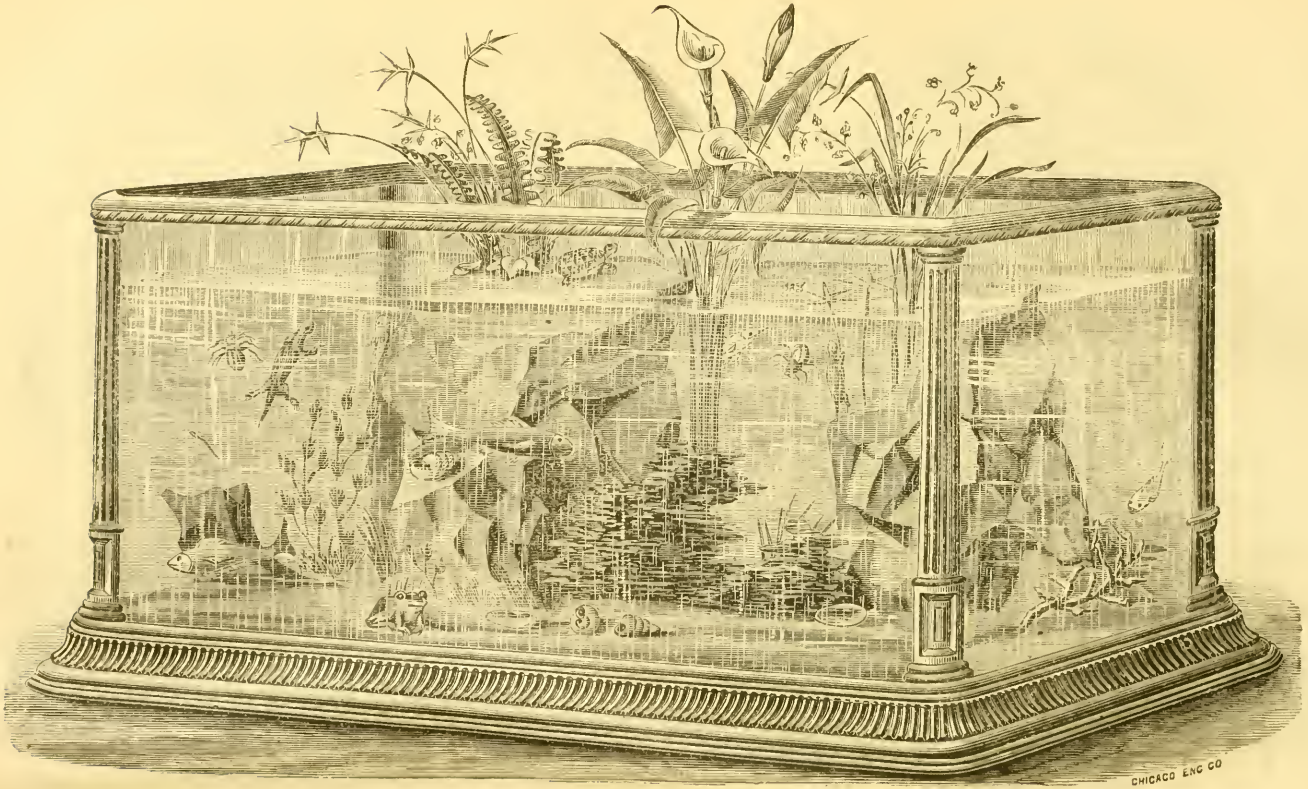
firm occupying a prominent place among the industrial manufacturers of this country. The exhibit comprised the various goods of which they make a specialty, such as glue, gelatine, sand and emery paper, emery cloth, curled hair in all its varieties, raw hide, whips, felt, and felting for covering boilers, steam pipes, and refrigerators. The firm also grind emery stone, which is used upon their paper and cloth, as also flint stone, for the manufacture of sand-paper and other purposes. Samples of the manilla paper made in their paper-mill at Riverside were also shown; this is used in the production of sand and emery paper.

House-Furnishing and Florists' Goods.

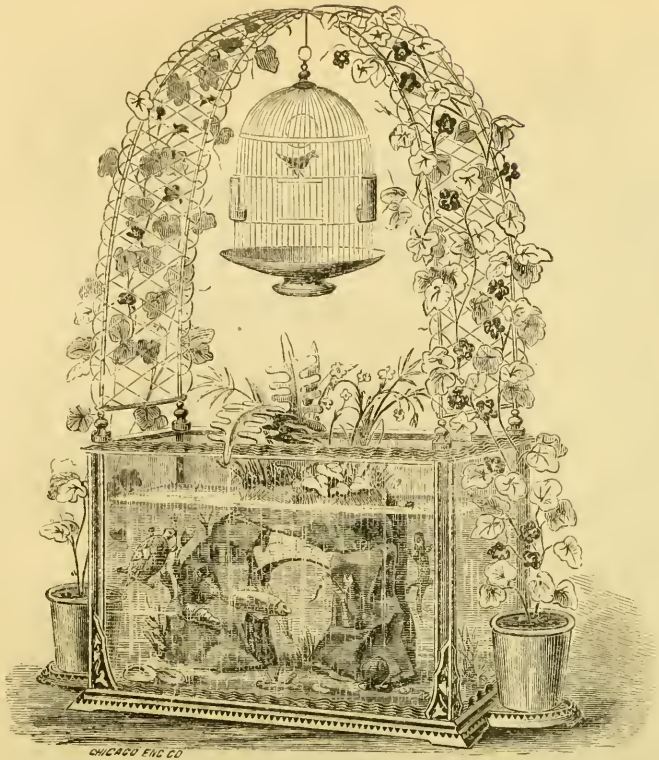
The Racine Hardware Manufacturing Company, of Wisconsin, made a very fine display of their goods, but we were more especially attracted by that of what may more properly be classed as florists' goods; illustrations of some of which we give.

These articles are specially adapted for the home-cultivation of flowers during the winter season, and the aquaria are beautiful ornaments for the home, and are a perpetual source of amusement and instruction. They have the peculiar advantage of making us acquainted with forms and habits of animated existence which are commonly hid from our inspection. Thus their influence upon the family circle is wholesome and elevating, tending constantly to awaken in all the members, both young and old, an increased love for the contemplation of the wondrous skill and wisdom of the great Creator.

We have an illustration of a Fernery with folding flower-stand; the height of this was forty inches; size of fern case seventeen by fourteen by thirteen inches, and the weight sixty-six pounds.



WINDOW AQUARIA.



ARCHED AQUARIUM.

TABLE AQUARIUM.

Another was that of a Fern Jardinier, also with a folding flower-stand below.

There are three different cuts of Aquaria, being those that more particularly struck our fancy, although there were a large variety of designs; one of these was intended for a table, and was in the form of a glass bowl twelve inches in diameter, holding nearly two gallons of water. This could be transformed into a table aquarium and bouquet holder by the addition of a vase, wire screen and glass shade. It is well known that cut flowers retain their freshness a long time when kept under glass, and some of the choicest foliage plants retain their beauty only as kept from dust and gas. A second was an arched aquarium, having an arch covered with ivy or other climbing plant, and a bird cage suspended from the centre of the arch. The third was a large aquarium intended for a show window, prepared for connecting supply and overflow pipes.

In addition to these we give an illustration of a very pretty Lawn Settee, with folding tent. The back of the settee reversed like a car seat, and the canopy could be thrown backward or forward, as desired.

Gas Fittings.

That this branch of household decorative art has advanced and become a very important branch of American industry was proved by the numerous and very elaborate displays made in the Exhibition by several firms. One of the most attractive exhibits was that of the Archer & Pancoast Manufacturing Company, of New York, who are principally engaged in the manufacture of chandeliers and all kinds of gas fitting. One of the most striking features of this exhibit was their "Extension Centre Light Chandelier,"

an attachment consisting of an Argand burner affixed to the main body of the chandelier and in the centre, and capable of being lowered or raised to any desired distance. The goods exhibited were worked in bronze, gold, nickel, brass, steel, and imitation, and the crystal work and frosting attracted great attention and were much admired.

Sugar Cane Mill.

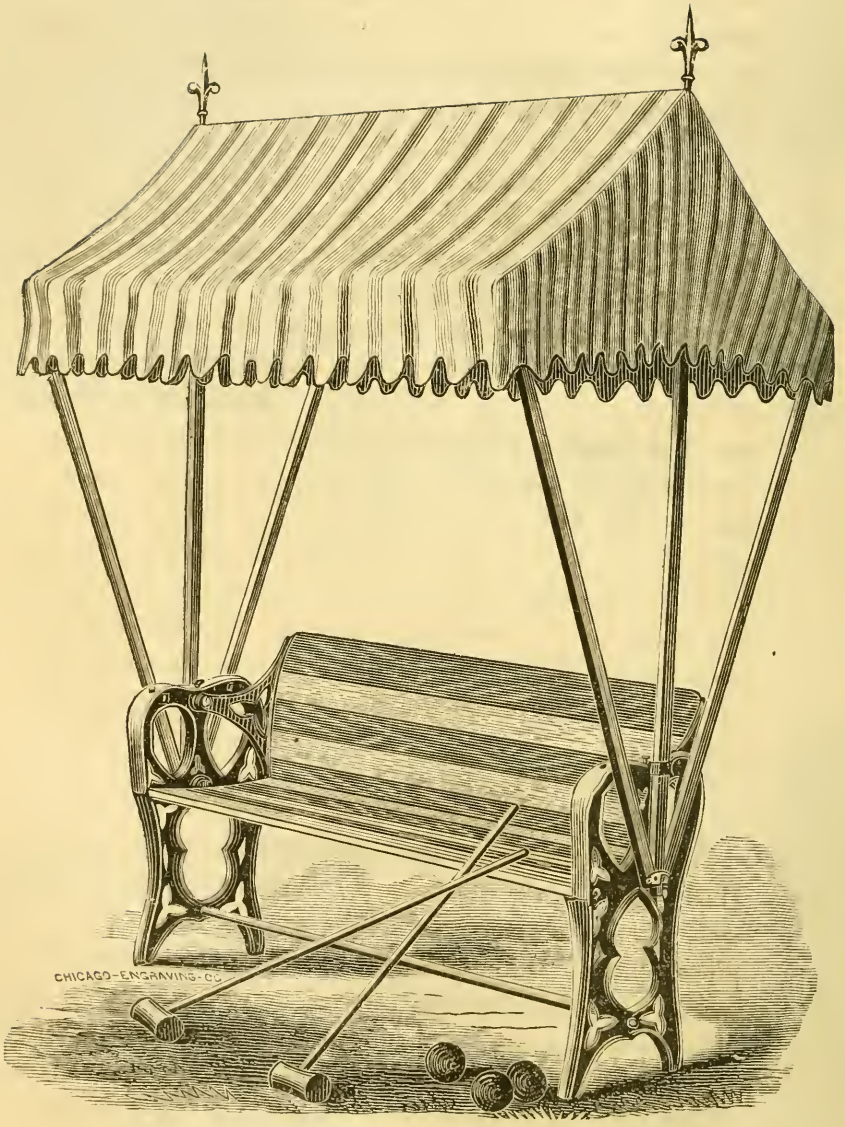
A huge sugar mill for cane, weighing close to 500 tons, was one of the most solid-looking institutions in Machinery Hall. It was intended for the largest size cane sugar mill, such as are in operation in Cuba and Louisiana. The motive-power was a powerful walking-beam engine of 150 horse-power. On the end of the shaft of the fly-wheel was a two and a-half feet gear wheel that gave motion to another gear nine feet in diameter, which motion was transmitted by a third wheel, three feet in diameter, in the same shaft to the large twenty-feet gear that carried in its immense shaft the upper of the three great rollers. The two lower rollers moved in opposite direction to the upper, and received their motion by gear wheels from another on the main shaft. The rollers move at a low rate of speed, making one revolution to twenty-two of the engine. There was also at the same section a centrifugal machine for the purpose of freeing the sugar from the molasses.

The Cotton Press,

Built by the Taylor Iron Works, of South Carolina, was another of the very heavy weights of the machinery. It was a double engine, with the cylinders inclined at an angle of about thirty degrees, and operated the powerful double and direct-acting hydraulic press,

FERNERY WITH FOLDING FLOWER STAND.

FERN JARDINIERE.



CROQUET SETTEE WITH FOLDING TENT.

the jaws of which worked in a double upright standard and guides, that were themselves of immense weight and strength. This was one of the most powerful presses of the kind that has ever been built, and the entire press and engines aggregated in the neighborhood of 250 or 300 tons of iron.

The Pin Machine,

Or rather the machine for sticking the pins in the papers after they are manufactured, was one of the very interesting little machines that attracted attention. After the pins are finished they are fed into a brass hopper of this machine, from which they slide down a steel gutter, with a small groove in the angle just sufficient to allow the body of the pin to rest in it, but not the head. They slide down until they reach a certain point, where the pin is turned at right angles, and at the same instant a small hammer or plunger strikes it into a strip of paper, fed by clock-work, and with two parallel ridges dented in it, at the rate of 300 per minute. As fast as these strips receive the pins they are wound upon a roller, and afterwards cut into suitable length, rolled, and pressed into shape ready for the market.

Apparatus for Printing Wall Paper.

Near the entrance at the northwest part of Machinery Hall was the printing press for making wall paper. It was upon the same principle as the calico printing press, except that here the printing rollers were of wood, with the patterns raised about three-sixteenths of an inch and faced with metal. A large drum carried the paper to be printed, and it passed successively under these rollers, which were equal in number to the number of shades of color in the pattern. The press on

exhibition printed with twelve different colors, each roll engraved with the part of the pattern of the same color, and by a peculiar arrangement each was printed as the paper passed it and brought that color in contact. The color to be printed was placed in a small trough as wide as the drum, and a flannel apron passed over a couple of rollers and in contact with the printing roll. After passing under the entire set and the final touches the paper was placed in the drying racks, which were arranged over a system of steam-pipes. The whole of this beautiful operation was shown practically in the building by experienced hands.

Machine for Cutting Bevel Gear Wheels.

Near the Corliss engine was a very peculiar machine for the purpose of finishing the teeth of bevel or mitre wheels. It was a very massive machine, and looked like a huge quadrant set on edge and a great gear wheel at the end of the curve. It was operated by a stationary engine, and by an automatic arrangement the teeth were cut to any form and any depth. The wheel to be cut was placed upon a horizontal mandril, and the cutting slide brought to the proper angle by the large geared wheel at the outer edge of the arc. There was a former that was set in the arm radiating from the centre of the arc, and which carried the cutter slide.

The Vacuum Pan,

For clarifying sugar, was situated at the west end of the hall, and was a very imposing exhibit on account of its enormous dimensions and the beauty of workmanship. Rising to a height of some thirty-five feet the huge ten feet vacuum pan looked like a monster carboy with ash and walnut lagging. There were two plat-

forms or stories one above the other. On the ground floor was a powerful horizontal engine working an air-pump to make the vacuum in the pan. The air-pipe connecting with the top was some eighteen inches in diameter, of iron, and had several drums. Underneath the pan was a large circular valve to run off the product of evaporation. There were also connected with this drying pan sugar boxes to receive the sugar and moulds for moulding the sugar loafs. The whole apparatus was of the most complete description, and was a fair sample of the vacuum pans used in the largest sugar refineries in Cuba or Louisiana.

Tailoring by Steam.

Tailoring by steam, or at least a very important part of it, is accomplished by a couple of machines that were on exhibition—one in the French department and the other in the American. The latter consisted of a long cutting-table, fitted on one side with a long guide rail the whole length, and carrying an apparatus consisting of an arrangement by which a rapid up and down motion was given to a narrow chisel. This latter could be moved so as to cut in any direction with the greatest ease, and could be so handled as to stop cutting whenever desired, so as to pass over spaces. It was claimed that it would cut from a single thickness up to one and a quarter inches solid, and make the cut in a cleaner manner than it could be done with shears, and travel and cut without the removal or pinning of the material.

There was also one of these machines in operation at the United States Government Building. There was another variety of the same make called the "Standard," in which the work was moved instead of the cut-

ter, and will cut 1,600 pairs of pants, and other garments in proportion, according to cuts.

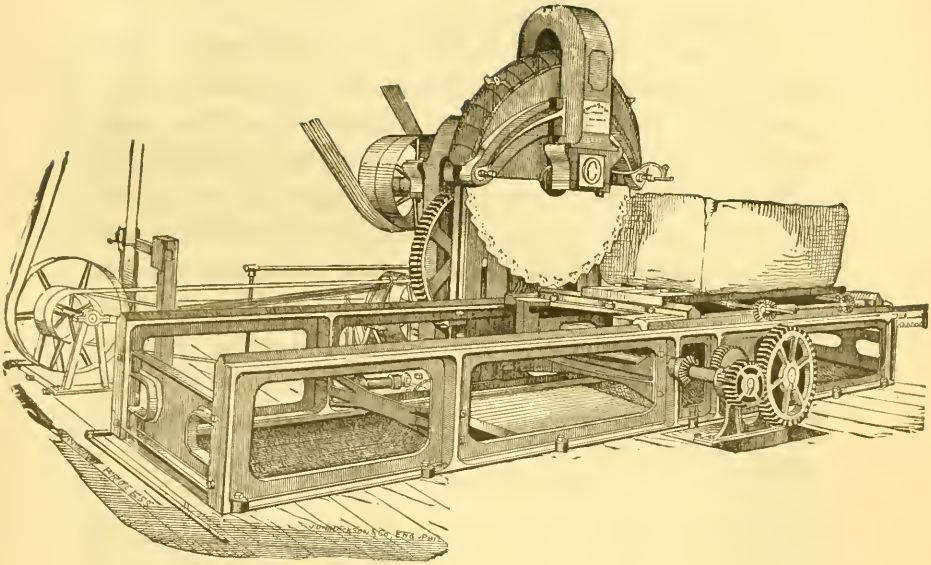
The other, which was in the French department, was much heavier in its construction, and operated with a steel ribbon that was given rapid motion, and the cloth was moved up against the edge, as in the "Standard."

Among the many curious and ingenious machines which we saw, we must mention two, both of them not very far from the big Corliss engine, and close to each other. One was for winding spools of cotton, exhibited by Clark; and the other for putting the labels on both ends of a spool, and cutting them from a printed sheet by one operation, exhibited by J. & P. Coats.

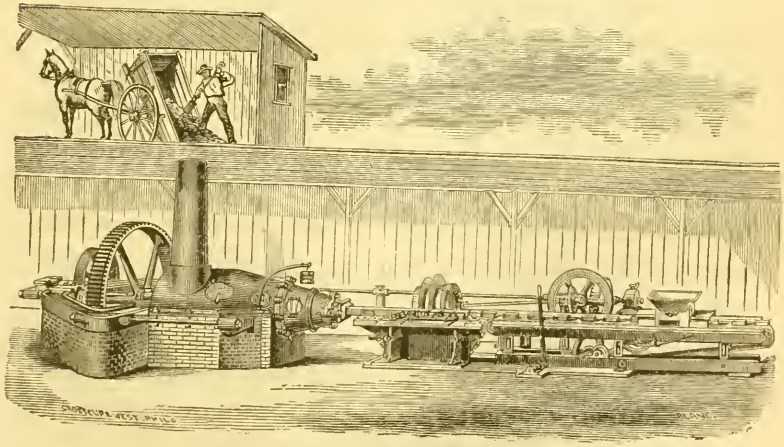
The Blake Crusher,

For crushing and breaking of stones, ores, and other hard substances into fragments of moderate size, to be used in the construction of roadways, in ballasting railroads, and in mining operations, which was shown by the Blake Crusher Company, of New Haven, Connecticut, deserves special mention, as being now generally in use wherever macadamized roads are constructed.

It was very simple in construction, but was made strong and massive on account of the great strain and wear to which its working parts are subjected in crushing minerals, some of which yield only to a pressure of over 27,000 pounds (thirteen and a half tons) to the square inch. Its principal features were a heavy frame in which were set two upright jaws, one of which is usually fixed while the other has a slight vibratory movement imparted to it by a rotating shaft. These jaws are wide enough apart at the top to receive the stones to be broken, but converge toward each other below, so that at the bottom the opening is only wide



DIAMOND STONE SAW.



ARCHIMEDEAN BRICK MACHINE.

STONE-CRUSHER IN OPERATION.

enough to permit the fragments to pass when broken to the required size. It will thus be seen that when a mass of stone or ore is placed between the jaws at the top, the vibrating jaw advancing cracks it into two or more pieces; then receding, it liberates the fragments, which drop lower down between the jaws, and are crushed again at the next movement of the jaw; and so on until all the fragments having been sufficiently reduced have passed out through the narrow space at the bottom.

These machines are made of different sizes, some of them being capable of taking in a stone weighing half a ton and reducing it in five seconds to fragments of five inches and downwards. The opening at the bottom of the jaws may be varied at pleasure so that fragments of any size may be produced.

As a labor-saving machine also this crusher appears to be admirably adapted. We were told that one of the fifteen by nine machines for macadamizing uses, will produce over one hundred cubic yards of road metal per day, the fragments being one and a quarter inches in diameter and less. This is not only equal in quantity to the work of one hundred men, but the quality of the product is said to be better than that of hand labor, because there is enough of fine material in it to make a perfect road surface at the outset.

The illustration given represents one of the many ways of setting up or locating this machine for breaking stone for roads, a purpose for which it is specially adapted. The crusher is placed on an elevated platform extending from the side of a hill or bank, which is easily accessible for loads of rock brought from the quarries shown in the background. When located as shown, the loads of stone can be dumped close to the

jaws of the crusher, and the cart, driven down under the spout below, can be filled with the broken stone in from six to ten minutes, and driven off to the road-bed, and the material dropped at the precise spot where it is required. This arrangement, it is obvious, saves much handling, and consequently decreases the cost of the finished work. Where the formation of the ground is such as to admit of it, a further saving is effected by placing the crusher on a foundation so much lower than the platform that the top of the jaws of the machine will be level with the surface of the dumping floor, so that the stone to be broken can be rolled or pushed into the jaws. By this arrangement one or two men can feed the machine faster and better than three with the other plan, and do it easier too, for the simple reason that they have no heavy lifting to do. In working on level ground, in addition to the disadvantage of being forced to handle the stone both before and after breaking, no space is afforded for an accumulation of the product, an important consideration. With a side hill location, ample room is secured for the broken stone, which can accumulate largely under the spout, and should fall on a plank floor to facilitate shovelling.

CHAPTER VII.

UNITED STATES EXHIBITS.

Killing Time and Labor.

A PHILADELPHIA firm exhibited a noteworthy labor-saving machine in Machinery Hall. Although not of very recent invention, it has never, until now, been in the market. It consisted of a flexible shaft of wire cable, revolving within a wire-lined gum tube, one end of the shaft being connected with the motive apparatus and the other effecting the mechanical association. If marble is to be polished, a cast-iron disc, eighteen inches in diameter, is made fast to this latter end, and it revolves with the shaft. The operative spreads cutting sand on the marble, applies the disc, which he easily moves all over the surface at will, and thereby effects the polishing with infinitely less bodily exertion and in much less time than is required in the old-time laborious process of shoving and drawing, jack-plane fashion, an immense block of marble over the surface of the block to be polished.

Among the exhibits in Machinery Hall was a very fine display of wire, and wire cables, of every size and description. Among these was a section of the cable that is being used in the construction of the great bridge across the East river, between New York and Brooklyn. This cable was about sixteen inches in diameter, composed of 6,000 No. 7 galvanized cast-steel wires, and capable of bearing a strain of 22,300,000 pounds.

It is by far the largest cable in the world, and will span the largest space ever crossed by a single span of a bridge. The Americans lead the world in bridge building, and the American system is being followed by all other nations.

Car Wheels.

The exhibits of car wheels were in the western end of Machinery Hall, and in the northern part. A. Whitney & Sons, of Philadelphia, had a variety of sizes, ranging from nine inches to thirty inches, for mining trucks and construction cars. They had also engine and car wheels, and several different patterns of car wheels. In this section were also a couple of steel tires for sixty-inch drivers, and a number of pieces of broken wheels to show the crystallization of metal in chilling.

The Ramapo Wheel and Foundry Company had a fine exhibit of new wheels and others that have shown good service, with their records pasted on their flanges. These wheels were made of cast-iron, with a sufficient proportion of white iron to sink the chill an average depth of about half an inch in the treads and flanges. These wheels, according to the records attached, had been run without injury over 200,000 miles under a Pullman palace car and subjected to severe usage, the life of an ordinary car wheel being limited to 50,000 miles.

The Miltimore Wheel and Axle was an exhibit of independent wheels run on compound axles. In this there was a solid axle, over which was a sleeve, with a space of about one inch between the two. This sleeve fitted into a casting at each end, inside the wheel, and the casting passed through the wheel. At the outer end it was trimmed out so as to leave a broad shoulder,

and in this was inserted a set of brasses with round in centre. Back of this brass, and also in front, was a circular wedge, to fit the round surface of the brasses, and it was also bevelled a little to allow a circular iron ring to be screwed firm and tighten it. The journal was oiled by means of an oil box, into which a hole opened from the end of the axle and led down to the inner surface of brasses. It was claimed for this wheel that a saving of 48½ per cent. of motive power can be made by its use, and a saving of fully one-half of fuel, etc.

The Hamilton Steel Wheel Company exhibited a palace car wheel, which, after 156,800 miles of running, was as sound as ever to all tests. There was also a case with a great number of pieces of broken wheels, to show the internal grain of the rim and steel.

The Jersey City Car Wheel Company exhibited a number of wheels with cast-iron web and steel tires. A web was shown with the tire half way on, to illustrate the manner in which it is done.

The Baltimore Car Wheel Company had their exhibit. Their wheels were mounted on stands and presented a tasteful appearance. These wheels were all made of charcoal iron.

In addition to the foregoing, the Cobdell Car Wheel Company, the Cayuta Wheel and Foundry Company, and the Lehigh Car Wheel Company, had very fine displays of wheels of cast-iron and steel, with some remarkable instances of toughness.

Nevada Quartz Mill.

Nevada was fittingly represented at the Exhibition by a quartz mill in operation. As the mining of the precious metals is the only productive industry of any

consequence that State possesses, she wisely determined to set it forth to the best advantage. The mill cost $20,000, and an appropriation, covering the entire expense, was made by the Legislature. Four mines, the Consolidated Virginia, the California, the Ophir, and the Belcher, sent quartz here and kept the mill supplied; the product was kept separate and sold for the benefit of the respective owners. This ore was packed in sacks containing about a bushel each, and loaded on cars of the Pennsylvania Railroad at the mines and unloaded at the building in the Park, making the entire journey of about three thousand miles without change of cars. The ore was in exactly the same condition as that used at the mills in Nevada. It was a light gray mixture of quartz, stone and white dust, and to the uninitiated had no appearance of value whatever. The rock went to the stamps through a self-feeding hopper, and came out in the form of a powder dissolved in a small stream of water that ran through a trough into the amalgamator—a big, round, sheet-iron box heated by steam. Here the quicksilver was added, and the mixture passed into another circular tank, where it was stirred by revolving arms. The quicksilver seized upon the silver and carried it off into an iron pot, whence the two commingled metals were put into iron pans and heated in a retort, when the former passed off in fumes and was collected, to go through its labor of releasing the silver from the dross again and again. The mill stood back of Machinery Hall, a little distance west of the Hydraulic Annex. Besides the crushing and amalgamating machinery, it contained all kinds of mining implements.

A Diamond Stone Saw

Was on exhibit by a company in Pittsburgh, which was claimed to be a very great labor-saving machine. When

doing regular work it is capable of cutting in ordinary sandstone at the rate of one hundred and fifty surface square feet per hour (counting both sides of the cut), and other stone in proportion, according to their relative density or hardness, leaving the stone perfectly true and in line, beautifully finished, free from spalls, and ready to be placed in buildings, etc. The company state that it can accomplish more work than a hundred men in the space of time, and at an expense not exceeding cost of sharpening and wear of tools necessary to do the same amount of work. In ten minutes the saw, which was seventy-two inches in diameter, cut through a block of hard sandstone, twelve feet long by thirty inches thick, making only a hundred and twenty revolutions to the minute.

In Machinery Hall we saw a

Diamond Drill,

Which, for its particular purposes, was one of the most remarkable tools on exhibition. This drill had for its cutting face the end of a hollow cylinder with diamond cutters set in such a manner as to cut out a solid cylindrical core. Its action on the hardest rock is extremely rapid. In quartz rock it will cut easily ten feet in depth in one day, and through ordinary sandstone a foot per minute. Its peculiar value is in showing the exact nature of the rock or soil through which it passes, and there were shown quite a number of the specimens of the results of their boring. One specimen was the core from conglomerate rock boring that was six and three-quarters inches in diameter, and showed the size taken out by the largest size drills, and the clean nature of the cut, the conglomerate, from its varying hardness, being a difficult rock for any other drill to bore through. In this particular case the rock was 200 feet in depth,

taken from Sugar Notch, Pennsylvania. There was also exhibited quite a number of smaller borings made in prospecting for coal veins and minerals, which showed the strata in a beautiful manner. These specimens of the strata bored into, called "cores," were brought to the surface by means of a tool called a "core-lifter," which was attached to the drill and was adjusted the next above the bit or boring head. The shell or thimble of this tool is of the same size and shape as the core bit. In a recess in the inside of the thimble is placed loosely a tempered open steel spring about half an inch wide, with several ribs to give the proper thickness, and which is sometimes armed in the inside with diamonds to keep it from being worn by the core. When the drill is descending, this thimble is pushed up into a recess where it has no effect, but when the drill is being raised slides down in bevelled sides of recess, and is contracted firmly against the core and carries it up to the surface.

Shingle-Cutting and Sawing Machines.

Several machines for cutting shingles for cottage and farm roofing were on display, but one that was exhibited by Messrs. C. S. & S. Burt, of Dunleith, Illinois, deserves special mention. It is claimed it can turn out 150,000 shingles a day. This machine was called the Evarts' Rotary Shingle Machine, and was constructed as follows:

Upright shafts standing on a square, heavy frame, carrying a horizontal saw each; a circular carriage, about eight feet in diameter, being mounted above the saws. This carriage was divided into twelve spaces, each of which was fed with blocks as fast as they were cut up into shingles. It was driven by two friction

rollers, which caused a uniform and steady feed. The motion was positive and continuous, there being no springs or other gear to get out of order. The dogs were simply weights raised by an inclined plane to drop off the end and fasten the block while the saw was passing through it. A man and a boy are sufficient labor force to attend to the machine, the man to feed the blocks into the revolving carriage, the boy to remove the shingles as fast as they are sawed. This machine turned out wonderfully even shingles. It sawed the blocks up as close as possible, leaving very small slabs or spalts. It took in the largest-sized block, and the blocks only being fastened by the dogs at the moment the saw was passing through it, they could be removed and turned, or, in the case of an inferior block, replaced by a new one without any danger to the man tending the machine, and without appreciable loss of time. A thirty-horse power engine will run the machine, drag-saw, jointer, bolter, etc. The whole machine only weighs about five thousand pounds.

Mr. Burt also exhibited Evarts' Hand-feed Shingle Machine, for sawing shingles, heading, fruit-box stuff, etc. It was a one-block machine, and had a single saw-shaft and a reciprocating carriage operated by hand. Eccentrically geared automatic feed attachments made it optional whether the feed shall be automatic or done by hand. Tapered shingles of any required thickness at top or bottom, and from sixteen to twenty-four inches in length and up to fifteen inches in width, can be sawed on this machine. The full capacity of the machine was from 25,000 to 30,000 shingles a day in good pine or cypress timber, and from 8,000 to 12,000 pieces of heading. Low's Shingle and Barrel-head Sawing Machine was exhibited by the same

manufacturers. This machine had its carriage in a vertical position, as also was the saw. This carriage was counterbalanced. The block was fed out over the saw, and then depressed while a shingle was cut off. The moment a shingle was cut the block rose, but was again fed out for another cut as before. This machine can turn out from 20,000 to 30,000 shingles a day.

Brick-Making Machines.

There were no less than twenty machines for making bricks on exhibition at the Centennial; Canada, Germany, France and the United States being all represented in this class. There was the clay-tempering brick-making machine of Chambers, Brother & Co., of Philadelphia, which was constructed almost entirely of iron.

In the operation of this machine, the clay—taken in its crude state from the banks—was dumped by the side of a large funnel. When necessary, it is mixed with loam, sand, or coal, and the requisite amount of water to reduce it to a proper consistency is added, and, the mixing process being completed, it is fed into a hopper, from which it falls into the machine. Inside the machine there was a revolving horizontal shaft, into which were set strong knives of steel. These knives cut through and through the clay, thoroughly mix and temper it, and, being set spirally, push it forward. On the end of the tempering shaft there was a conical Archimedean screw, revolving in a cast-iron case, the inside of which was ribbed, so as to prevent the clay from slipping and revolving in it. It was also chilled in order to prevent wear. The screw being smooth, the clay slid on and formed, as it were, a nut. But as the

screw revolved, and could not go backward, the clay also had to go forward. This operation had a further tempering effect upon the clay, which, by the time it reached the shaping die, had assumed the form of a solid round column. The die was of a peculiar construction and was designed to reduce the round column of clay to a rectangular form; its breadth and thickness being the breadth and thickness of a single brick. At the same time the clay was forced into the corners of the rectangular or finishing part of the die, so that the angles of the bar of clay, when it emerged from the die, were perfectly well defined and square. By the combined action, first of the knives and then of the Archimedean screw, the bar of clay was forced through the die and is carried away on an endless carrier in a solid bar. And here Mr. Chambers had a most ingenious device for cutting the bar into bricks. The bar, as it passed along, struck a spiral cutter, with a two-and-a-half turn, the blades of which, following the movement of the bar, cut it and fit into the slats of an endless chain, which ran on the under side of the bar, thus dividing the bar into bricks of equal dimensions, and leaving a clean, straight edge and sharp corners on either side of each brick. The bricks, thus cut from the continuous bar, were separated and carried by another endless chain through the sanding-machine. This machine consisted of a chamber into which, by means of a centrifugal blast of air, a continuous cloud of fine dust or sand was thrown. The sand prevents the bricks from sticking together, and was said to improve the color of them when burned.

The bricks on leaving the machine are placed in hacks under sheds to dry, or they are placed in a drying room to be dried by artificial heat, or they are

passed through a heated tunnel direct to the kiln. Under shedding, from six to fifteen days are required to dry the bricks, while only from eight to twelve hours are occupied in drying them by the artificial process. One of these Chambers' machines will make from fifty to eighty bricks per minute, or at the rate of from twenty-five thousand to thirty-five thousand a day.

The Gregg Brick Machine Company had one of their machines in daily operation in Annex No. 3, Machinery Hall. This machine had a circular mold-board, rotating intermittently, which had eight sets of molds, with four in each set, making thirty-two molds in all. The crude clay was fed into a hopper, from which, by the action of agitators, it was filled into the molds. The molds, as the board carrying them rotated, passed under a roller and received a steady pressure as they passed. This was a sort of preparatory pressure. The molds then passed under a horizontal knife, placed diagonally, the knife removing from each mold any excess of clay developed by the preparatory pressure. Passing on in their rotary journey, the molds received pressure number two. This was an upward pressure and was caused by a toggle joint. The third and last pressure was a double one, both upward and downward, and was brought about by a simultaneous action of cams and toggles. The bricks were then discharged from the machine on to an endless carrier, and transported by it direct to the burning kiln. The expense of working the machine is trifling, it being entirely automatic in its operation.

The Page Belting Company, Concord, N. H.

This company had on exhibit a large and varied display of belting, ranging from one-eighth inch round in

all sizes to thirty inch double, including usual sizes of single, light double, and heavy double belting. This was a very interesting exhibit of these transmitters of power—the belting.

Amid the whirl of thousands of revolving wheels in machinery, the apparently endless miles of belting furnished by the Page Belting Company attracted much attention. Near the great Corliss engine was a mammoth thirty-inch double belt in constant operation, driving a great shaft which made 240 revolutions per minute, which was double the speed of the other main shafts. This belt only stretched one inch during the whole time it was on exhibition. Two large belts, one a twenty-inch banded, and the other a fifteen-inch double, ran as driving belts in the machinery annexes. This company also exhibited a large stock of single, light double, heavy double, and round belting, the heaviest belting 100 feet long; and from this class of heavy goods, down to hame strings, mill straps, and loom pickers, the exhibit was full.

In addition there were some interesting novelties in the exhibit made by this firm. Among these was an immense ox-hide, tanned and finished for belt leather, that weighed, in its finished condition, ninety-three and one-half pounds, which was claimed to be the heaviest ox-hide ever exhibited. A very handsome pair of ox-horns, measuring four feet eight and a half inches from tip to tip, were placed over their sign, at the front of the space. Two panoramas, in constant motion, illustrated the old way and the new way of making belts.

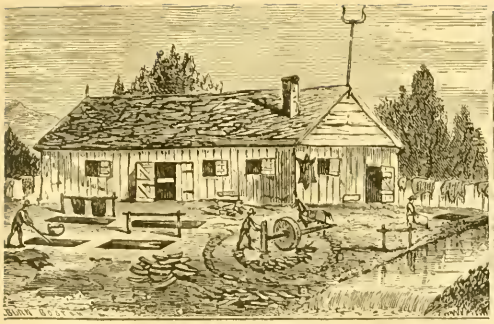
The illustrations we give herewith show the vast improvements that have been made in the art of belt-making, and afford a striking contrast between the "old way" and the "new way." One of these cuts

represents an old-fashioned Tannery and Belt Factory, while the general view of the Page Belting Company's works gives an illustration of a modern Belt Manufactory. The remaining cuts are as follows: one of a modern Bark Mill, in which the bark is ground; an interior view of the belt shop, in which the process of belt-making is carried on through all its several processes, from the time the leather is straightened on one side to the final operation where the coil is winded and finished. The same motion which winds the belt into a solid roll draws it through an attachment of knives and finishers, which trim the edges true and give them a hard, smooth, and handsome finish. The last of the cuts gives a good illustration of the belting ready for market as produced by the old way and the new.

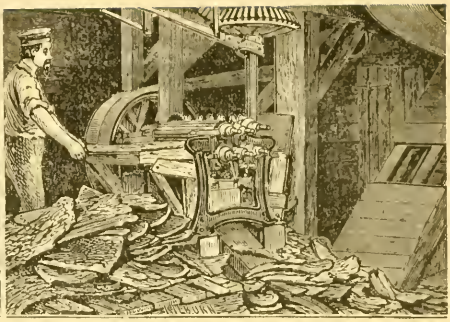
Leather Belting.

Among the other exhibits in belting we noticed that of Alexander Brothers, who had a very handsomely fitted-up stand of black walnut, on the central part of which was a case containing specimens of leather, showing the many different ways in which the ends of the leather belting is spliced together. Some had steel bands passing through each, sewed with raw hide or waxed thread, pegged, sewed with hide and riveted after being brought to feather edge. Here, also, were shown round leather belting with steel swivel attachments. There are two wings on which were placed seven heavy rolls, each of sole leather belting, varying in width from two inches to twelve inches.

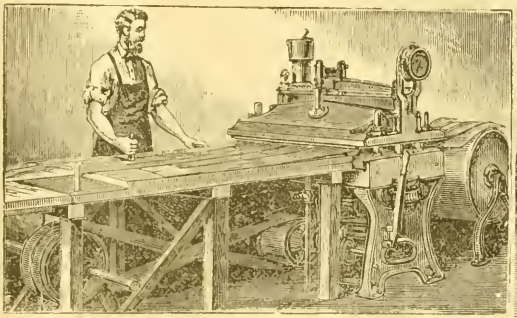
Adjoining this was the exhibit of Thomas J. Rorer. Amongst the rest was a belt that was fifteen inches in width, and during a great part of the time transmitted ninety horse-power and upwards to the different



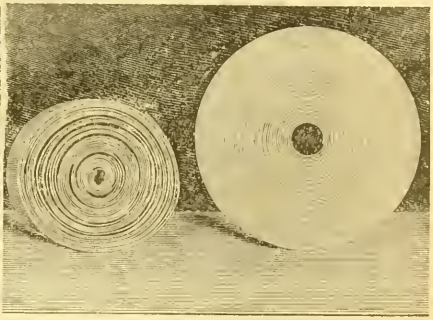
THE OLD WAY.



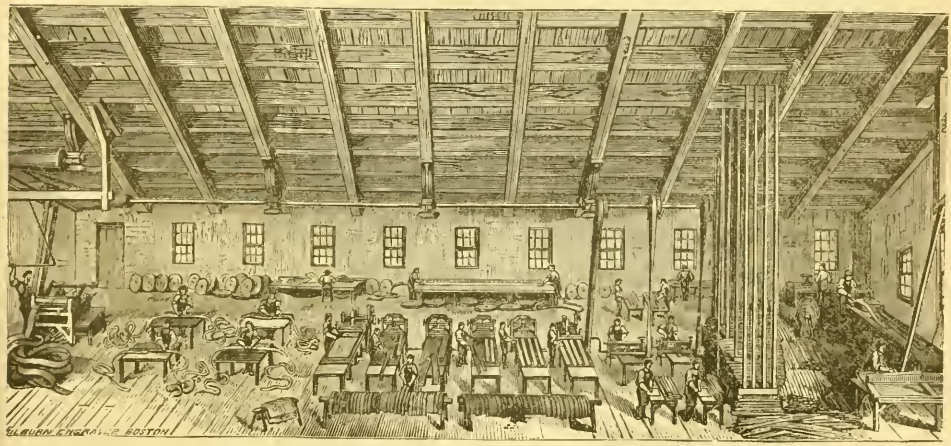
THE NEW WAY.



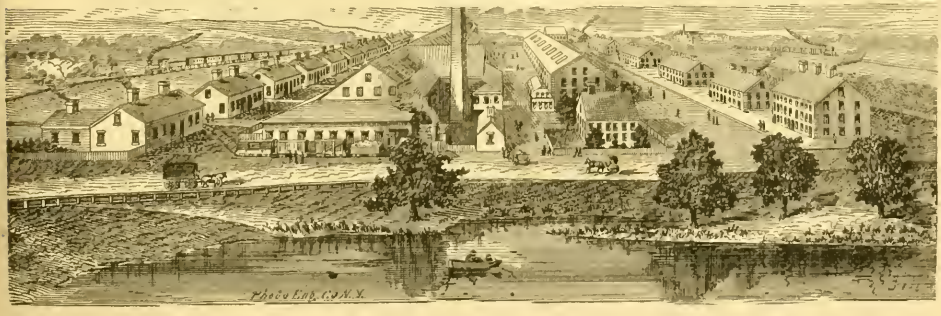
POWER PRESS FOR MAKING JOINTS.



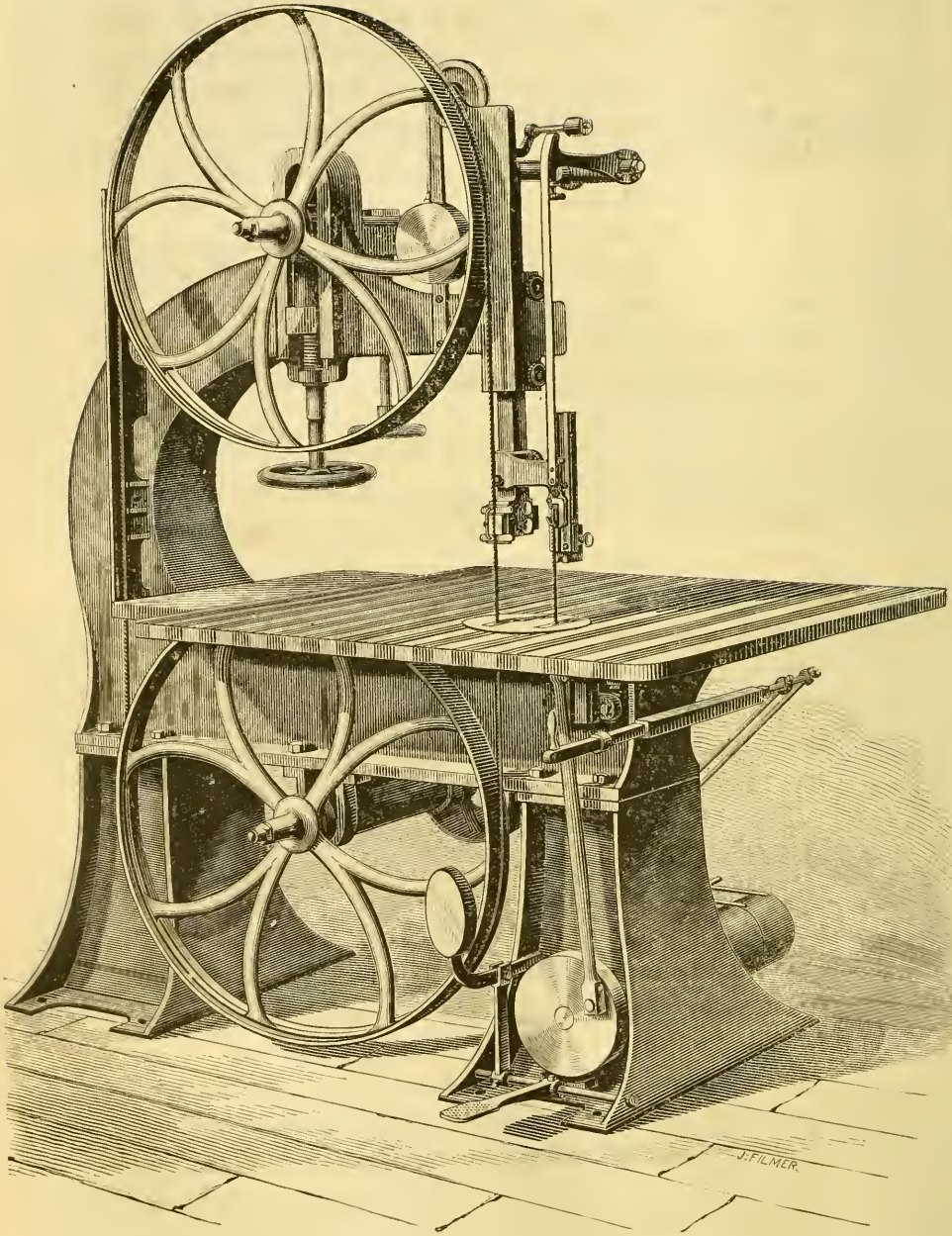
THE OLD AND THE NEW.



BELT SHOP.



MODERN TANNERY—PAGE BELTING CO., CONCORD, N. H.



PATENT BAND SAW.

machines on exhibit. This union belting was made by firmly cementing between two or more thicknesses of leather one or more layers of heavy cotton canvas, and then riveting or stitching throughout the entire length.

The exhibit adjoining this on the west was that of Mr. Hoyt, who exhibited three monster belts, the smallest of which was a double one thirty inches in width, the next in size thirty-six inches wide, and the largest thirty-six inches wide and 147½ feet long, and weighing 1,130 pounds.

Band Sawing Machine.

Of all the various tools used for cutting wood the saw is, perhaps, the most valuable, and among them the Band-Saw is acknowledged to be best adapted for different work.

Although the Band-Saw has been introduced more than sixty years ago in almost the same form, and provided with nearly the same commodities as now used, nevertheless, some obstructive mechanical disadvantage has prevented the general use of the same.

The breaking of the saw-blades, and the difficulty of joining them, have been the main obstacles. It is true, the manufacturers of steel have given us a better article of steel, and the saw makers have succeeded in manufacturing saw-blade sheets which are far superior to those heretofore used. Improvements in joining the saw-blades have also been made, and now it is a very simple operation; but, with these exceptions, little has been done to prevent breakage of the delicate blades.

Messrs. Bentel, Margedant & Co. exhibited a Band-Sawing Machine with an improvement in the shape of a self-adjusting steel band wheel.

A recess of the proper width and depth is formed in the rim, the bottom of the same has a number of projections which are turned true and ground to a circle, corresponding to the diameter of the wheel. The space between the projections is laid with an anti-friction material to the exact height of the projection, thus prepared, the recess forms an accurate and everlasting bed for the reception of a cast-steel band, accurately ground on the in and outside.

Type-Casting and Setting Machine.

Among the many machines on exhibit in Machinery Hall, which commanded universal attention from all visitors, was the "Westcott Type-Casting and Setting Machine," made by the American Type Machine Co., of New York. It was interesting and instructive to watch the machine in operation, and to note the extent that it simplified and economized the labor of type-casting and setting.

The machine occupied a little less room than an ordinary printer's case and stand; it was composed of a single iron cylinder, mounted, and which revolved in a substantial iron frame; from cams upon this cylinder all the motions were derived and they were all positive, nothing being left to the uncertain action of springs or gravity, and it was impossible for the machine to make a single revolution without performing all the motions necessary to perfectly cast, dress, finish, and set-up in line, any type which the will of the operator may require.

At the left end, and in the rear of the machine, was a small tank, or font, containing metal kept in a molten state by means of a small gas-jet. Immediately in front of this were the molds in which the body of the

type were cast. These molds, by a small quantity of water contained in them, were kept at a uniform temperature under the well-known natural law, that no piece of metal containing water can be heated above 212° F. until the water is evaporated.

The face of the letter was formed in a piece of copper, in which it was punched, and which was held in position while the metal was injected. As soon as the type was cast, this copper matrice was withdrawn from the face of the newly-cast type and returned to its proper place, ready for use when again required.

While the matrice was in front of the molds, the metal was injected by a pump, a valve was opened to admit it, and closed as soon as the mold was full; the quantity of metal injected by the pump was sufficient to cast the largest type, and if a small one was to be cast, the surplus, after the molds were full, prevented the piston of the pump descending farther, as it was forced down by a yielding rod. The piece of metal which contained the matrices was made of different widths, and each one opened the mold just the width required for it; the molds being closed after the casting of each type.

When the type was cast the molds were opened to admit a hook which removed the type, and carried it forward in a channel to a point at which it was received between the jaws of two vises, which seized it on all four of its sides firmly. On an exact line with these jaws were four cutters, and as soon as they grasped the type it was pushed through, and the cutters shaved off all roughness which was upon the type and deposited it perfectly finished upon the composing stick; as soon as this was done, it and all the preceding letters which had been cast were shoved along to the left upon the

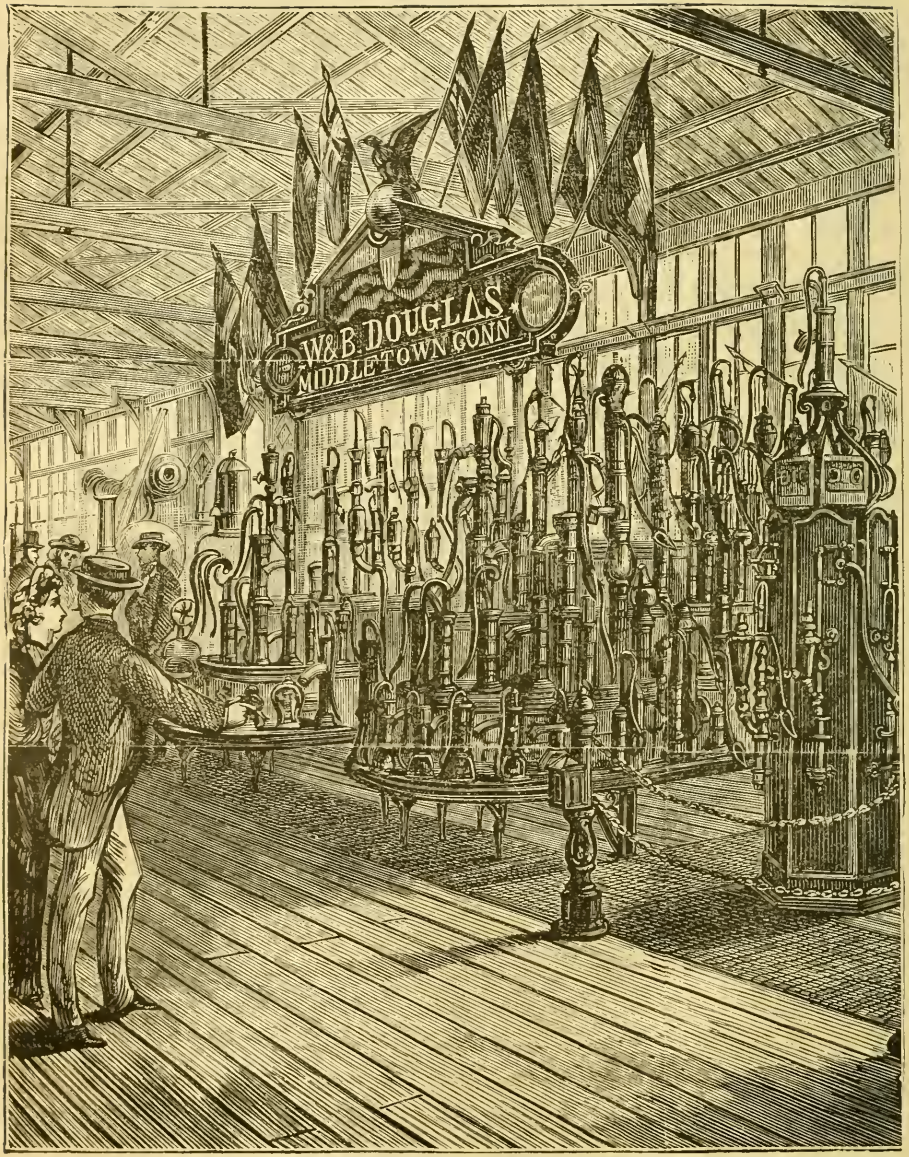
stick by a small piece of metal called the "setter;" the instant that the setter performed its work the next succeeding type was cast and in the molds ready for removal.

All the above operations were going on simultaneously; for while a matrice was being carried back to its place in its frame, and another being brought forward, the other part of the mechanism was engaged in removing a type from the molds, finishing and setting it up.

The Pump Annex.

Among its wonders the Exhibition was not without its miniature Niagara Falls. On the south side of Machinery Hall was an annex for the exhibition of hydraulic and pneumatic machinery of all kinds, and in the centre of the annex was a tank or basin, 146 feet long, 60 feet wide, 8 feet deep, and which held 500,000 gallons of water. All around this basin were arranged pumps of every imaginable kind, from the smallest hand pump, up to those run by steam and which raised nearly 300,000 gallons a minute; blowers, for forcing great volumes of air; hydraulic rams; water meters; and mining machinery. All of those pumps which were driven by steam drew the water up from the tank and then discharged it back again over the edges, either allowing it to quietly fall from a considerable height, or forcing it through nozzles, which sent the water high in the air, as from a fire engine. The constant falling of thousands of gallons of water created a noise that completely drowned the roar of all the machinery in the adjoining hall. In the exceedingly hot summer days, there was no pleasanter place than a seat by the side of this basin, as the air was kept constantly in motion by the blowers and was always delightfully cool.

HYDRAULIC RAM.



HAND AND POWER PUMP EXHIBIT.

Among the pumps, the exhibit made by W. & B. Douglas, of Middletown, Connecticut, of which we give an illustration, deserves special mention. This firm manufactures all kinds of pumps, hydraulic rams, garden engines, pump chain, etc. Over 500 pumps were on display, of which one-half were patterns, ranging in size from small pumps, mounted with a water-bucket on wheels, intended to be used by ladies in watering flowers, to deep-well force-pumps, capable of lifting water from 150 to 200 feet. Among the specialties displayed by this firm was a new model for a hydrant, provided with an arrangement for allowing the water to escape below freezing point. Also the Little Giant, a triplicate force-pump intended for use in factories in case of fire. They also exhibited a hydraulic ram in operation.

A. Gawthrop & Son, Wilmington, Delaware, had on display single and double-acting improved hydraulic rams, an illustration of which we give, showing the automatic regulator in operation. The superiority in these rams is claimed to be in the following points: that they are securely fastened together by key bolts instead of screw bolts, so that any part of them can be got at in a few minutes, requiring no other tool than a hammer; also that the outlet valve is regulated by holes through the piston, and not requiring jam-nuts on the stem, which are always liable to get out of order.

The automatic regulator is attached to the upper end of the feed pipe of the ram, and acts as a sentinel to stop the ram before the water gets so low in the feed box as to allow air to enter the end of the feed pipe, and will start the ram again (without wasting water) as soon as the water arises again to a given point; thus allowing the outlet valve to work with a

long, healthy stroke, always raising a greater per cent. of water than when working with a short stroke, and much less liable to stop.

Among the varied and fine displays made by other firms in this Hydraulic Annex we must mention two others which merit special description—one for its immense size and the fine display it made, and the other for intrinsic worth. The first was known as the Niagara pump, and its name was fitly chosen. It consisted of two Andrews centrifugal pumps, which elevated about 30,000 gallons a minute fifty-two feet high, and then discharged it back again into the tank in one broad, steady sheet, about thirty feet wide, making as pretty a miniature waterfall as was ever seen. These pumps required 100-horse power to run them, and were capable of emptying the main basin of its 500,000 gallons in sixteen minutes. The other pump was known as the Huffer Steam Vacuum pump. It consisted of two or more chambers, into which the steam was alternately admitted so as to form a vacuum, and into these vacuums the water was forced by the pressure of the atmosphere. Instead of requiring live steam direct from the boiler to operate it, it was run entirely by exhaust steam, that is, by steam that had already done its work in driving the main engine, and was then allowed to escape into the air. A pressure in the steam of a pound or two was as good as the pressure of many pounds, so that a person who runs an engine, however small, can also run a pump that will raise any desired quantity of water without the expense of a single pound of fuel extra.

The Oscillating Pump Company, of Philadelphia, made a good display of a strange pump, the Sluthour. The body was shaped like a coffee-mill, in the funnel of which a lever worked in an arc of a circle, turning

rectangular double valves fitted to the round part of the pump-body. A great quantity of water was carried up through the valves and discharged over the mouth of the funnel. A modification of this form—the addition of an air chamber—gave a force-pump of considerable power. It was very simple in construction, and by the expenditure of very little force a great quantity of water was raised, together with any refuse matter, such as blocks of wood, chips, etc., which will pass through the large valve openings. The Sluthour pump was not a novelty, but was worthy of examination, as the only one of the kind exhibited. It is intended for use as a ship pump, and in stock-yards, etc.

CHAPTER VIII.

UNITED STATES EXHIBITS.

Locomotives.

THE history of the steam engine is the history of all enterprise and ingenuity for the last hundred years, and it were impossible to speak of industrial progress without referring to it.

It was interesting to examine the old and the new style of locomotives, of which our Exhibition showed examples. Franklin said of the first balloon, "It is a babe, but it may become a giant." The balloon, however, is a "babe" still; while the locomotive presents to it a most striking contrast. This was one of the most instructive sections of the whole Exhibition, and well repaid a careful and exhaustive study.

Locomotives.

Just beyond the west end of Machinery Hall, in the open air, was the first locomotive ever run in America, and which was attached to two passenger cars such as were used in 1833. Both the locomotive, cars, and the track upon which they stood, were such curiosities in their way, in comparison to those used to-day, that we give a full description of them. The rails were not attached to wooden cross-ties, but to great stones, upon

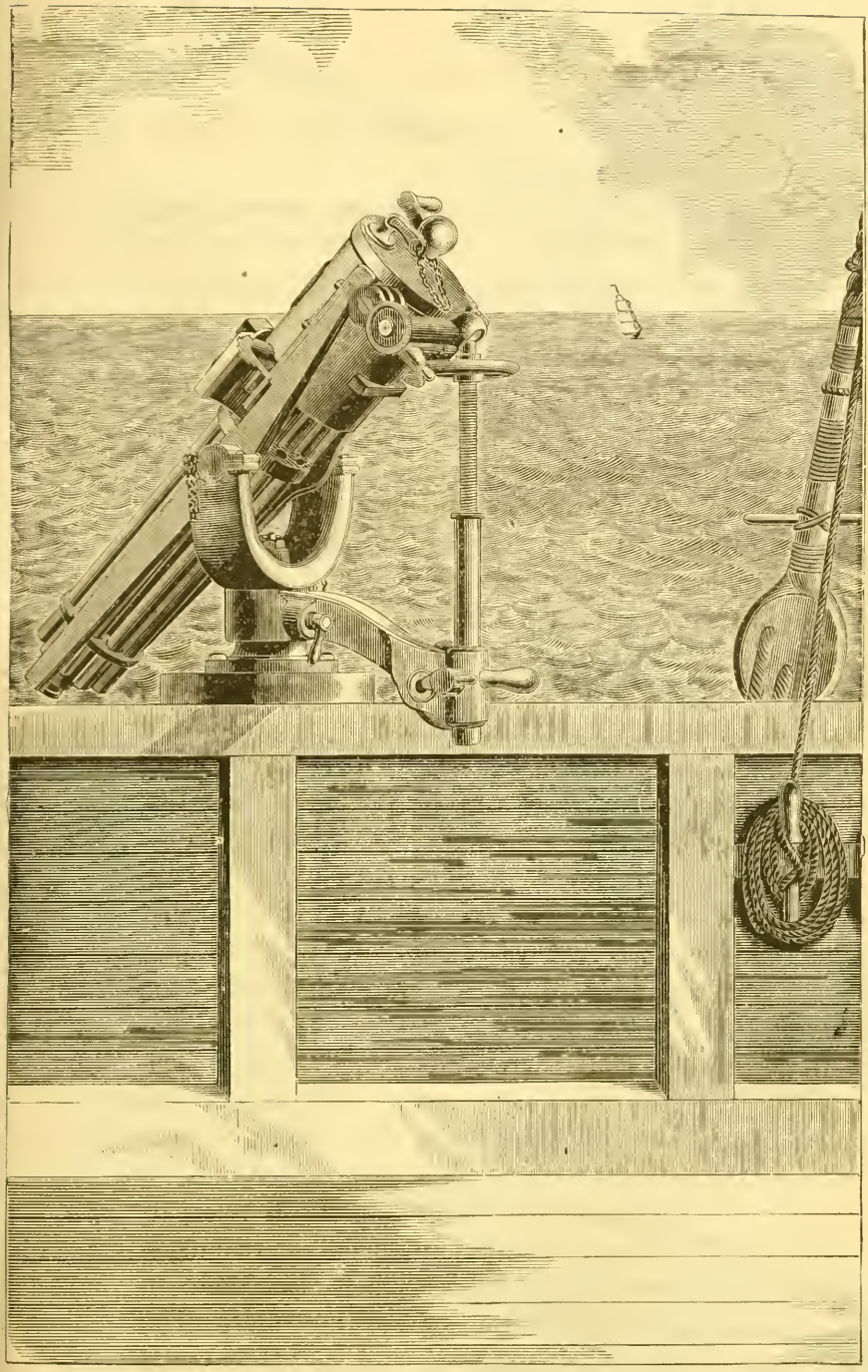
which were placed thin blocks of wood, as it was considered unsafe in those days to run an engine which weighed nine tons on rails affixed to anything so frail as wood. The rails were much lighter than those used to-day, were rolled in England, and then shipped to America at great expense. The locomotive "John Bull" was built in England in 1831, and then shipped to America. On the arrival of this locomotive at Bordentown, N. J., it was transferred from the sloop, on which it had been brought from Philadelphia, by means of wagons, to the only permanent track of the Camden & Amboy Railroad Company, then completed, about three-fourths of a mile in length, and about one mile from Bordentown. The machinery was then put together, and a tender constructed from a whiskey hogshead placed on a small four-wheel platform car, which had been used by the contractor in the construction of the road. The connection between the pump of the locomotive and the water-tank was made by means of a leather hose made by a shoemaker. This engine first began to run in 1833, and took the place of horses, which had been used up to that time.

The cylinders are nine inches in diameter, have a twenty-inch stroke, and are placed underneath the front end of the boiler, in between the two front driving wheels. There are two pair of these driving wheels, four to six inches in diameter, which are not coupled together, so that the force of the steam on the piston is exerted on the rear pair alone. The cow-catcher consists of two long wooden beams, which have their rear ends pivoted to the outside ends of the shaft of the front pair of driving wheels, while the front ends of the beams are supported upon a special pair of wheels three feet in diameter. In order to prevent the catcher

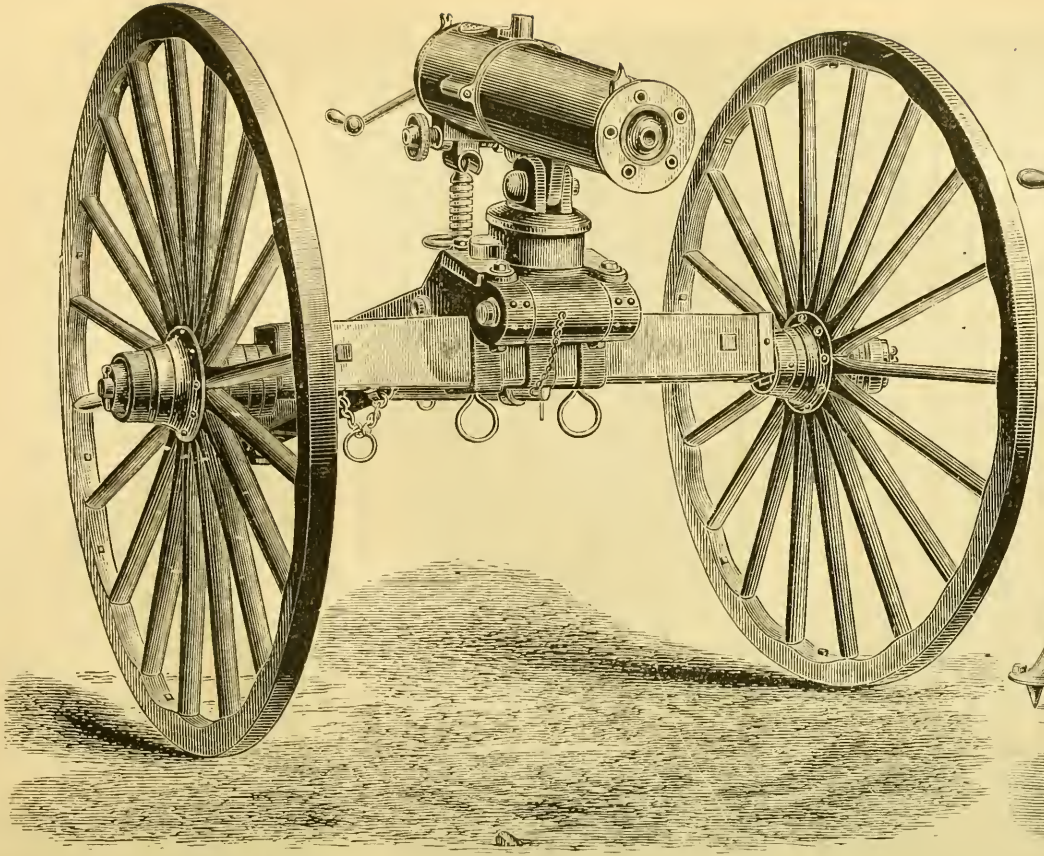
from raising upward too high, it is held down upon the rails by a coiled spring.

There is no cab for the engineer and fireman, and the only protection whatever given to them from the cold, heat, wind, rain, and snow, is that the front end of the roof of the little tender projects slightly over the rear end of the locomotive. The funniest feature is a covered seat, such as is used on wagons, but only large enough for one person, which is placed on top of the big covered box that forms the tender, and which seat is turned so that the person sitting in it looks back over the train. What that seat is for we cannot imagine, unless a person was placed in it to keep a watch on the cows, and to let the engineer know when they were catching up so that he could go a little faster, and thus prevent them from walking into the rear end of the train. The two cars were each about thirty feet long, and looked more like the "Black Marias" that are used to convey prisoners from the different stations, than passenger cars. The windows were about twelve inches high by six wide, not made to be raised or opened, and furnished with sliding curtains. Above each seat was a ventilator two feet long by six inches wide, so that each one can ventilate for himself.

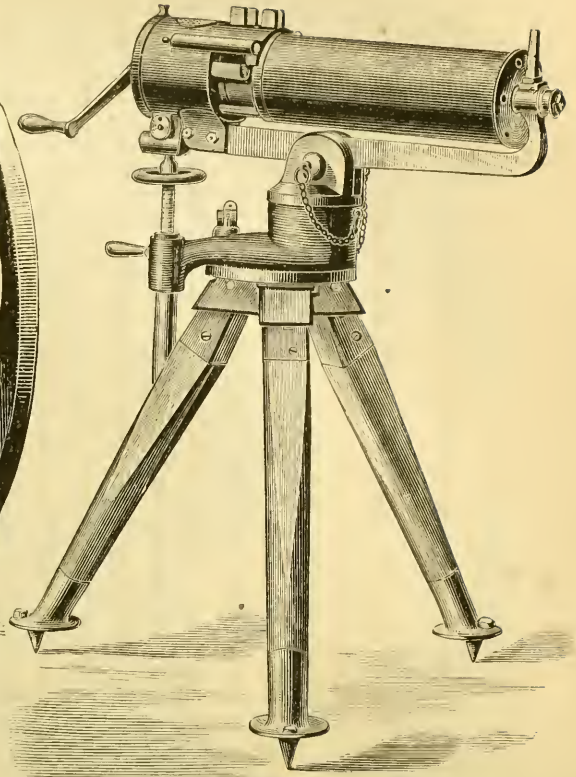
In Machinery Hall there were about a dozen locomotives of all kinds and sizes, one of which was one of sixteen purchased by Dom Pedro to be sent to Brazil, and was named after him. The locomotives built in England and America differed principally in two particulars. The Americans place their cylinders outside of the driving wheels while the English place theirs in between them, under the front end of the boiler. The Americans never use driving wheels larger than about



GATLING GUN MOUNTED ON GUNWALE OF SHIP.



NEW MODEL, FIVE BARRELED GATLING GUN, FIRES 1,000 SHOTS PER MINUTE.



GATLING GUN MOUNTED ON TRIPOD.

five feet in diameter, while the English have always made them from six and a half to eight and a half feet in diameter. As long as the track is perfectly level these immense wheels are just what is needed, but as soon as grades are encountered, they only impede the progress of the train, and the English are now beginning to realize this, and are discarding these immense drivers and adopting the American plan of never having them over five feet. To the Americans are due some of the finest and best improvements in the locomotive. America has built some of the largest passenger engines ever made; also, the largest coupled engine. As a general thing the English run their cars faster than the Americans, but this is owing to better ballasted roads and more uniform levels.

The Gatling Gun.

The Gatling gun was invented by R. J. Gatling, of Indiana, in 1861; and the first was manufactured in 1862, in Indianapolis, Indiana, and full descriptions of it were published in the newspapers in the United States and Europe. The gun was brought to the notice of the French government in 1863, before the invention of the French, or the Montigny mitrailleuse.

Trials of the gun have been made from its invention to the present day, by the military authorities of the United States, by Mexico, by every nation of Europe (except the Greeks and Belgians), by several of the South American States, by Egypt, and by China and Japan. These trials have made the gun well known, and its position as an important part of the armament of modern armies is now well assured. Besides, the gun has been formally adopted as an auxiliary service arm in many of the countries mentioned, and has

been adopted by our own government as an auxiliary to artillery in forts, and also in the United States navy for shore service, as well as for use in ships' tops, on launches, and for shore service.

We have given three illustrations of this gun, as follows:

The New Five-Barrelled Gatling Gun.

This improved Gatling gun, in lightness and rapidity of fire, excels any gun heretofore made on the Gatling system. Its weight is only ninety-seven pounds, and it fires 1,000 shots per minute. It differs from the previous models in the following particulars:

1. The barrels and working mechanism are enveloped in a metal casing, which supplies the place of the frame formerly used, and protects the mechanism from rain, dust, rust, etc.

2. The crank is attached directly to the rear end of the mainshaft, superseding the use of gearing to revolve the gun.

3. Improvement in the feed has been made, so that the cartridges are fed directly to the carrier on a central line, vertically, above the axis of the gun.

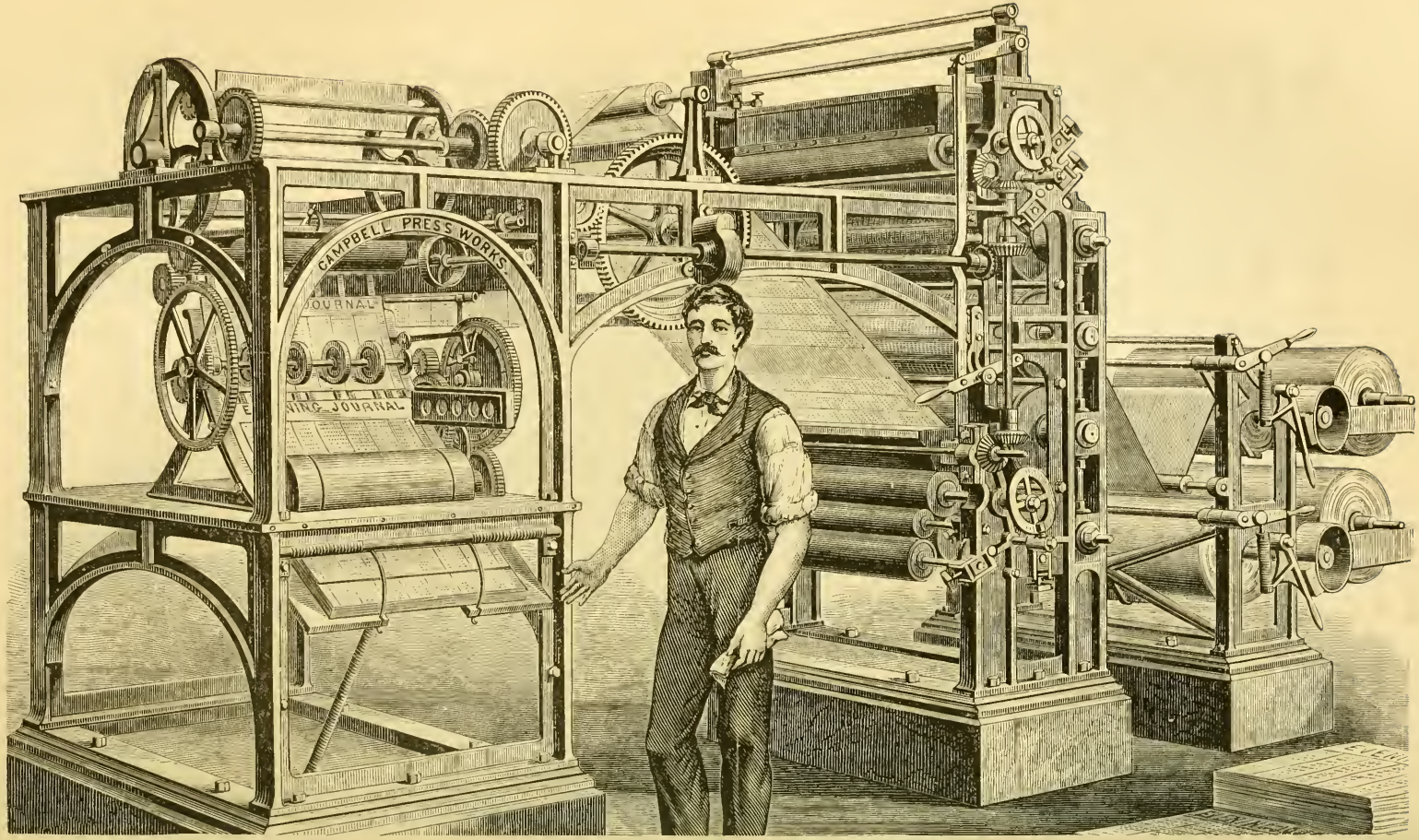
Although the external appearance of this new gun differs greatly from the older models of the Gatling, its main mechanism and mechanical principles are substantially the same.

The improvements are of such a character as to increase its effectiveness nearly two-fold. Guns with ten barrels and having these improvements are also made.

The Gatling Gun on Tripod.

This illustration represents the Gatling camel gun, mounted on the improved tripod, which holds it quite steady when firing, and allows every facility for aiming

THE CAMPBELL PRESS BUILDING.



CELEBRATED ROTARY PRINTING PRESS.

it quickly, so as to deliver its shots at any desired point. The gun is so pivoted that it can sweep an entire circle, and at the same time be traversed laterally and automatically by the traversing device attached to the gun and tripod as shown in the diagram.

Description of Gatling Gun for Naval Use.

The third illustration represents a light Gatling gun (weight 125 pounds) of forty-five inch calibre, mounted upon the gunwale of a ship. The fixture upon which the gun rests allows it to be fired at an elevation of thirty degrees, or at a depression of forty degrees. The gun and fixture can, if desired, be easily and quickly transferred to a small boat or launch. Its range and accuracy are much greater than that of an ordinary boat howitzer. These guns are especially adapted for use in ships' tops, to repulse boarders, for boat service in making landings, etc.

The United States navy is supplied with a large number of these guns, and the British government has ordered them supplied for all their war vessels.

The Campbell Printing Press.

The Campbell Printing Press and Manufacturing Company, of New York, had a building of their own, located at the west end of Machinery Hall, which covered an area of over 4,000 square feet and was three stories in height. In it were exhibited the process of running a complete newspaper, a job printing office, as well as the various articles manufactured by the exhibitors whose enterprise had erected the structure.

We give an illustration of the Campbell Rotary Web Printing and Folding Press.

This press afforded a very striking evidence of the progress of and improvements in the Art of Printing. The fierce opposition to, and confident predictions of failure of some of the most noted and valuable improvements in the art read strangely in the light of present experience.

On November 28th, 1814, the first newspaper was printed by steam upon a power press—a very rude affair and incomplete in all its contrivances, yet containing the germ and potentiality of the progress that has rendered possible the mechanical triumphs of the present day, in which seem to be attained the acme of speed and the perfection of workmanship.

The power-press of Konig, of 1814, had the whole fraternity of printers combined against it, with the notable exception of the managers of the London *Times*. With this paper, fortunately for Konig, his press was a necessity. He began to construct the press on the continent of Europe, but, failing utterly to interest printers in it, he went to England, arriving in London about 1806, and succeeding in getting a press running in 1810 or 1811. The proprietors of the *Times*, after examining Konig's book press, ordered two one-side presses, and furnished the means to build them. Even with this indorsement, and demonstration of the capabilities of the new press, it was the subject of a long and bitter contest between skill and stupidity, and so late as 1824 we find published articles, from leading printers, decrying the power-press and asserting that so useless were they that they could be had for the price of old iron.

We have not the space here to describe the various improvements that have been made by different inventors in the Old World as well as in the New, until we

have now presses which may be termed the concentration and perfection of centuries of progress in the arts, and as far in advance of all previous mechanical efforts as was the power-press of Konig in advance of the slow and cumbrous press of Faust and Gutenberg. Among these, "Campbell's Rotary Web Printing and Folding Press," which was exhibited in a separate building erected by the Company for the purpose, deserves special mention, as being, with all its improvements and combinations, a master-piece of mechanical ingenuity.

It would be impossible to describe this press fully to our readers, for mechanical descriptions without descriptive drawings are always obscure. In operation the press consisted, apparently, of four rollers or cylinders, arranged one above the other, and produced all its results from the simplest rotary movements. All that had to be done was to put a roll of paper, weighing about a hundred pounds, on the feeding apparatus, and a complete sheet was printed on both sides, cut off, folded and delivered in one-tenth of a second; and all this with such apparent ease that it was difficult to believe that it had been really done, till one examined the register and compared notes.

The cutting and folding apparatus is very simple. One sheet is drawn forward to this part of the machine by two top rollers over the cutting roll. These rollers are driven by friction that can be easily adjusted to the strength of the paper. In fact, it only needs to be set to take up the slack of the paper. Beyond this point the paper is absolutely free from all strain.

There is no question connected with the publication of a newspaper of more importance than the cost of its production, and to meet this is the great object of all recent improvements in the printing art.

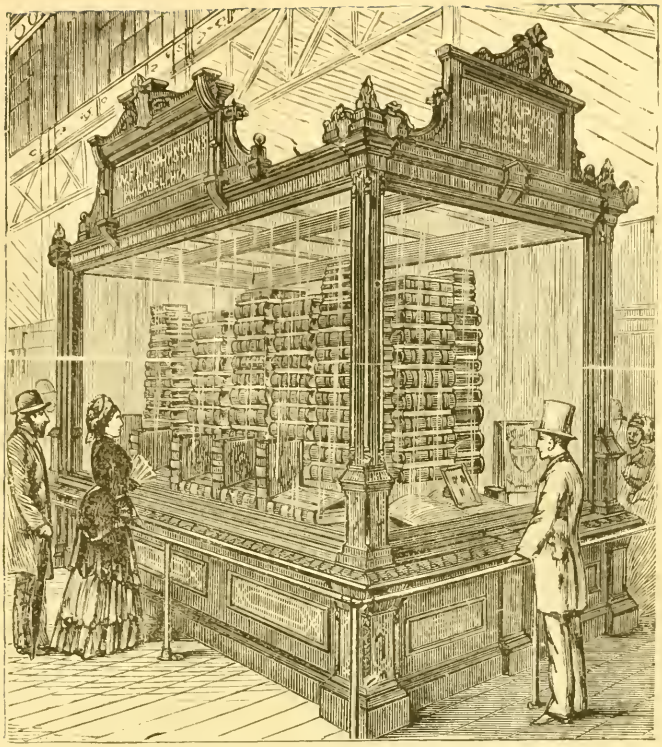
Paper Exhibit.

The paper-makers had very fine displays, one of the most striking of which was that of Byron Weston, of Dalton, Massachusetts. It consisted of a pyramid, whose base was a ream of "Leviathan" paper, five feet by ten, and weighing 1,000 pounds, and other kinds in regular sizes up to the top, which was a ream of cap, fourteen by seventeen inches. His exhibit of ledger papers, which was the only line he manufactured, was the largest and most varied of any in the building. A special feature of his display was an enormous ledger of 2,400 pages, weighing 105 pounds, bound in Turkey morocco, and quite surpassing anything else in that line. It was used to register the names of visitors, and, in three weeks after being opened, contained about 4,000 names, including those of the leading foreign and home manufacturers.

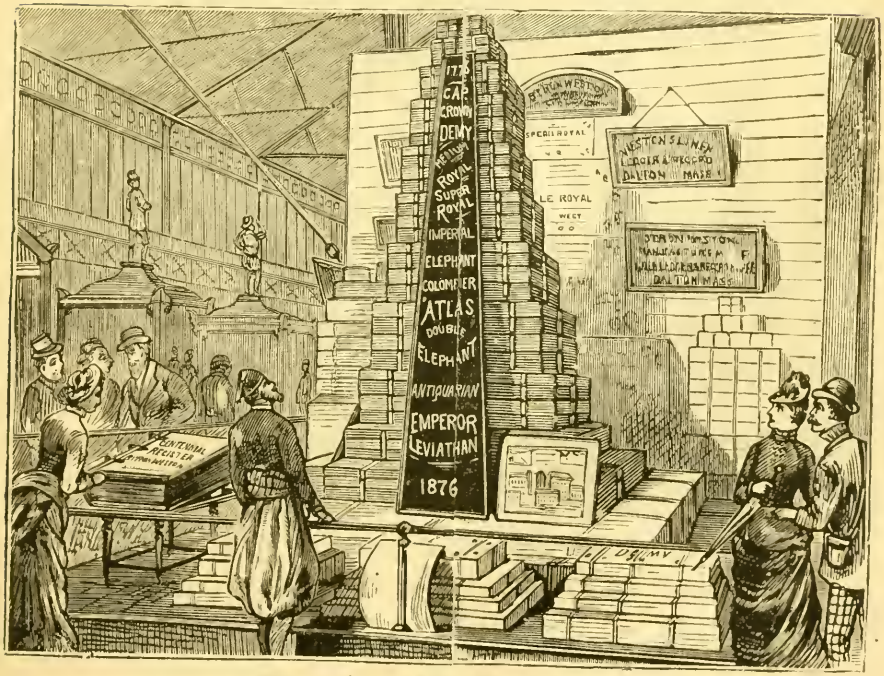
Messrs. Murphy's Sons, of Philadelphia, had a handsome case in which were exhibited some of their goods, very tastefully arranged. Over 200 blank ledgers were piled up in a pyramidal form, and formed a very prominent feature in their display.

Gold Pen Exhibit.

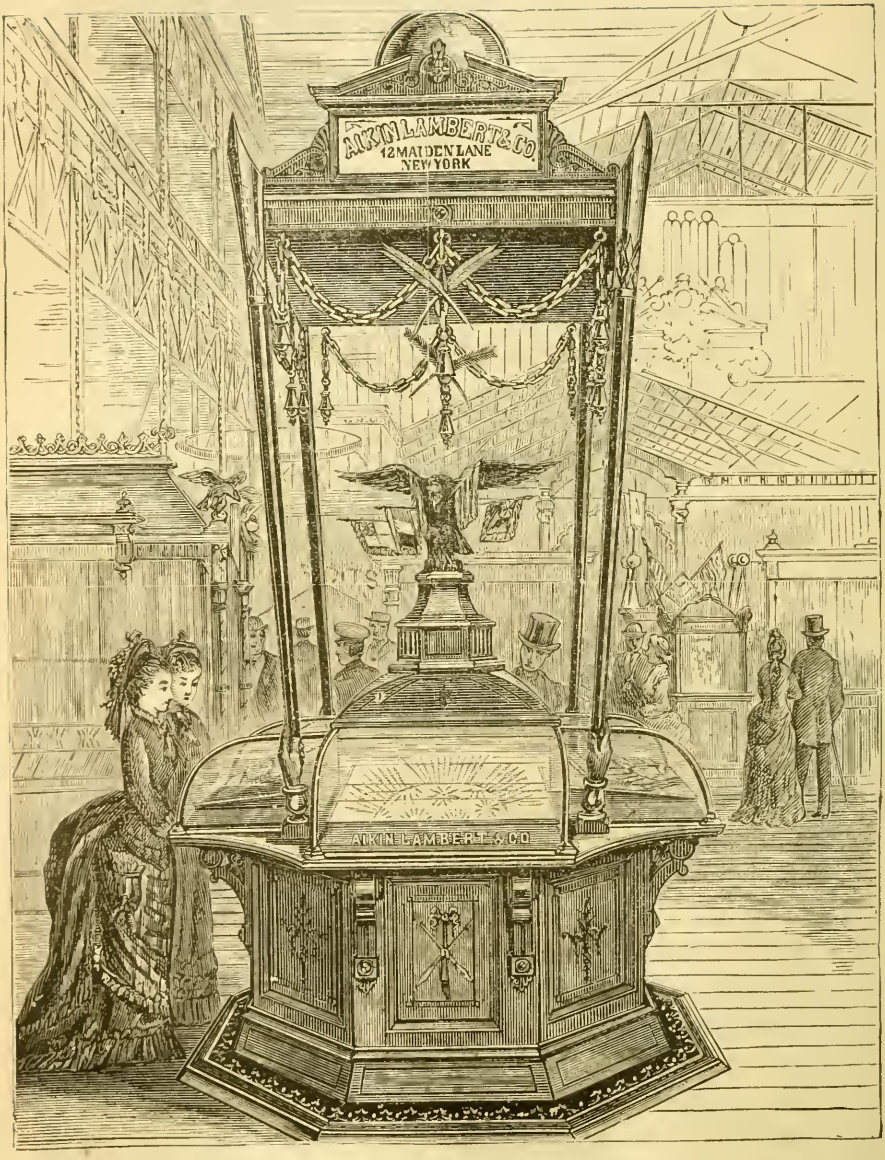
There was a very attractive display of gold pens made by Aiken, Lambert & Co., of New York, in the Main Building, of which we have an illustration. The case, which was of ebony finished with gold, rested on a platform, and above the platform, supported by four massive barrel pens, was a canopy, resting on the top of which was a globe, indicative of the purpose of the Exhibition and the visitors thereto. Three or four show-cases were upon the platform, in each of



MURPHY'S EXHIBIT OF BLANK BOOKS.



WESTON'S PAPER EXHIBIT.



SHOW-CASE OF GOLD PENS.

which were displayed in profusion a large and varied assortment of eighteen carat gold pen and pencil-cases finished in Roman, enamel, carving and red gold; fourteen carat gold articles finished in same styles; little pencils and tooth-picks of gold, pearl, ivory and fancy woods tipped with gold. Then pens of all sizes; Leviathan, Mammoth, Oblique, Spencerian, Ruling, Ladies', Red Ink Pens, Gold Barrel Pens in pearl and other holders.

Exhibits of Metals, Crude and Manufactured.

One of the most interesting, because one of the most characteristic, exhibits was the display of metals, both crude and manufactured. The exhibit of pig, bar, ingot and sheet metals of all kinds was particularly full. The articles of this class were located along the southern portion of the Main Building, between the eastern end and the central transept, and many of the exhibitors displayed much good taste in the arrangement of their products. Among the numerous exhibits we can only mention a few of those which more prominently attracted our notice.

The Union Iron Mills (Carnegie Brothers & Co.), of Pittsburgh, exhibited sections of special wrought-iron, in shapes, in bar, T, and angle iron, iron beams, joists, etc.; also a section of the rolled wrought-iron coupling used in connecting the steel tubes in the arches of the Illinois and St. Louis bridge over the Mississippi river, at St. Louis. The same firm also exhibited a beautiful model of the Lucy furnace, at Pittsburgh, showing all the buildings and their accessories. This furnace produces 700 tons of iron per week.

The New River Railroad Mining and Manufacturing Company, of Virginia, exhibited magnetic oxide, spec-

ular, red and brown hematite, spathic and black band iron ores, manganese marbles, lithographic stone, zinc ores, graphite, corundum, baryta, limestone, copper ores, lead ores, and bituminous, splint and cannel coals, from the valley of the New river, in Virginia.

The Lalance and Grosjean Manufacturing Company, of Woodhaven, L. I., had a large case with an elegant display of house-furnishing goods in copper, tin and iron, such as pans, pots, kettles, spoons, forks, ladles, candlesticks, shovels, tongs, pokers, etc. The goods were tastefully arranged, and made a very attractive display.

Cooper, Hewitt & Co., of New York, made a very handsome exhibit of pig-iron, wrought-iron, Martin steel, etc., from the ore to the finished articles. Chains from half an inch thick to the immense chain cable, with links a foot long and two inches thick; rough and polished bars, sections of beams, etc., horseshoes and other articles. In this exhibit were several interesting relics of the iron manufacture of the last century, among them a pig and a pot cast in the Ringwood furnace in 1772, and a stove plate cast at the Durham iron works in 1756.

W. H. Harrison & Bro., of Philadelphia, made a beautiful display of low-down and elevated grates for fire-places. Some of them were very handsome, with nickel-plated bars, bronze andirons and fenders and surrounded with artistically painted tiles, with figures of birds, flowers, etc., upon them.

Zinc.

The production of zinc is one of the growing industries of our country, and the domestic product is fairly on the way to supplant the imported. The zinc mines

are found in New Jersey, Pennsylvania and among the lead regions of the West. The Lehigh Zinc Company, of Pennsylvania, sent a complete collection of everything relating to the metal they produce. They sent zinc ores consisting of calamine and smithsonite, but prominently of blende, which is their predominant ore, spelter in blocks as it comes from the smelting furnaces, and sheet zinc prepared from the spelter in their rolling mills. One of their specialties is white oxide of zinc for making paint. This they produce in great perfection, and it was shown in quantity in the exhibit. Their display also included a small but remarkably fine cabinet of the various minerals found in connection with zinc ores.

The sheet zinc exhibited was of very excellent quality, of great flexibility, lustre and smoothness of surface. The zinc white is much used for paint, being when carefully worked up quite equal to white lead and not being liable to discoloration from sulphurous vapors.

Tin Plate.

N. & G. Taylor, of Philadelphia, had a very handsome display in the metal department of the Exhibition, in the Main Building. Their case was one of the largest in the Main Building, had a display surface of 1,500 square feet, and was made outwardly attractive by its sheen of color, gilding and glass, by a bright array of great sheets of tin, and presented strong claim to inspection by its appearance and practical value and interest of its contents.

Their patent pattern sheets were fully displayed in the case. The shapes of the plates were ovals, circles, splayed sides, with various other irregular and indescribable patterns for special uses. These sheets,

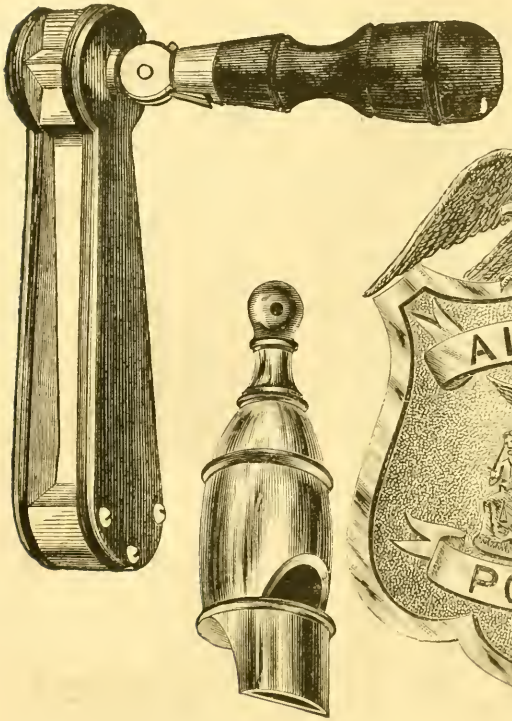
cut from sheet iron and then tinned, were for the more rapid, economical and substantial manufacture of articles of tin ware. The increase in the tin trade in the United States may be inferred when we state that the direct imports of tin plate to Philadelphia had risen from 63,294 boxes in 1871, to 207,117 in 1876.

Hardware and Cutlery.

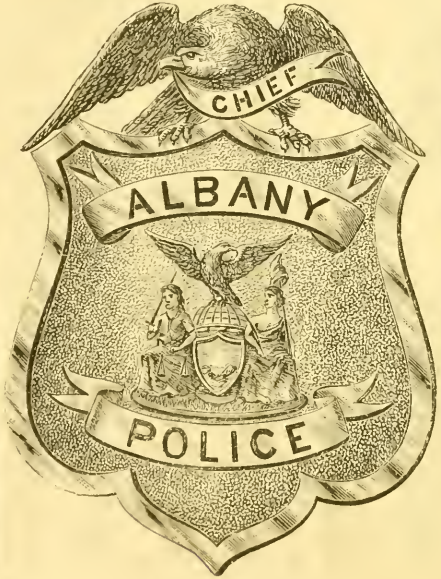
The exhibit of American hardware and cutlery in the Main Exhibition Building was situated on the south side of the main aisle, about half way between the central transept and the east end of the building. It occupied quite a large space, and the goods were tastefully and attractively arranged. The cutlery exhibit was particularly fine, and compared favorably with that of any other country. In the line of building and housekeeping hardware there was a very interesting display of the countless labor-saving devices and appliances for which American mechanics are so justly celebrated. The display of tools for carpenters surpassed any other display of the kind in the Exhibition, and was worthy of especial attention.

A. G. Newman, of New York, exhibited an ingenious indicator for French apartment houses. It was intended to be placed alongside the street door and contained a bell-pull and speaking tube, communicating with each floor, and also a letter box for each floor.

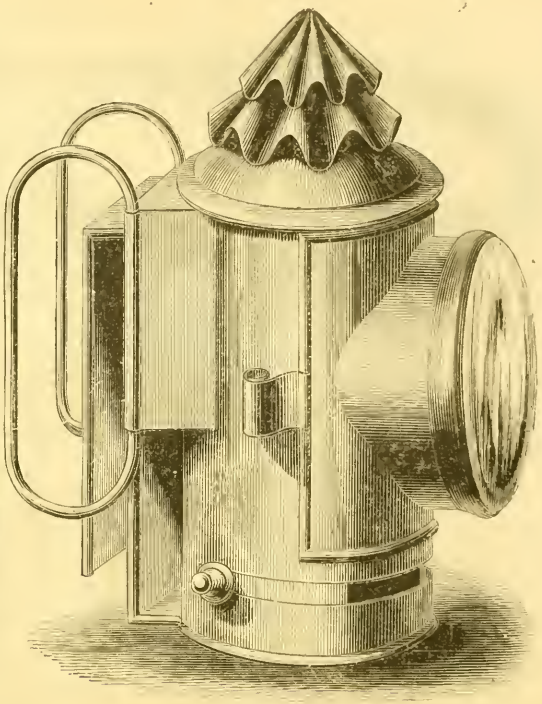
Wm. H. Jackson & Co., of New York, exhibited a fine assortment of low down and other grates in brass, bronze, nickel plate, etc.; many of them beautifully ornamented with porcelain tiles, colored marbles, etc. The grates and their surroundings were made in modern, mediæval, Chinese, Egyptian and other styles.



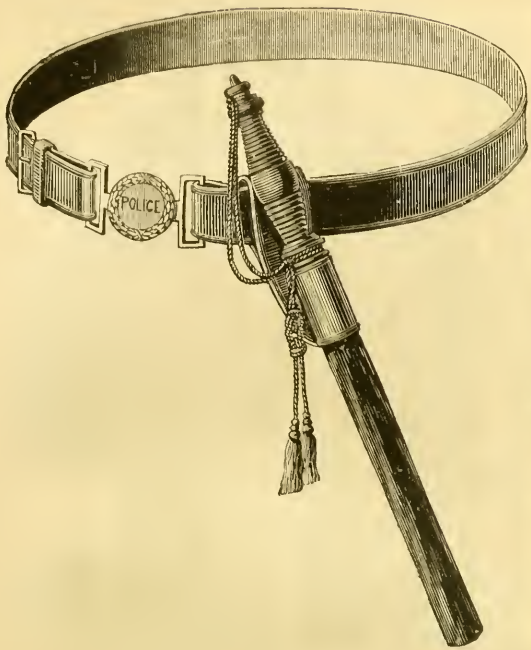
POLICE RATTLE AND WHISTLE.



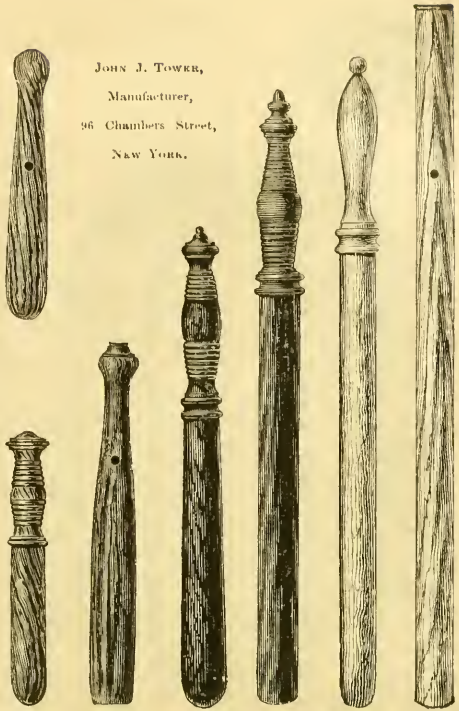
POLICE SHIELD.



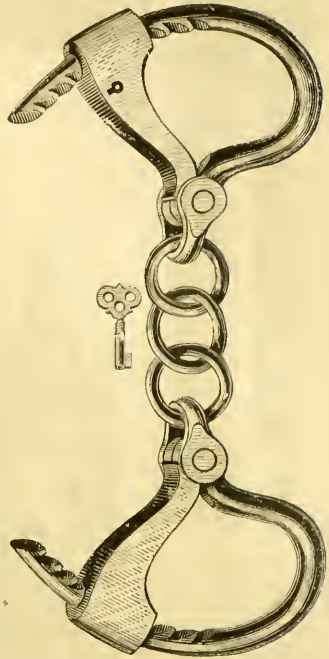
POLICE LANTERN.



POLICE CLUB AND BELT.



POLICE CLUBS.



POLICE HANDCUFFS.

Hardware Specialties.

Conspicuous among the exhibits in this particular branch of industry, the display made by J. J. Tower, of New York, was curious and interesting. There was a handsome line of iron bench planes, with handles finished, some in nickel and others gold plated, presenting a very showy appearance. Boardman's combination wrenches, in great variety of sizes, were also shown in gold and nickel plate and highly polished steel finish. The curious part of this exhibit consisted in the police nippers, which could be easily applied, easily worked with one hand, and gave an officer complete control of his prisoner. Then there was a flexible police club, made of sole leather, brought together under a heavy pressure over a stiff whalebone cemented and riveted. It felt very easy in the hand, though we do not imagine it would be so on the neck. There were also leg-irons with ball and chain, the former weighing fifty pounds—the heaviest—and twelve pounds—the lightest; hand-cuffs with flat keys for two hands and three hands, so that the prisoners could move by couplets or triplets; duplex police calls, police rattles, and every conceivable variety of police equipment.

Screws.

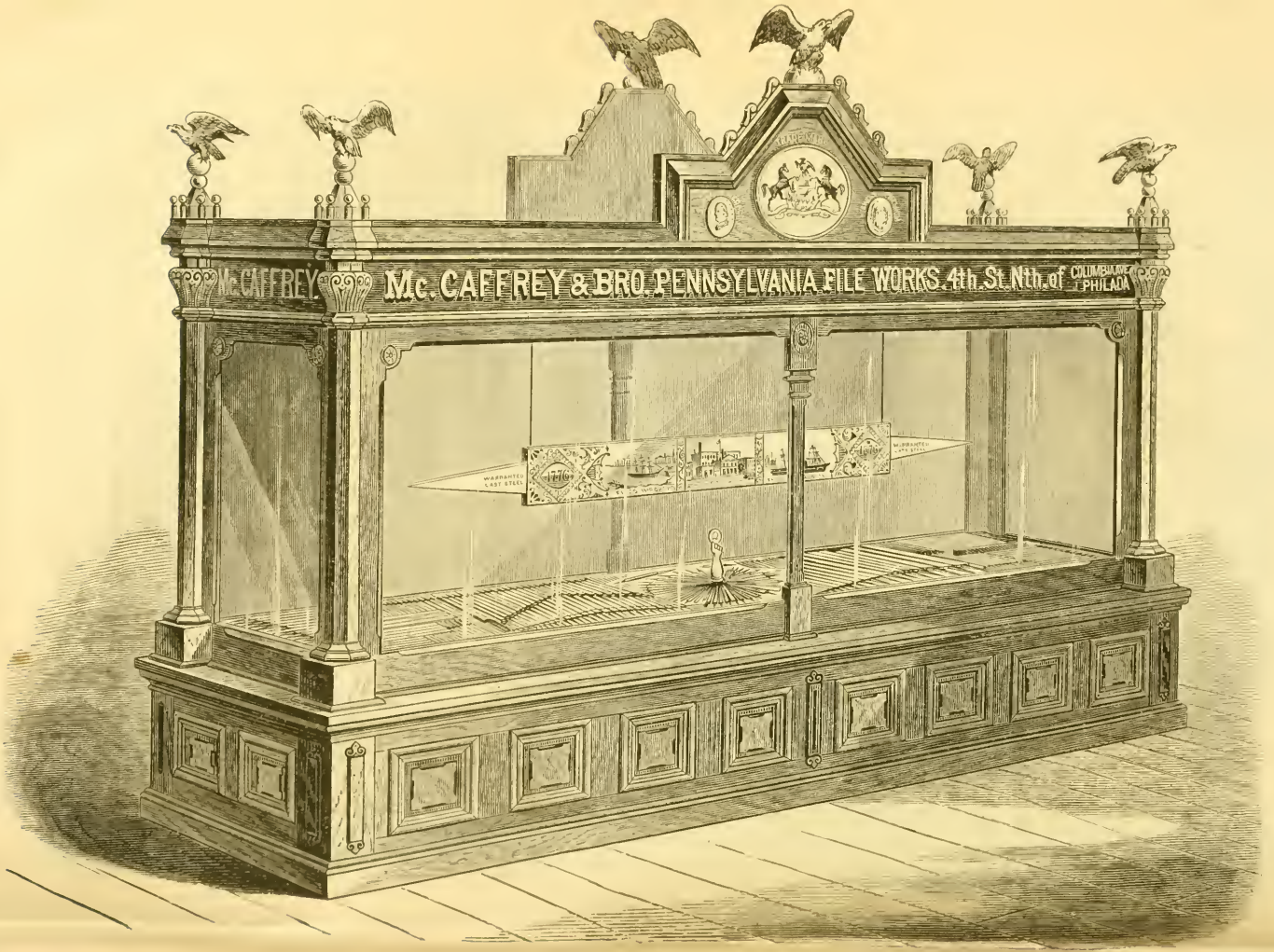
The greatest exhibit in the hardware specialty line which we saw was that of the American Screw Company, of Providence, R. I. This company showed a long line of nothing but screws, of which it makes some 3,000 varieties. The display included machine screws, rivets, stove bolts and tire bolts, besides all the varieties of screws used by carpenters, carriage-makers, cabinet-makers, and other trades.

Hand-Cut Files and Rasps.

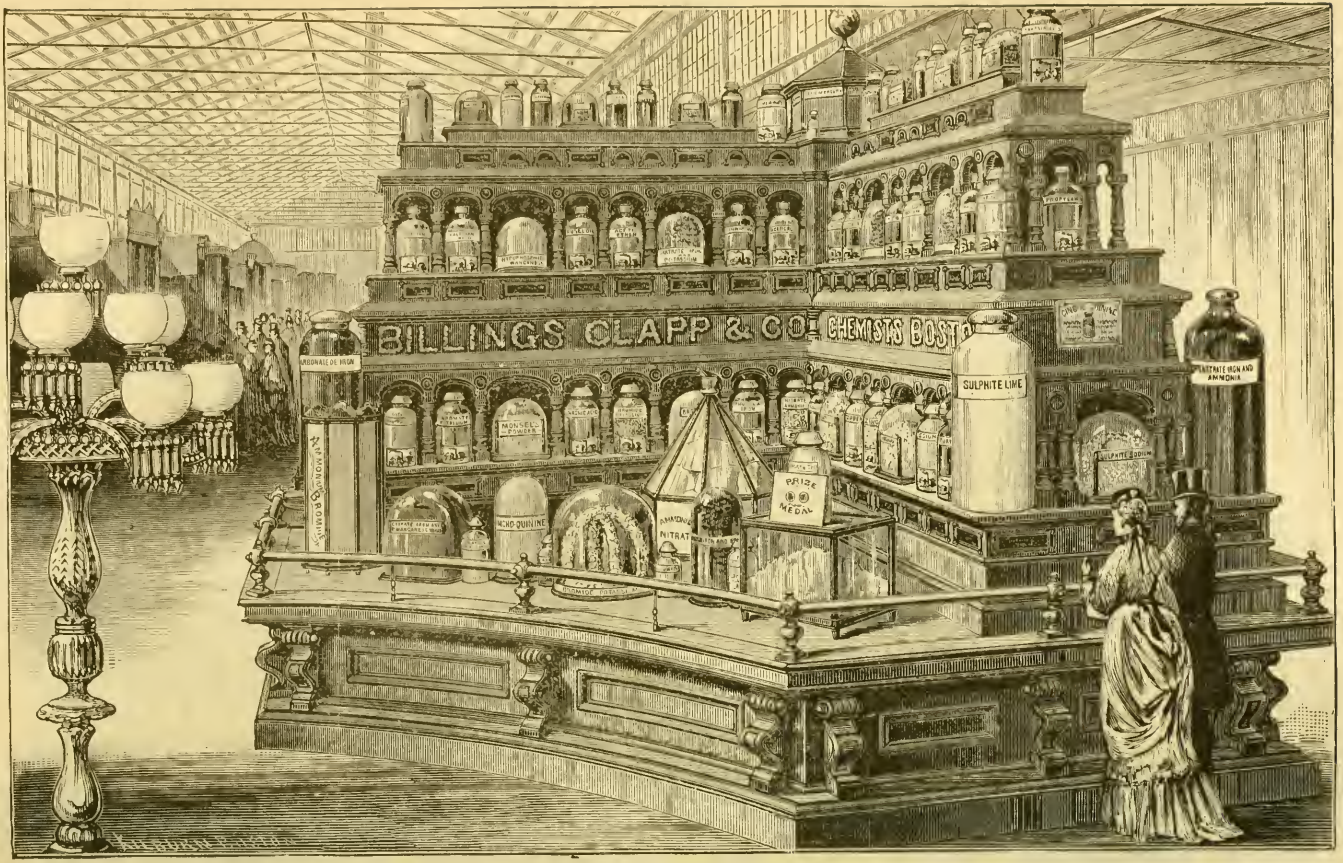
The Pennsylvania File Works, of Philadelphia, had a very handsome exhibit of their specialties, files and rasps, of which they manufacture every description. They had on exhibition the smallest file, measuring half an inch, and the largest, being over six feet, on which was etched the figures 1776, with a sailing vessel in port showing files imported. It is scarcely necessary to remind our readers that there were no files manufactured in the colonies in 1776. On a mammoth file was the inscription on one side—"One Hundred Years of Liberty," and showing a steamship departing in 1876, exporting files. On the reverse was a picture of Philadelphia as seen from the New Jersey shore, and was inscribed—"Philadelphia the Mechanic's Home."

Cutlery.

One of the most complete displays of cutlery was that of the Meriden Cutlery Company, New York city. In a very handsome case this company showed selections from their varied makes of table cutlery of every description, tastefully and beautifully arranged. The assortment included steel-bladed knives with cocoa, rosewood, ebony, bone, rubber, ivory and mother-of-pearl and patent ivory handles, also some with superfine ivory handles, and some knives made of cold steel throughout, and these plated thickly with silver. The latter was a most durable and desirable pattern, but the most elegant appearing knives at their price were those with patent "ivory" handles. The patent ivory is a substance prepared by a peculiar process, and can scarcely be told for whiteness from the superfine ivory which appears in the case beside it. It takes a polish



FILE EXHIBIT.



CHEMICALS EXHIBIT.

as readily as the genuine article, is quite as rough, and can be carved into any shape, receiving the most delicate work with all the fineness of the real article. It is hard and elastic, and ranks among the most perfect imitations of natural products that have ever been seen.

Chemicals.

One of the most encouraging signs of our country's progress is the vast amount of chemicals yearly turned out of the numerous laboratories which abound in our country; for the production of these, in the perfection to which they have been brought, demands a scientific knowledge of the most accurate sort combined with a rare gift of understanding, directing and devising new and difficult processes, or of adapting old processes to the new wants of to-day. That these qualifications are found thoroughly well developed in our countrymen was clearly evidenced by the beautiful exhibits which were made at the Exhibition from all parts of the country, including many articles and products which could not be equalled by the best and longest founded laboratories in Europe.

The Old World sent to the New rare and beautiful specimens of skill and industry, and as we compared their products with those of the United States, we were reminded that it was the first time that they had ever fairly been brought in contrast.

The chemical industries and products, in their various forms and modifications, were represented by 214 exhibitors from the United States, 65 from Great Britain, 82 from France, 80 from Germany, 113 from Italy, 33 from Brazil, 1 from Tunis, and 3 from Egypt.

No estimate can be made of the value of these exhibits, but the wealth in kind was unquestionably greater than ever before seen by the public.

The most skilful artisans had been employed in planning and constructing the receptacles for the thousands of curious and wonderful substances there brought together. The skill of the glass maker had also been called into requisition, some large jars which were exhibited having the capacity of a barrel, and said to be the largest ever made in this country.

There were some fine specimens of caffeine from Edinburgh, morphene from Germany, and wonderful specimens of lava, sulphur, and other crystalline substances from the Sandwich Islands.

In the United States department were fine specimens of camphor, and of alum in crystals, in the form of large artificial caves, attracting a great deal of attention.

Messrs. Billings, Clapp & Co. made a very attractive display of chemical products, on a stand which was erected on a triangular space sixteen by seventeen feet, and was over twenty feet in height. The name of the house appeared in large letters made of crystals of bromide of potassium. In front were several large glass cases, one octagonal in shape, containing crystals of nitrate of ammonia, weighing over 150 pounds each.

Upon the shelves were arranged more than sixty specimens of chemicals, in glass jars, three of which were filled with propylamin, and some idea of the rarity and costliness of this article may be obtained from the statement, that the contents of these three bottles alone were valued at more than $2,000.

There was also a jar of the capacity of twenty-five pounds, filled with carbolic acid of perfect whiteness;

another jar filled with citrate of bismuth; also fine specimens of citrate of iron and bismuth in scales, sulphite of sodium in crystals, the various preparations of gold and silver, etc., used in photography.

The most attractive and complete display was made by Messrs. Powers & Weightman. This of itself was an almost exhaustive one, and a sight of itself. Most of the preparations were very interesting and some very beautiful, especially those of mercurials, and of iron, the colors of the latter being very brilliant and beautiful. One of the finest and most curious was a mass of caffeine, the active principle of coffee. The mass was shown just as it was turned out of the vessel in which it had been crystallized. It resembled down, except that it was a far purer white than almost any feathers, and the minute spears or crystals glistened like the snow. A pyramid of quinine, two feet six inches square at the base, and four feet high, containing 300 ounces of quinine, valued at $800, was another feature of the display.

The Pennsylvania Salt Manufacturing Company had a very large and handsome case, in which was shown cryolite from their mines at Ivigtut, in Greenland, and several models of Esquimaux fishing boats, ice huts, etc., which were quite interesting. They also showed a crystal of alum, six feet square at the end and nine feet long, weighing nine tons.

McKeone, Van Haagen & Co. had a large and handsome white pavilion, ornamented with gold, with plate glass sides, in which they made a full display of soaps of their manufacture. There were 460 different styles of soap, of which samples were on exhibition. In the centre of the pavilion was a square pedestal of rose-colored soap, weighing 1,400 pounds.

Steel Works.

The steel industry was pretty well represented at the Exposition : from the rough bars with the blisters still on them, from the cementing furnace, to the finished product, in a thousand and one varieties of form, all were to be seen, forming a most instructive synopsis of the whole industry. One of the most interesting displays was that of the Adirondack Steel Works, of Jersey City, New Jersey. They exhibited bars of cemented steel, blooms and cast-steel ingots. The new construction of railroads involves the use of steel frogs and other appurtenances, which were fully represented in the exhibits of the works. They also showed slide bars, lathe spindles, and many other shapes, into which the raw cast-steel can be worked.

The Adirondack works cover 98,000 square feet of ground, comprise forty melting furnaces, four steam hammers, two tilt hammers, three trains of rolls, six boilers and three engines, employing over 120 hands, and turn out ten tons of finished steel per diem.

Manufacture of Pins.

The progress and advancement made in the manufacture of pins is a matter of gratification to all who take an interest in the success of our home industries. A few years since, all the pins used in this country were imported, but we can now get pins of American manufacture at any dry goods or notion store in the country, although some brands are not considered as good as those of foreign make.

The Pyramid Pin Company, of Connecticut, who manufacture pins on a very large scale, had on exhibit a pin-sticking machine, which put up the pins in a pyra-

midal form. The illustration we give represents the work accomplished by this machine.

Needle-Making.

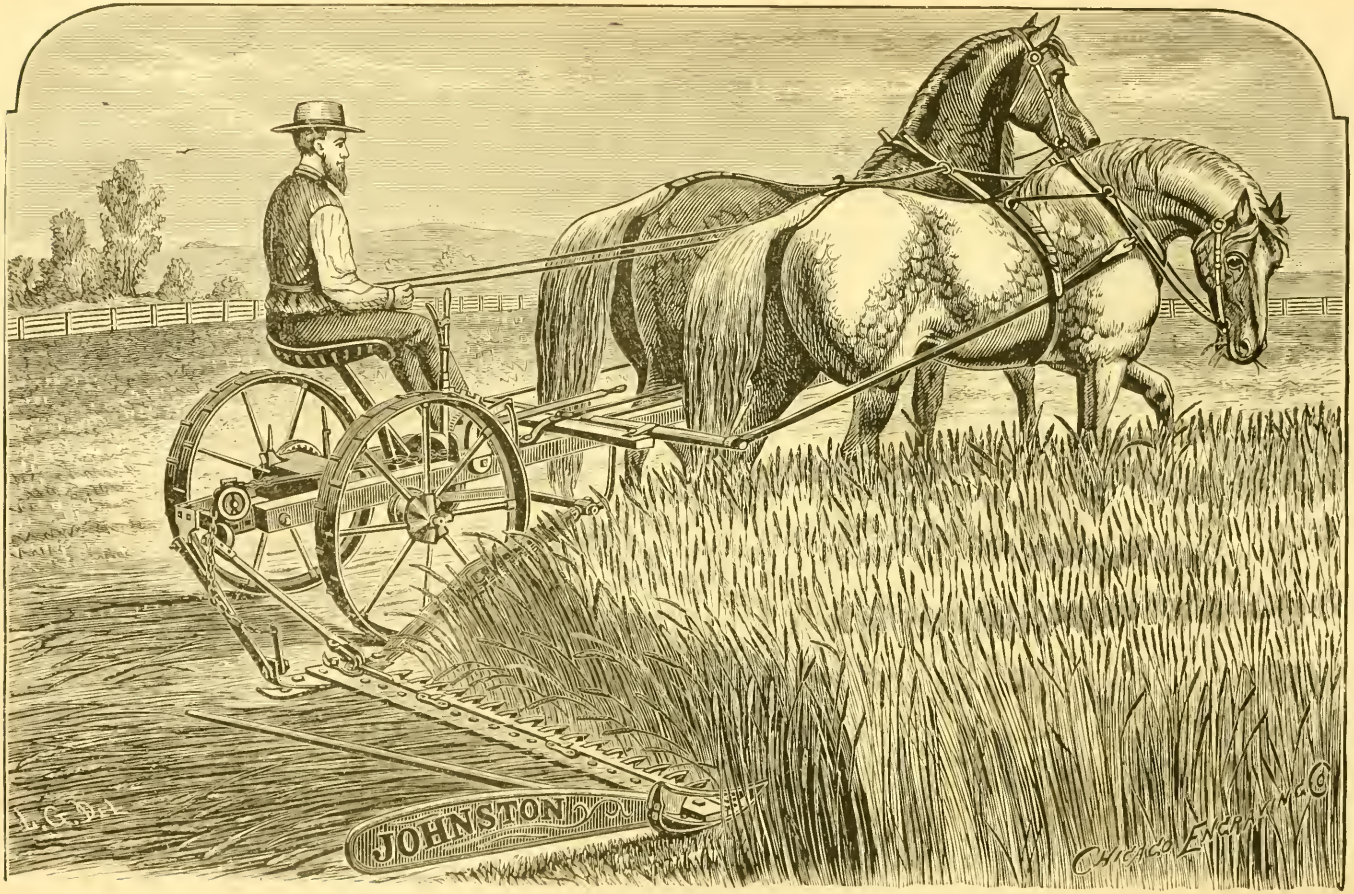
A needle wielded by the dainty hand of some expert seamstress, or glancing up and down with the rapidity of light in a sewing machine, seems a remarkably simple thing. Just a straight bar of steel with a hole at one end, polished and pointed, is all that the casual observer sees, but yet in the making of that simple instrument is required most complicated and delicate machinery, to invent and perfect which has cost many an ingenious mechanic years upon years of hard labor. The needles used in this country were once almost exclusively made in England, but some years ago their manufacture was commenced by the National Needle Company, Massachusetts. This company had a large space in Machinery Hall where it showed the entire process of needle-making, from the wire to the finished needle, including both those used in sewing machines and by hand, and of all sizes, from the finest cambric needle to that for the heaviest harness work. The machinery shown comprised no less than twenty-four different machines, in each of which a separate process in the manufacture of needles was carried on. All of these processes were of a singularly delicate character, and the machines attracted universal attention from all, and especially the lady visitors, in the building. It would take too much space to describe each of these machines in detail; suffice it to say that the processes included straightening the wire, cutting it, reducing and rough-shaping, fine-shaping, pointing, grooving, punching the eye, hardening, tempering, cleaning and polishing. After this the needles were inspected, and

all not straight were rejected; the others were finished at the point on a fine emery wheel, and then finally dropped into a mixture of crocus and alcohol, and subjected to the action of a fine hair brush revolving with great rapidity. After this they are ready to be packed. For the Eastern market they are done up in packets of one hundred, for the Western market in packets of twenty-five, and for the South American market in assorted dozens. This machinery made about 4,000 finished needles a day, but at the main factory the company turns out 25,000 finished needles in a day.

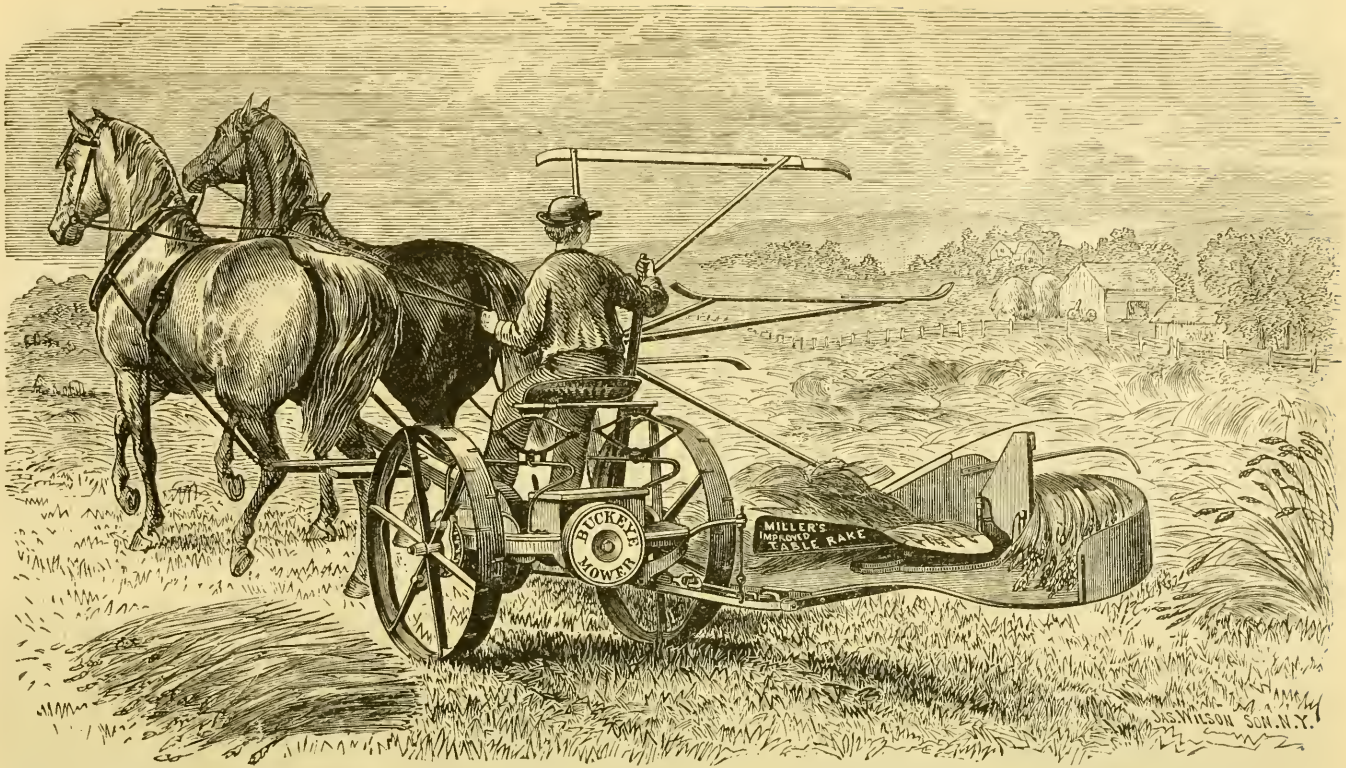
Agricultural Machines.

Even a superficial observer could not fail to observe with delight and pride the superior exhibition of agricultural machines in our exhibition. It was immense as to number shown; varied, as to uses intended, and admirable as to excellence of workmanship.

Most prominent amid all this array of practical beauty were the reapers and mowers, which, more than anything else perhaps, signalize agricultural progress. It is only a few years since the sickle was seen in every grain field, and with its slow and toilsome results each farmer had to be content. When the cradle came it seemed as if the climax had been attained, and the man who could cut three or four acres of wheat in a day, laying it in fair shape for the binder who followed, was doing good work. But the cradle and hand-rake gave way to the reaper and self-raker, and these, year by year, improved and perfected, make of harvest-time little more than a holiday. There remains for further accomplishment in this direction only the automatic binder, already a partial success, and quite sure to reach perfection in the near future.



THE IMPROVED MOWER EXHIBITED BY JOHNSTON & CO.



BUCKEYE MOWER, COMBINED WITH TABLE RAKE REAPER, EXHIBITED BY AULTMAN, MILLER & CO.

The reaper is peculiarly an American machine. As manufactured here it is confessedly superior to the same implement made in Europe, proof of which statement is found in the fact that American reapers are sold in all countries of the world, and are favorites in England and on the continent when operated in direct competition with machines there produced.

American genius first invented the perfect reaper, and only in America, with American material, by American skill, can it be most perfectly manufactured. As here made, in the light yet durable manner which characterizes all American machinery as contrasted with that constructed abroad, it is the acme of utility, and everywhere bears off the palm.

We give an illustration of an improved reaper and mower combined, which was on exhibit by the Johnston Harvester Company, of Brockport, New York, and which will show the perfection to which these machines have been brought in this country.

Buckeye Mower.

In connection with the foregoing, we also give an illustration of another agricultural machine, which attracted considerable notice from those interested in such matters at the Exhibition, and which is too well known to every farmer to need any description here. We allude to the Buckeye Table Rake Reaper and Mower combined; manufactured and exhibited by Aultman, Miller & Co., Akron, Ohio. At the official field exhibition of mowers and reapers, under the auspices of the Centennial Exhibition authorities, which was held during the last week in June and the first week in July, 1876, at Schenck's Station, about twelve miles from Philadelphia, this new table rake was pronounced

by the binders to be the easiest machine to bind after, as it left the grain in such even condition, and so compressed, that the work of binding was comparatively easy.

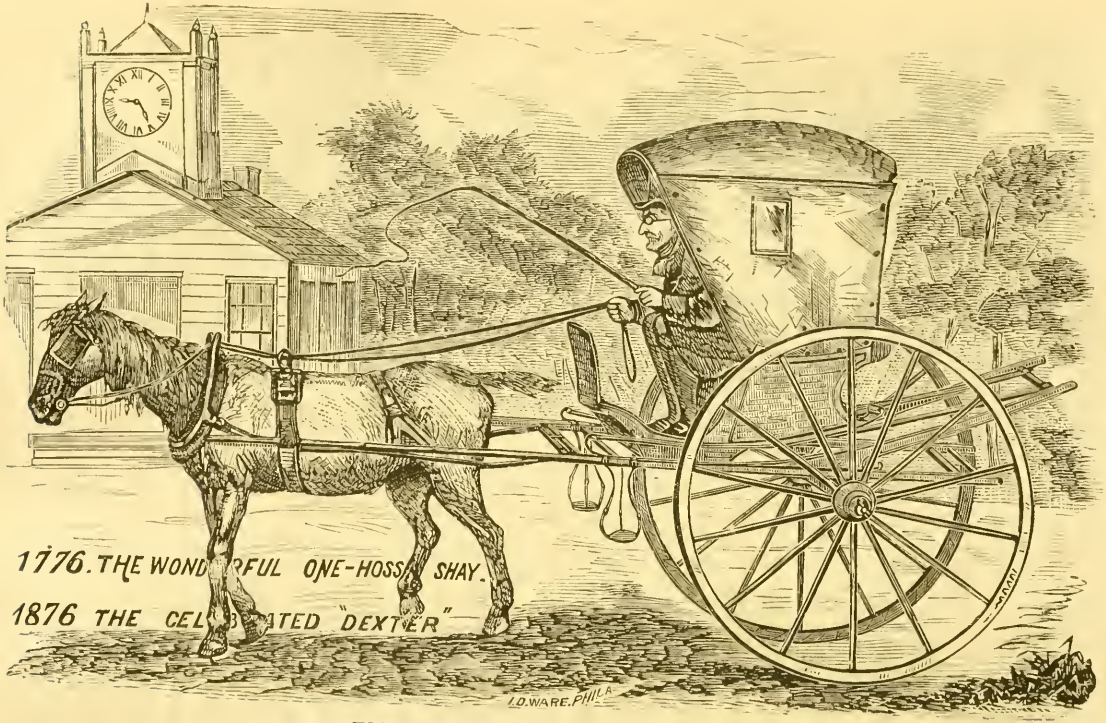
Straw-Burning Engine.

The Ames Iron Works, Oswego, New York, exhibited their portable steam-engines of different styles, one of which was a straw-burning engine, which, from the attention paid of late years to the utilization of straw for fuel, attracted much notice.

This boiler is constructed on the return-flue principle, with one large flue extending the entire length, forming the fire-box, and a number of small tubes returning each side of the large one, by which means perfect combustion of the straw is obtained. In the front end of the large flue, or fire-box, are placed the furnace doors, which are so arranged that a very slight pressure of a fork in inserting the straw easily opens them; and when the fork is withdrawn they are as easily closed by means of a handle at the top of the doors. When it is desirable, these boilers can be used equally as well with either wood or coal; and, in fact, are really superior to the ordinary boiler, having more extended fire surface. The boiler is so constructed that the fibre of the straw is entirely consumed, and the heat so thoroughly extracted from the smoke that nothing passes from the pipe but superfluous gas. A very convenient and desirable feature is, that the fire is instantly extinguished by simply throwing open the doors. This is particularly desirable in case of the discovery of low water in the boiler.

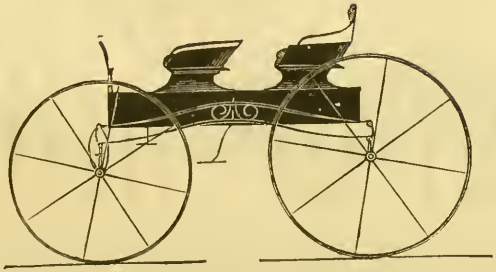
The Dexter Spring Company.

The Dexter Spring Company made a fine exhibit in the Carriage Building, and also in the Main Building, of

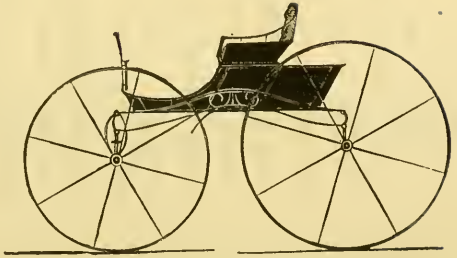


THE WONDERFUL ONE-HOSS SHAY.

THE MODERN DEXTER—HORSE AND CARRIAGE.



TWO-SEAT DEXTER.



SINGLE-SEAT DEXTER.

their Dexter carriage springs, one of which was successfully tested with two thousand and fifty pounds. The Dexter carriages were on exhibit in the American department of carriages, and attracted considerable attention, both from foreigners and our own countrymen. The progress made in carriage building during the last century has been wonderful, and the two illustrations which we give show the strides that have been made in this branch of industrial art. The United States excel all other countries in the construction of light, fancy, and practical vehicles, in point of finish, strength, durability, and comfort. Conspicuous among them the Dexter carriage merits commendation. The Dexter spring consists of two springs, made of crescent crucible steel, several inches apart, having parallel motion, being rigidly connected at the centre, and pivoted at the ends, thereby securing the axles in a perpendicular without the use of a reach. The absence of the latter allows either wheel to pass over an obstruction almost independently of the other wheels.

In connection with it, and adding materially to its value, is the noiseless Dexter fifth wheel. The body being suspended on the centre of the springs, it is claimed that it gives the rider the most pleasant and undulatory motion known in vehicles.

The Carriage Building displayed many novel and valuable points of interest. The oldest and most interesting, as a relic, was the carriage of George Washington, around which cluster the memories of a loved President, the Father of his Country. Eager throngs daily visited it, and seemed to be fascinated with its ancient appearance and evident marks of service. It afforded a most striking contrast with the modern Dexter carriage which we have described, and which stood just across the aisle.

Perpetual Hay Press.

The baling of loose material, particularly the baling of hay and cotton, has become an immense business, and improvements in machinery for such work rank among the most important.

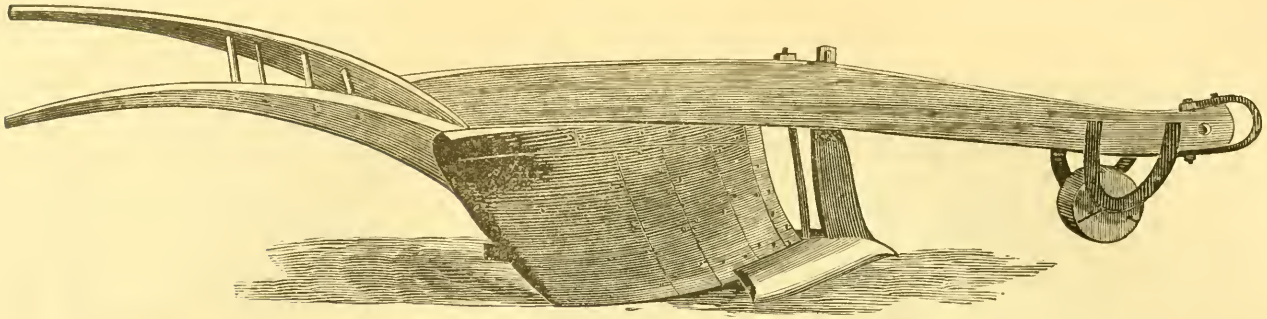
Until recently, it has always been done by placing the material for a bale in a large box and then pressing it into a bale, thus forming a bale at a time, and necessarily so much time was consumed that only large bales are practicable, although they have always been found exceedingly disadvantageous.

We give an illustration of a new machine exhibited by the P. K. Dederick Company, of Albany, New York, called the Perpetual Hay Press, which works on an entirely new plan, forming, as well as discharging the bale without any assistance, except pitching the loose material into the hopper; and the operation being continuous, a whole stack or mow of hay can be baled without stopping either to tie or remove the bales. The cut we give shows the perpetual press driven by a small portable steam-engine, both press and engine mounted, in which condition they should be worked.

Seeds and Horticultural Articles.

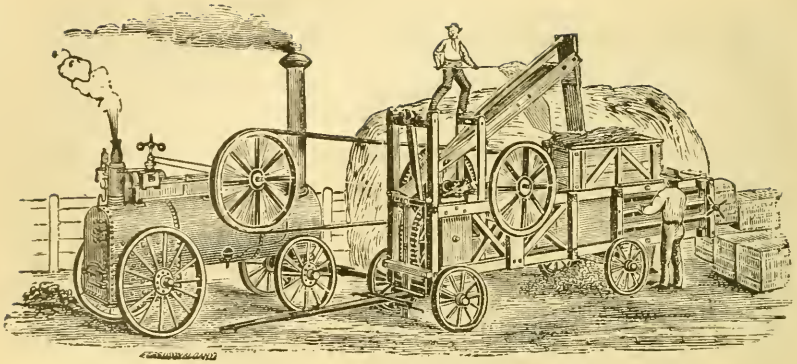
The astonishing results produced by the competition as to who should grow the largest amount of potatoes from any particular kind of tubers have excited much comment among the agricultural community.

Messrs. B. K. Bliss & Sons, New York city, have been offering premiums to those who have been making experiments in this line, and the illustration we give herewith shows a crop of Snowflake potatoes which was realized from one pound of the seed, grown in a



THE DANIEL WEBSTER PLOW, BUILT AND USED BY HIM.

COLLINS' GANG PLOW.



DEITRICH'S PERPETUAL HAY PRESS.

MR. BURNETT'S CROP OF SNOWFLAKES FROM ONE POUND OF SEED.

garden in the State of New York last summer. They were grown in good garden soil, without extra manure, and had the same cultivation as other potatoes.

Plows.

Collins & Co., Hartford, Connecticut, had a very fine display of their axes, hatchets, adzes and steel plows, the latter being a very important part of their business. Their "Eclipse" prairie and plantation gang plow, of which we give an illustration, was of the best cast-steel. The lightness of draft of this plow was shown by a recent trial, as follows: In heavy, matted grass turf the draft of the prairie gang, with coulters turning a furrow twenty-two by six inches (and carrying a heavy plowman) was 800 to 825 pounds. In a stubble field, heavy, sandy loam, the draft was 450 pounds.

The Collins improved wrought-iron frame gang plow was also a centre of attraction. The improvements on this machine are its extreme simplicity, there being no gearing, springs, or other attachments to get out of order; the new double arm giving the operator complete and easy control of the machine; and one lever only is required to regulate the depth of furrows, and to raise the plow from the ground at the end of furrow for turning, etc.

The Webster Plow.

In striking contrast with the many improved plows shown in the Exhibition is the representation which we give of the Webster plow, made by Daniel Webster in 1837. The total length of this plow was thirteen feet, beam nine feet one inch, and handle six feet four inches. It was with reference to this instrument that

Daniel Webster used those well-known words which have come down to us: "When I have hold of the handle of my big plow, with four yoke of oxen to pull it through, and hear the roots crack and see the stumps all go under the furrow out of sight, and observe the clean mellowed surface of the plowed land, I feel more enthusiasm over my achievement than comes from my encounters in public life in Washington."

This venerable plow was part of the agricultural exhibit of the State of New Hampshire in the Agricultural Hall. Though made in the name of the State, the collection was the result of personal efforts by Mr. James O. Adams, Secretary of the State Board of Agriculture, and reflects great credit upon that officer. It consisted of samples of Indian corn, wheat, rye, grass seeds, etc.; also specimens of manufactured woods in carriage hubs, lasts, piano sounding-boards, seed boxes, "Excelsior" bedding, grain measures, etc.; also two dressed Chester county swine, which weighed 1,307 and 1,253 pounds respectively, bred and fattened in Croyden, New Hampshire.

The Old Windmill.

The immense windmill was a very odd feature among the exhibits in Agricultural Hall, and by reason of its shape and size, no less than by its silent reminder of the slow and uncertain process of treading grain in the olden time. In its interior were all the pieces of rude machinery, together with the burrs, necessary for the reduction of the fresh grain to flour. It appeared extremely singular to the majority of visitors by contrast with the most compact, thorough and positive machinery of the present day, and this novelty was greatly increased by the knowledge that, with all the

mechanical devices of the last fifty years, thousands of mills, even ruder in construction and more primitive in appointments than this, are seen in various parts of the United States and in foreign countries, making noticeable dots in patches of beautiful scenery. When we see scattered throughout what should be prosperous localities such specimens of antiquity still in operation, it does not look as if the progress of civilization, and the arts and sciences, has been quite as lively as is generally believed.

This old windmill was put up by Messrs. Geo. V. Hecker & Co., New York, who had an exhibit close by of the products of their Croton Flour Mills. Their self-raising flour for making bread, biscuit, pudding, etc., also their griddle cake self-raising flour, were tested before the eyes of thousands, as the operation of making bread, cakes, griddle cakes, etc., therefrom was in daily operation. Acting on the old adage that "the proof of the pudding is in the eating," Messrs. Hecker & Co. took the very practical method of making known the merits of their specialties by giving away to any one who was willing to take them samples of cakes, biscuits, etc., made on the spot. This was the centre of attraction to thousands of visitors.

Cracker Bakery.

Trenton, N. J., is famous for her crackers, which have tickled the palate of many thousands of hungry mortals all over the country. These were very tastefully exhibited in Agricultural Hall by Exton & Co., who employ in their manufacture the most ingenious machinery, doing work that was formerly thought impossible to accomplish except by hand. These machines work up over sixteen tons of flour per week, which may

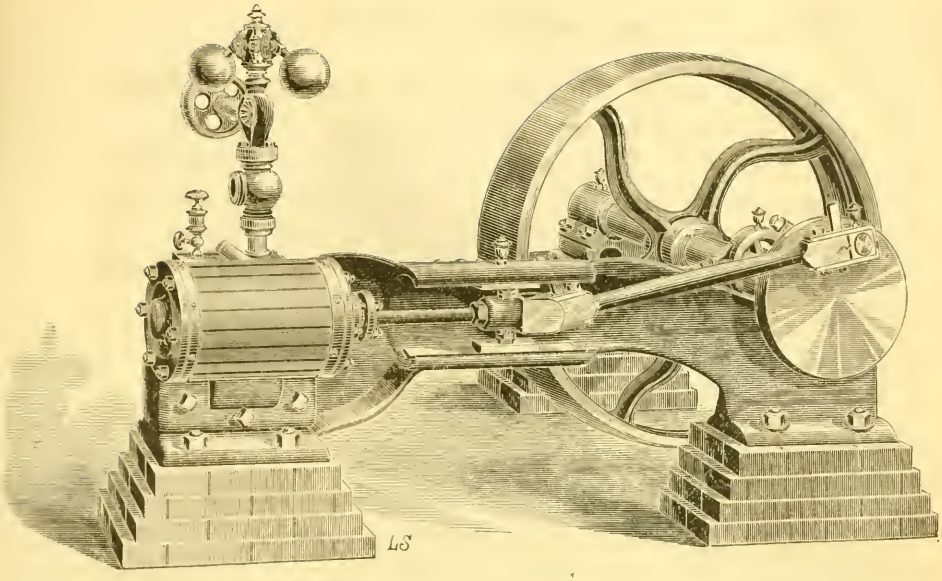
give the reader some idea of the quantity of Trenton crackers that are consumed throughout the country.

Alongside this, there were other cases containing every imaginable kind of biscuits and ornamental confectionery, displayed in the most tasteful manner. A glance at these evidenced the perfection to which this branch of industry has been brought.

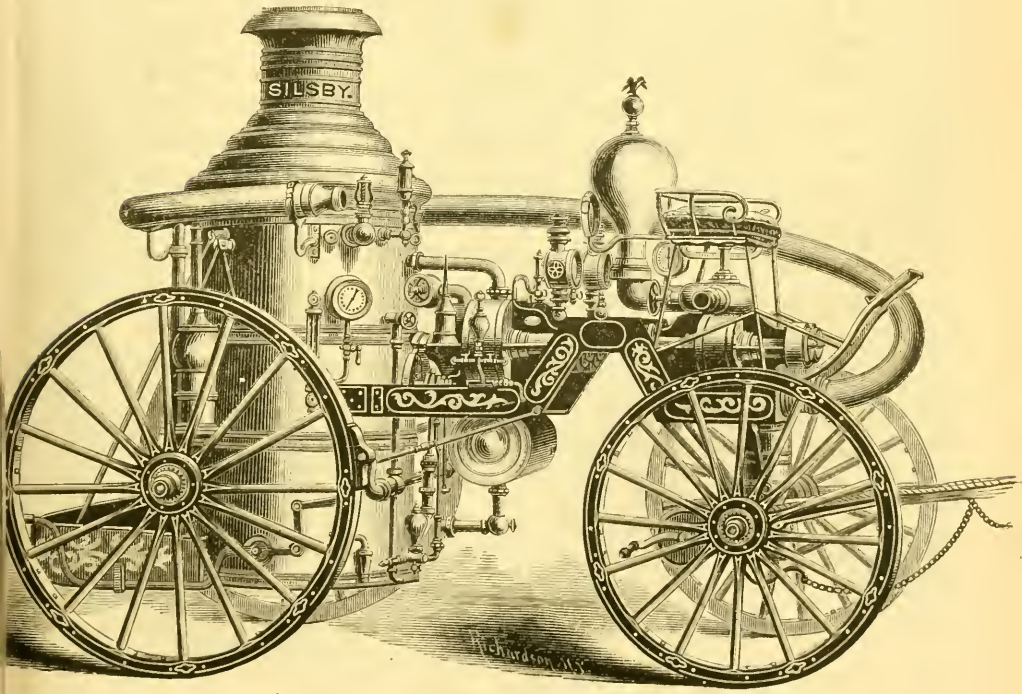
Fire-Engines.

The display of fire-engines from all parts of the country was one of the most attractive in Machinery Hall, and a description of some of the most prominent which were on exhibit will, we feel sure, be of interest.

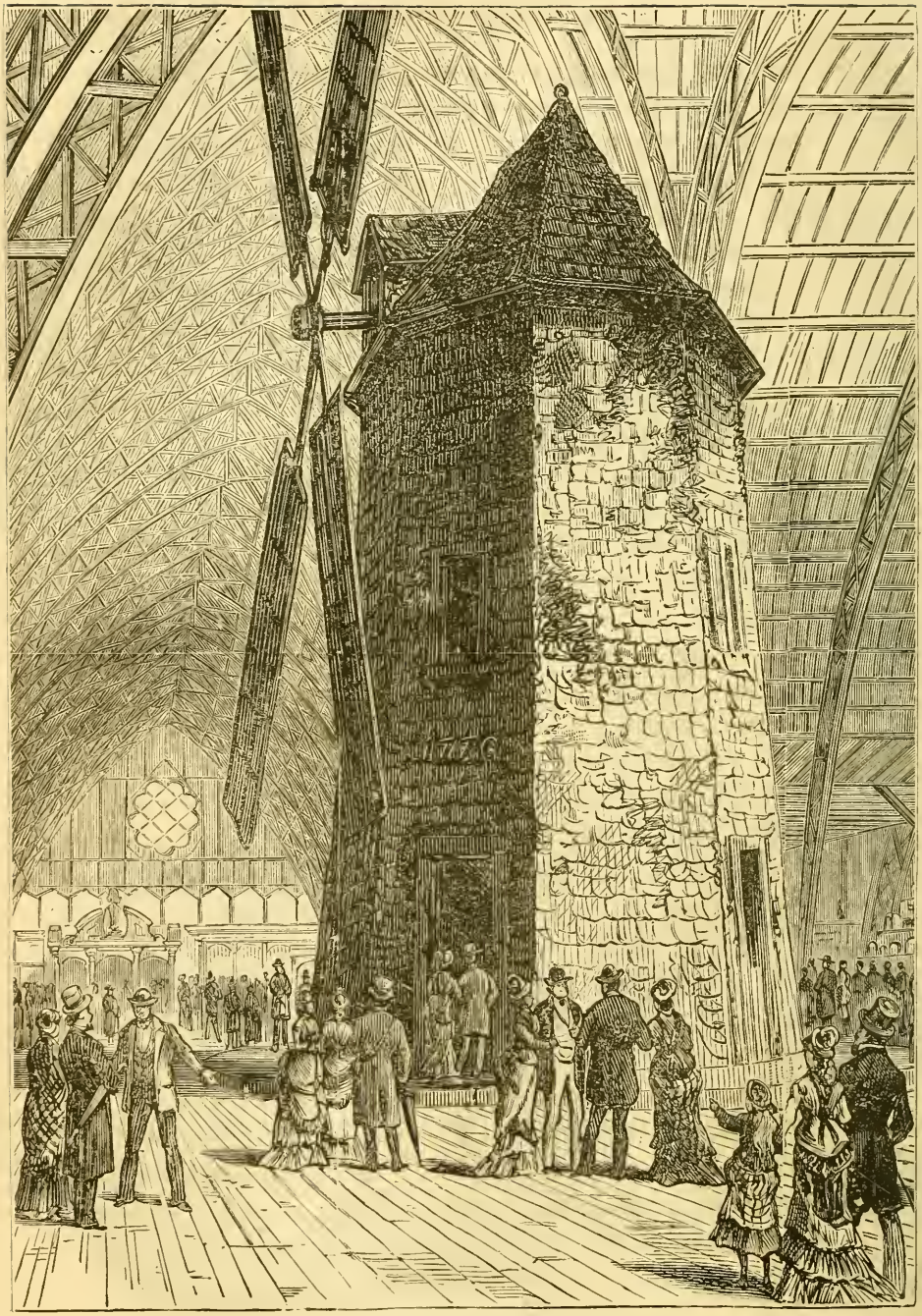
At the very entrance of the Hydraulic Annex stood the "Silsby" steam fire-engine. This engine consisted of a pair of corrugated cams running together within an elliptical steam-tight case. The steam enters on one side of the engine, and exhausts on the other, turning the two cams in its passage. The motion being circular, a very high rate of piston speed is attainable; and no space is required for incessant forward and backward motion of the connecting parts, as in reciprocating engines. This engine performs effective service with a very low pressure of steam, from fifty to sixty pounds being all that is necessary. The pump is on a frame, in a line with the engine, and of similar construction; the main difference between the two being that the cams in the pump have each three long teeth, instead of two, as is the case in the engine. The cams are fixed on steel shafts, which are coupled to the shafts of the engine. The action between the engine and pump is direct, the outside gears steadying the motion and equalizing the pressure. As with the steam in the engine, so with the water in the pump: it enters on one



THE BIGELOW STATIONARY ENGINE, WITHOUT BOILER.



SILSBY STEAM FIRE ENGINE.



THE OLD MILL.

side and is discharged on the opposite side. There is plenty of free passage through the pump for foreign matter, and sandy or gritty water can be used. The boiler is of peculiar construction. It is both tubular and tubulous; that is, there is an extended heating and circulating surface of water tubes, in addition to the ordinary smoke-flues, the fire-box having water walls. Circulating water tubes hang from the flue-sheet, which are closed at the ends, are tightly screwed into the sheet, and are so inclined as to best receive the heating action of the fire. Within each of these tubes is a light iron tube, down which the water passes after being heated by contact with the smoke flues above. Become highly heated and evaporated, the resultant steam escapes through the openings at the bottom, passes upward through the annular space between the inner and outer tubes, and becomes still further heated. Reaching the upper chamber of the boiler, the steam is further heated, while it is dried by the smoke flues. A very valuable novelty in this boiler is the apparatus by which water is fed into the boiler at a temperature of 212° from a tank, though the boiler can also be fed with cold water or from the main pump. By an attachment of the exhaust, part of the exhaust steam is turned into the reservoir tank to supply the boiler. The water thus becomes heated and pours into the boiler at the temperature named. This arrangement also prevents the freezing up of the feed-pipe in severe weather or in generally cold climates. The boiler itself will raise steam from cold water in from four to six minutes, but the general custom is to keep the water in the boiler heated from the boiler beneath the floor of the engine-house—the two boilers being attached by rubber hose. A very ingenious and, at the same time, a

novel arrangement separates the two boilers instantaneously, without necessitating any screwing up of the pipes through which the water flows from one boiler to the other. A valve is placed in each of the two pipes; the valves being supported by keys united by a small light chain. On the alarm of fire a slight pull at the chain withdraws both the keys, the two valves fall, and both pipes are effectually closed; the first plunge of the horses drawing off the rubber hose running from the engine-house boiler.

Portable Engines.

Among the many engines in Machinery Hall the Bigelow Stationary Engine attracted considerable notice. These engines, made by Bigelow & Co., were of various dimensions, varying from six up to twenty horse-power. The one which we illustrate is one of the stationary engines without a boiler.

CHAPTER IX.

UNITED STATES EXHIBITS.

Fire-Engines.

THE La France Manufacturing Company, Elmira, N. Y., exhibited rotary pumps and engines and a rotary steam fire-engine, for which the usual advantages were claimed over piston pumps, and some special advantages, such as a packing plate with the rotary pumps, by which the slightest wear could be taken up at any time even while the pump is in motion; a packing plate in the engine which makes it as tight as a piston steam cylinder, and provision made for the expansion of the cams or gears, so that there is no leakage of steam when cold, and no danger of stopping from over expansion when heated.

L. Button & Son, Waterford, New York, exhibited a steam fire-engine and a hand engine. The steam-engine was of the crane-neck type, and was said to be the shortest of that kind on exhibition. The boiler had copper instead of iron flues, and the pump's capacity could be changed to suit the length of hose through which it is pumping. The crane-neck was sufficiently high to allow the front wheels to be turned so as to bring the axle in line with the engine, and expose all the controlling parts of the machinery to the engineer. The hand engine was very large. In the same space was a miniature steam fire-engine, built by Henry C. Gaunt, of the Button engine works. It was three by

two and a half feet, carried 100 pounds of steam, and threw a stream through a quarter-inch nozzle seventy-five feet, or two streams through a nozzle of three-sixteenths of an inch sixty-six feet.

The Gutta Percha and Rubber Manufacturing Company, New York, exhibited a great variety of hose of various kinds, including all sizes of rubber hose. Boyd's patent riveted cotton hose, which, it was claimed, would sustain 500 or 600 pounds water pressure per square inch, and carbolized hose for steam fire-engines.

John E. Lindlaw, New York, exhibited a model of the Centennial fire-escape, which, when unfolded, covers, with a ladder-like structure, the entire front of the building. When not in use it is rolled up in the cornice and hidden from view. It may be lowered by means of a windlass, convenient to the sidewalk, but locked up so that the latter is inaccessible to thieves.

A. F. Shawn & Co., New York, exhibited a case of firemen's hats, shirts, belts, horns and other supplies, and the Little Giant chemical engine, which contained compartments for dry chemicals which are thrown into reservoirs and combined with water pumped by hand power. It is said to be very efficient. They also exhibited a ladder truck, and the Bangor extension fire escape ladder, which may be extended to seventy feet, and has straddling legs to support it.

B. S. Nichols & Co., Burlington, Vermont, exhibited the Gould steam fire-engine, for which it was claimed that an engine of the first class will throw a one and a half inch stream 354 feet, and one of the second class a one and a quarter inch stream 323 feet. They also exhibited a stationary heater for the engine house to supply hot water to the fire-engine.

Louis Falk, Morrisania, New York, exhibited a patent

fire-escape, which appeared like a centre table when closed up. When opened, the base formed a brace against the window, and from the interior a ladder was taken, which, thrown from the window, furnishes the means of escape from fire.

Chemical Fire-Engines.

Of these there was quite an attractive and numerous display, in every variety of construction and mode of working, power, etc.

In cases where water cannot be readily procured, and in communities where steamers are out of the question, this class of engine is serviceable, and indeed must prove invaluable. Also in cases of small fires occurring in private houses, hotels or public resorts.

The Babcock Manufacturing Company, New York, exhibited Babcock's fire-extinguishers in an imposing pyramid of many different patterns; chemical engines, to be drawn by men and by horses; trucks, with extension ladders; and hose carriages, fire-buckets, etc.

Another chemical fire-engine, the Little Giant, was exhibited by Messrs. A. F. Spawn & Co., of New York. This engine differed from other chemical engines or fire-extinguishers in the power to throw the stream being produced by the action of a pair of plunge pumps. It is claimed that a stream from the Little Giant is equal to that from the largest extinguishers or the water stream from a steamer. The engine runs on four wheels, scarcely exceeds 800 pounds in weight, and can be easily drawn by two men.

This firm also displayed a new design of light hook and ladder trucks, with crane-neck reach, tongue and tiller, and the "Bangor extension fire-escape ladder."

At a recent trial this ladder was raised to a height of sixty-five feet in twenty-seven seconds by ten men.

W. K. Platt, Philadelphia, exhibited portable chemical fire-extinguishers, which are very readily charged and discharged. The acid chamber is a heavy glass jar, which cannot be upset or broken or discharged of its contents until the machine is turned on its feet and the cover raised. The working parts are all above the water when the machine is not in use, and the weight of the extinguisher when charged is only sixty pounds. The double cylinders allow the use of smaller and stronger cylinders in proportion to capacity and weight, and each is tested to withstand a pressure of 250 pounds to the square inch, although the working pressure does not much exceed 100 pounds.

Hoisting Apparatus.

This illustration represents a hoisting apparatus which was on exhibition in Machinery Hall, by M. Pennypacker, of Philadelphia. It could be used either as a traversing hoist, when suspended by wheels on a rail or beam, or, by detachment therefrom, be used as lifts at any desired point. It consisted of a central box, affording bearings for a wheel carrying winding sheaves on its opposite sides, over which a double winding chain was applied. By the direct attachment of the chain wheels, by means of clutches and a clamp bolt, the shaft and keys were dispensed with, thereby facilitating repairs, as these wheels are the only part liable to wear out. It will sustain its load at any desired point, but will lower rapidly on being started. One man can lift 4,000 pounds by means of this apparatus.

Weighing Machines.

Of these there was a particularly fine and large display in Machinery Hall. Messrs. Fairbanks, of Vermont, exhibited upwards of 300 scales, balances, etc., of every variety. They included platform scales, such as were used during the war by commissaries; rolling mill scales; mine scales; a hay scale, of six tons capacity; fish scales; post-office scales; druggists', tobacco, grocers' and butchers' scales, etc., etc. A number of these scales were graduated for use in foreign countries, whither they are largely exported, such as China, Denmark, Russia, Spain, Turkey, France and South America. A striking feature of their exhibit was a large testing machine for weighing and testing the tensile strength of iron, steel, wire, rope, chain, etc., the deflection of iron bars and beams and the resistance to crushing of building materials, etc. Power was applied gradually by screws, and was indexed on a scale beam by a scale poise, which moved along the beam gradually and stopped the instant the sample to be tested broke, or when the pressure was no longer increased. This machine was shown daily in operation. It exerted a force of 50,000 pounds.

There were several other exhibitors of scales, as for instance the Brandon Manufacturing Company, of Vermont, who had a large display of the improved Howe scales in great variety, many of them very elaborately finished in costly woods, fine painting, and the works gold, silver, or nickel-plated. In front of their exhibit was a platform scale, which had a plate-glass platform, which gave a view of the working parts.

The Philadelphia Scale and Testing Machine Works had a very interesting exhibit containing a variety of

scales not heretofore shown. Among them, a peculiar wagon scale attracted our attention, from its not having any visible movement of the platform. Cattle or horses could be weighed accurately while moving over it, the beam working quietly and evenly at the time.

There was also a very large show of finer balances, such as are used by assayers, jewellers, scientists and apothecaries, which were perfect in construction and elegant in finish.

Wood-Working Machinery.

There was probably no more interesting and instructive department of Machinery Hall than that devoted to wood-working machinery, some of which we shall describe as being more prominent than others.

First & Prybil, of New York, had on exhibit a very ingenious band-saw and jig-saw combined, which was claimed by the firm to be the first one ever made. There was also in their display a carving machine, designed to carve heads and ornaments of all kinds. This machine was also a novel and ingenious invention, producing an exact copy of an original. The upper arm is set in a spring, forming a ball and socket joint, so as to move up, down and sideways. The pattern and carving block can be set in any required position, and moved forward or back by a coarse screw connected to a slide of the bed. Several sizes can be carved from one pattern.

The other specialties of this firm on exhibit were an automatic band-saw set, adapted for band-saws of from one-sixteenth to one and one-fourth inches wide, which it will set perfectly in from three to ten minutes; and a re-sawing band-saw, the capacity of which was from ten to fifteen thousand feet of lumber per day (ten hours).

The height of machine was ten feet, wheels of *wrought-iron* five feet in diameter, weight over 5,000 pounds.

The whole machine rested on a planed iron bed, six feet two inches long, and two feet nine inches wide; set on a strong floor or brick foundation. The lower wheel was sunk in the floor about two and one-quarter feet. Speed, 360 to 400 revolutions per minute.

Scroll Saws.

Power, Tainter & Co., of Philadelphia, had a very full display of excellent machinery, including a No. 2 Woodworth planer, twenty-six inches wide; a panel planer designed for fine shop work; a hand jointer or buzz planer, as it is called, from the noise made by its rapidly revolving cutters; a new double surfacing, endless bed planer, which planes the stuff equally smooth on both sides, and on which the bottom and top heads operate alike; an endless bed single-surfacing machine; a shaping machine, with patent concave moulding cutters, and a moulding machine for six-inch mouldings.

Mr. Joseph Jones exhibited in the same space a useful joint and mitre planer of his own invention, made by the Gridley Company, Newark, New Jersey. The plane itself was of iron, and the planing iron was readily adjustable. The plane was run at any angle to the face of table, so that in using it with thin stuff the wear came equally on all parts of the knife. The table and guides were adjustable for bevels and mitres, and the machine was altogether very compact, and has many uses.

Among the several scroll saws exhibited in this department by the Combined Power Company, of New York, Greenwich Machine Works, New York, and

others, there was a very ingenious parlor scroll saw which was operated by a cam on the driving wheel, and which was the lightest running and noiseless in movement. It was also ornamental in design and finish, with no slides, belt, fly-wheels, or anything of the kind to get out of order, having but one cast wheel, giving 1,200 motions to the saw per minute. It was provided with a tilting table, enabling a new beginner to do the finest inlaying without instructions. With this saw, horn, ivory, pearl, shell, gold, brass, and any kind of wood can be cut, up to one and a quarter inches in thickness. These parlor scroll saws are very handsome ornaments to a room, and afford a fund of profitable and instructive amusement to all ages.

Spiral Spring Machine.

Mr. Beach had also on exhibit an improved spiral spring machine, the lower part cast in one piece, so as to secure perfect rigidity of the frame. Both the upper and lower guide-ways were adjustable for keeping the saw in line whenever required by the settling of floors. The crank-shaft carried a friction pulley, by which the saw was made to stop and start instantly without shifting the belt. This machine was intended especially for pattern work; and for carpenter work, house brackets, electrotype plates, etc., it is claimed to be very useful.

Adjustable Mitre Machines.

The making of close and perfect joints is a desideratum in all trades that work in wood, as enhancing immensely the beauty and the value of the work. For many years the old hand-process with its clumsy and inaccurate box and saw, so familiar a part of the carpenter's kit, has been felt to be totally inadequate to

the demands of first-class work, and several machines have been invented to take its place and to secure the making of bevels accurately cut. Several of these were on exhibition at the Centennial, and among them was the Howard Adjustable Mitre Machine. This machine was adjustable throughout in every one of its working parts, and was strong and reliable. It was so made that it can be used in any and all of the multifarious positions in which joints are to be made in the various trades of the house carpenter, cabinet maker, pattern maker, car builder and wood makers generally, or it can be used firmly boxed in one position by the picture frame maker. It is thus adapted to a very wide range of work, making a perfect joint with great ease and rapidity. It can be furnished with a patent adjustable back rest, making the entire machine very complete. The rests are adjustable to the backs of all picture frame mouldings, thereby avoiding the tendency to tip back while being cut, which is so troublesome under other circumstances.

Clothing.

Among the many exhibits which more particularly marked the progress of the age were the fine displays of ready-made clothing by different exhibitors. Of this branch of industry—one of very great importance, giving beneficial employment as it does to thousands of workmen and women throughout our land—a number of extensive displays were made.

Prominent among these was that of Mr. John Wanamaker, who, in addition, showed in a case both ancient and modern clothing worn by American gentlemen during the past century.

We give an illustration of the mammoth clothing

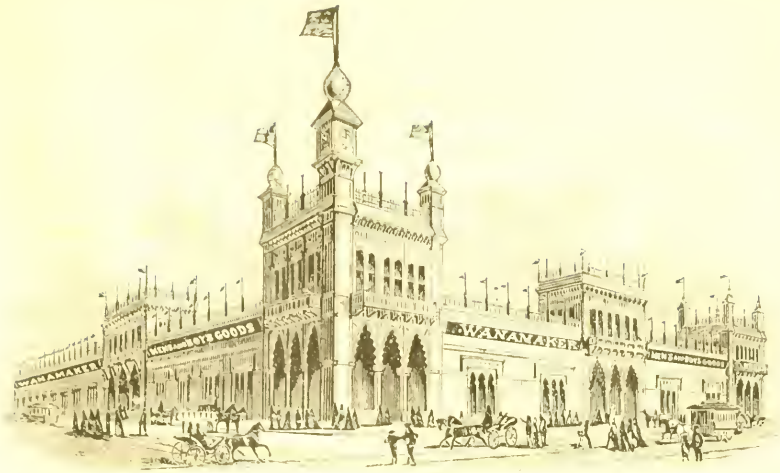
establishment of Mr. Wanamaker, on the corner of Thirteenth and Market streets, memorable as the site and the building which was used by Messrs. Moody and Sankey for their remarkable meetings.

This property after being purchased by Mr. Wanamaker was placed at the disposal of Messrs. Moody and Sankey for their meetings. The huge building, which covered the entire space of the present establishment, was crowded daily and nightly, even to overflowing, by the hundreds of thousands who came from all parts of the country to attend these meetings. As soon as they were over Mr. Wanamaker commenced the alterations to the present structure, which is the largest and most complete establishment of the kind in this country, perhaps in the world.

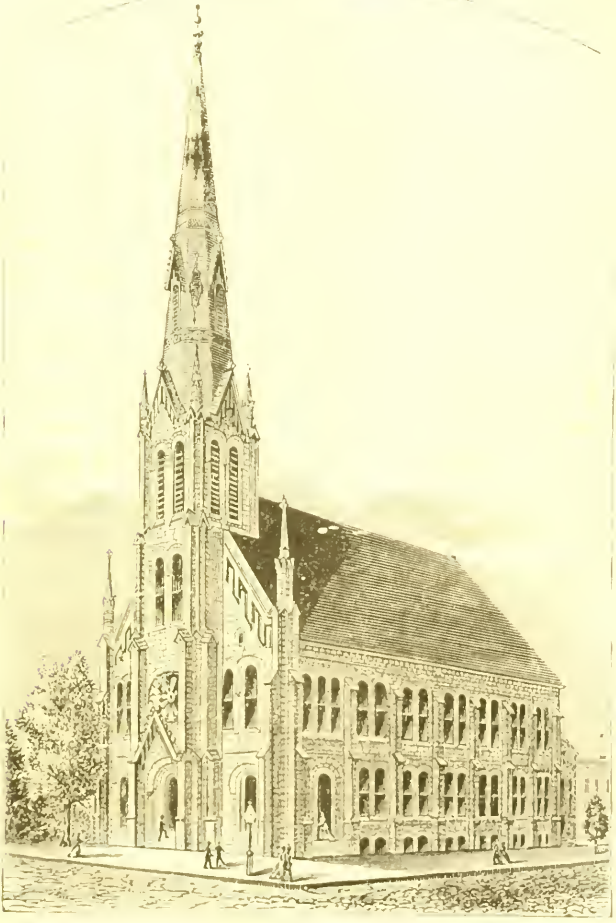
The name of John Wanamaker is so intimately and honorably connected both with our Exhibition, in the cause of which he was one of the earliest and most earnest workers, and with so many of our charitable and benevolent works, the Bethany Mission Sunday-School in particular, that it will not be out of place here to say a few words in regard to this gentleman in lieu of a biographical sketch elsewhere in our volume.

First, as to his share in the preliminary work in the Centennial. He was one of the first and most energetic in the movement, and on the appointment of the Centennial Board of Revenue for the purpose of operating through the auxiliary Boards of the States and Territories, Mr. Wanamaker was appointed Chairman, which responsible position he very ably filled.

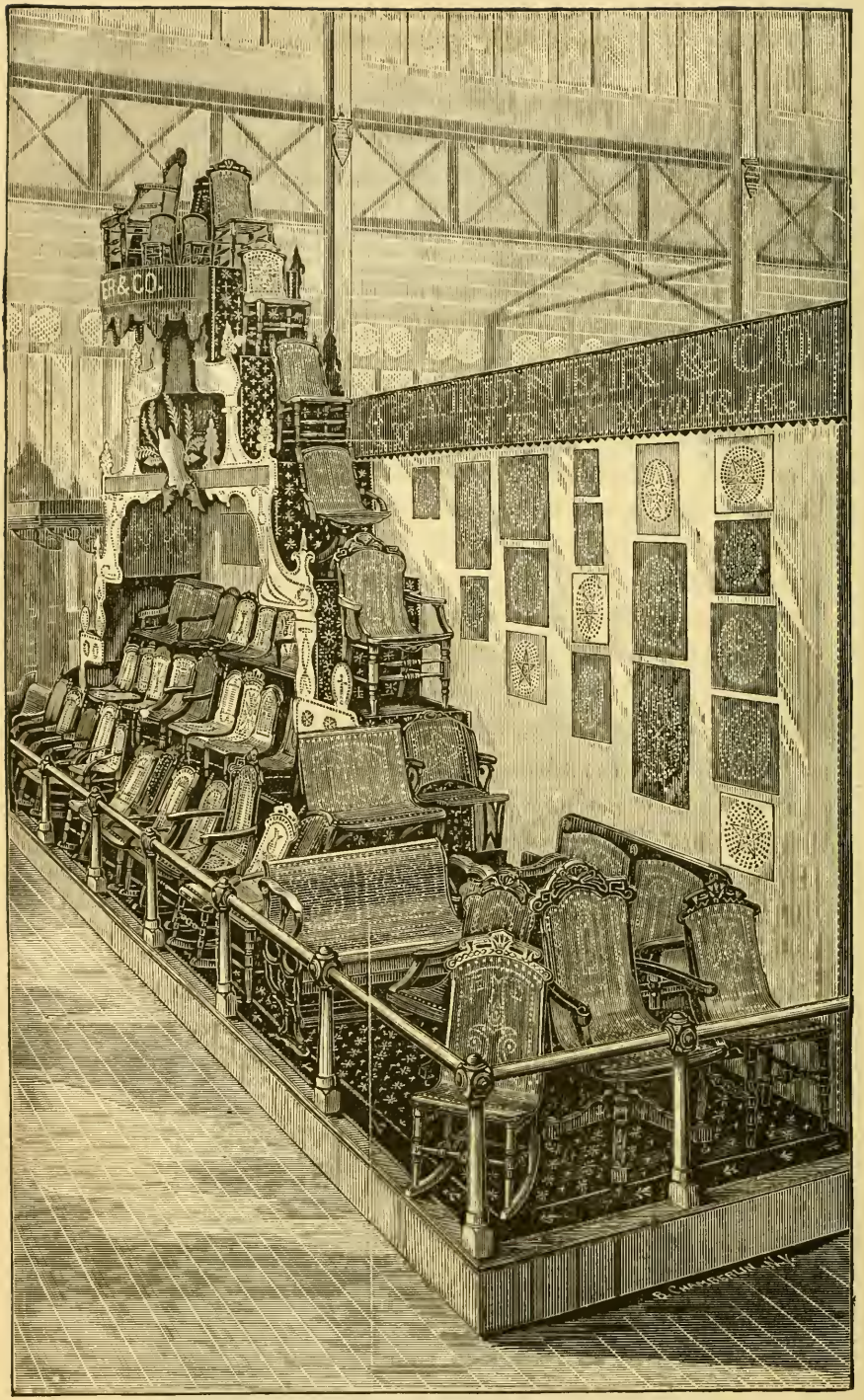
The Bethany Sabbath-School was visited by so many thousands of our visitors during the Centennial season that it came to be regarded as one of the sights of Philadelphia. It was opened on February 14, 1858, with



OLD DEPOT USED BY MOODY AND SANKEY, NOW THE GREAT CLOTHING EMPORIUM.



BETHANY MISSION.



PERFORATED VENEER SEATS.

twenty-seven scholars and two teachers, in two second-story rooms in a small house on South street; it has now reached such a magnitude that its good influences are felt all over the land. On July 18, 1858, quarters were taken in a tent built of an old ship's sail. On September 30, 1859, the new Bethany Mission Chapel, situated on the corner of Twenty-second and Bainbridge streets, was first used by the school, with 291 scholars and 13 teachers. It has rapidly grown, until now it has no peer in the country as a Sunday-school, with a building unsurpassed for neatness, size, and utility for the work, and with an attendance every Sunday of about 3,000 scholars, teachers and visitors, included.

To Mr. John Wanamaker, who has been the Superintendent ever since its first formation, is due in a very large measure its marvellous success.

Perforated Veneer Chairs.

In the Main Building, among the exhibits of furniture, there was a very attractive display made by Gardner & Co., of New York, of their specialty, Perforated Veneer Chairs, an illustration of which we give. These goods were a comparative novelty, more especially to foreigners, from whom they received considerable notice and approval. For durability, beauty and cleanliness, not to speak of comfort, they are infinitely preferable to the old cane seat, and they are rapidly coming into use, not only in private houses, but in public buildings, churches, schools, railroads, hospitals, street cars, etc. They are made by gluing veneers together, so that the fibre of each layer crosses the other at right angles, neatly perforated and shaped to fit to all styles of chairs, rockers and settees adapted for cane.

Japanese Paper Ware.

There was a very interesting exhibit of Japanese paper ware by Jennings Brothers, of New York, which comprised pails, basins, bowls, spittoons, cuspadores, fruit dishes, foot-baths, slop-jars, etc. These articles are said to be water-proof, non-conductors, durable, and undoubtedly capable of a fine finish. They will not leak, break, shrink, rust, or fall to pieces if exposed to the action of the weather.

Slate.

The State of Pennsylvania has within her borders vast mineral wealth, not only of coal, iron, and oil, but also of another material scarcely inferior in versatility of application to iron and as certain in its continuance as coal, and that material slate. The most extensive exponent in the Exhibition of this rapidly growing product of the old Keystone State was probably the exhibit made by the Columbia Slate Roof Company, of Slatington, Pennsylvania. This consisted of large slabs of the crude slate, as it came from the quarry, and samples of the finished products. The slate from this quarry is highly superior in color, elasticity and strength, and is especially distinguished by a clear and easy rift, which, continuing through the whole seam, renders its extraction remarkably easy. The quarry where the specimens were taken is situated on the property of the company at Slatington. The Washington Vein Roofing Slate made here has met with great favor in the markets of Europe, and there is a very large demand for this slate.

Rutland Marble.

One of the most beautiful and artistic exhibits at the Exposition was that of the statuary marble, quarried by Sheldons & Slason, at West Rutland, Vermont. This material is naturally remarkable for its purity of color, fineness, and adaptability to all artistic purposes, and was here shown, worked into most exquisitely carved mantel statues and statuettes, and into monumental forms of various kinds. The beauty of this marble was the subject of comment to all who saw it, and hundreds of visitors daily paused to gaze at its pure color and brilliant polish. Seen side by side with the best imported marble it loses nothing by the comparison. Some of the best sculptors in the world have pronounced it fully equal to the imported for statuary, while it has latterly been used for the interior work of many public buildings, notably the "Gold Room" at Washington, D. C., and also in the Art and Mutual Life Buildings at Philadelphia, and in some New York and Philadelphia banks.

Terra-Cotta Ware.

The literal meaning of the term terra-cotta is baked earth, which most expressively and simply asserts the nature of a material that has been known and used for the past two thousand years. First, perhaps, in antiquity, we may refer to its use as a material for forming drain pipes; sewers built of it having been discovered in the excavation of Herculaneum and Pompeii, destroyed by an eruption of Vesuvius, A. D. 79.

Terra-cotta pipes are especially adapted for sewerage purposes in cities, towns, and public institutions, and for the conveyance of water generally; made with

great care, from the purest selected fire-clay (sizes two inches to twenty-four inches diameter, with branches and house connections), and partake of the nature of the hardest stone, and from the principle adopted in their manufacture, are indissolubly coated inside and outside with glass, at a high temperature, and from the smooth surface thus obtained are not liable to be choked from deposits, and although laid at a much less grade than brick, or any other form of sewer, their capacity and usefulness are much superior.

Being constructed of a fire-clay vitrified by being subjected to an intense heat, it becomes thoroughly proof against all rust or decay, and will last for ages. Being made round and smooth inside, and doubly glazed with a mineral substance which covers every portion, and being hardened by the fire, renders the surface like glass; nothing in passing through will adhere to it; offensive odors cannot find a lodgment, and it is not affected by the strongest acids.

The Trenton Fire-Brick and Terra-Cotta Works, of New Jersey, had a very attractive exhibit of their varied manufactures: fire-brick for rolling mills, forges, foundries, furnaces, or any purpose where the heat was very intense; terra-cotta ware sewer and drain pipes of all sizes, and shapes, and angles conceivable, such as are used in the multifarious branches of industry; chimney tops and chimney flues, which now have greatly superseded the ordinary brick chimney or tin flues, both in partition walls or stud partitions. These flues are made without flanges, for brick walls, and for frame buildings, and stud partitions, with flanges, so that a strong and tight joint can be made.

No decoration adds so much to the natural beauty

APOLLO BELVIDERE.

EXHIBITION VASE.

of a garden, and at so little expense, as a few vases filled with flowers, and terra-cotta vases are now almost universally used for this purpose. This ware was exhibited in rustic designs for hanging-baskets, flower-stands, garden-vases, garden-seats, and which were very pretty indeed.

Messrs. Galloway & Graff, of Philadelphia, made a very beautiful display of their art and horticultural terra-cotta ware, in the shape of statuary, vases, flower boxes, fountains, tazzas, fern cases, pedestals, etc. For variety, excellence of design, and workmanship, this collection was equal to any in the Exhibition. A number of the vases were copies of some of the finest specimens from the antique, old Greek and Roman productions; while the statuary was made from casts of the originals. Of the latter, a figure of Apollo Belvidere (from the Vatican), seven feet high; Psyche (by Gibson), four feet nine inches high; Diana and Flora; "Dancing Girl" (by Canova); and a fountain, six feet three inches high, deserve special mention.

Crucible and Clay Ware.

Messrs. J. Goebel & Co., of New York city, had an unique and tastefully-arranged display of their clay ware, which attracted much attention. It included specimens of raw clay, the same after burning, jewellers' sand crucibles, and specimens of glass pot shells. Some of these had been in use for nine months and three days, others seven months, and one fourteen weeks, where the pot was still unbroken. These were all placed upon a handsome stand of the finest French walnut, elaborately worked and highly polished, with a relief of gilt lines. The design was admirable and unique, and carried out in a true, artistic spirit. The

feature of the exhibit was, however, an elegant frame, enclosed between two Corinthian columns, which supported the entablature, on the apex of which was perched an American eagle, just ready to fly off, and with sharp eyes peering after an imaginary prey, grasping in his claws a block of clay, upon which was the monogram of the house.

Ceramic Gas-Kiln.

In Machinery Hall the Ceramic Gas-Kiln Company, of Chicago, exhibited a patent ceramic gas-kiln for burning bricks, tiles, drain-pipe, terra-cotta, and other products of a similar character. The advantages claimed for this kiln were economy of labor and fuel, and a greater uniformity in burning, as opposed to the irregular action of the fire in ordinary kilns and ovens. In this gas-kiln the different grades of bricks, such as "oven brick," "stock and face brick," "salmon or soft brick," etc., all of which grades vary widely in market value, are unknown. The heat in the kiln being under perfect control, its direction can be changed at pleasure, the mass of material to be burned being in this way equally exposed to the action of the heat, the loss from vitrifaction and excessive burning being reduced to a minimum, and the duration of the operation of burning being greatly reduced—all this in addition to a uniformity of product, a consummation devoutly wished for by all pious and conscientious brickmakers. The company desired to erect one of their kilns, and exhibit the principle of them in practical operation; but there was some difficulty about the supply of gas, and the idea was necessarily abandoned.

Glass.

One of the most beautiful objects in the Main Building was a crystal fountain, which every visitor to the Main Building must have noticed, and which was designed and exhibited by the Washington Glass Company, of Massachusetts. This fountain, forty-eight feet in circumference and seventeen feet high, was built entirely of prisms of cut crystal glass, which reflected the changing light, and decomposed it into all the colors of the rainbow. It was so arranged that at night it could be lighted up by 120 gas-jets concealed within, and then, with the dazzling colors reflected from the countless drops of water and flashing from the glittering prisms, it presented a spectacle of fairy beauty almost beyond imagination. The fountain was surmounted by the largest crystal figure ever made—a statue of Liberty thirty inches in height, and without imperfection.

In the centre of the Main Building, the same company had another space, in which it exhibited many beautiful samples of its products in cut and molded glass, including chandeliers, busts, goblets, paper weights, and many other articles of beauty or usefulness.

Glass-Making.

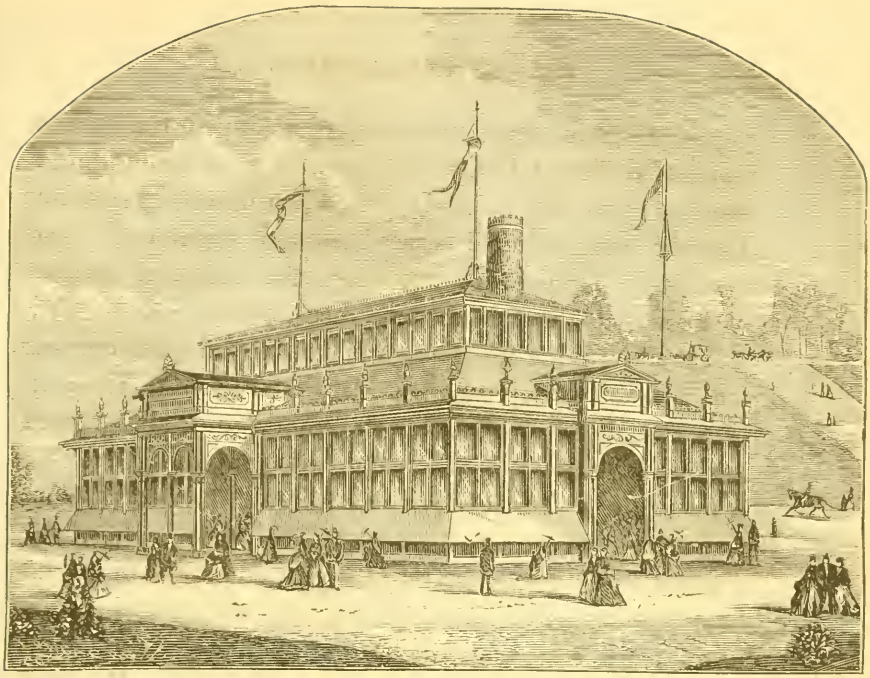
Among the many exhibits on the Centennial grounds, there were few more complete and interesting to visitors of all ages than the Glass Factory of Messrs. Gillinder & Sons, of Philadelphia, of which we give an illustration.

The whole process of manufacturing glass was here shown, and it was a very interesting and highly instructive exhibit. Many of the articles manufactured were especially designed as mementos of the great Exhibition, and found a ready market. These included

paper weights, upon which were stamped representations of different Centennial buildings, or public buildings of the city; busts of Washington, Franklin, Lincoln and others; vases, colored ornaments, and trinkets. There were also made the standard articles of trade—goblets, decanters, vases, etc.

The engraving on glass was one of the most curious and attractive departments in this building. The cutting was done entirely with emery and oil, pressed against the glass by the edge of a rapidly revolving copper disc. These discs were of all diameters, from a fraction of an inch to three or four inches, the smaller revolving more rapidly, and cutting a finer and deeper mark. The operator carried the pattern in his mind, and did not outline it upon the glass, but depended entirely upon his eye and hand. He held the glass to the wheel, which instantly cut through or roughened the surface, he rubbed off the oil with his thumb or finger to see the result, alternating this movement with pressing the glass to the wheel, and these movements were so rapid that the glass seemed to be almost continuously upon the wheel. Flowers, birds, leaves, fruit, and in fact any object was thus cut upon glass by the skilled workman.

Among the fancy articles of glass filament, made by directing the flame of a blowpipe upon glass rods, was a lady's hat seemingly of a fabric much finer than the finest white silk, and decorated with natural flowers. This was said to contain over 10,000 miles of "spun" glass. Another wonder—although not made of this filament—was a steam-engine made entirely of glass, pumping water to a glass fountain. The fly-wheel was about fourteen inches in diameter, and the pressure five pounds. The only part of it not glass was the



GILLINDER AND SONS' GLASS WORKS.

PHOTOGRAPHERS' STUDIO.

H. C. FOX & SON'S EXHIBIT.

fire. Appendages requiring flexibility, such as belting, were formed of strung glass beads. Taken as a whole, the place was one of great interest. It required three weeks immediately preceding the opening of the Centennial to get the fire in the furnace up to the necessary heat, and it was never allowed to go out.

Druggists' and Perfumers' Glassware.

The display made by H. C. Fox & Sons, druggists and perfumers, of glassware, was very handsome indeed, and was contained in a showy case ten feet long, five feet wide, and thirteen feet high. Within this were ranged very tastefully from 3,000 to 4,000 bottles of every conceivable shape and design. Inside was an oblong square, formed of mirror-glass, which reached to the top of the case, and before this were rows of glass shelving on which the bottles stood. The bottles being reflected in the mirror, the effect was to so magnify and multiply the number as to somewhat bewilder the visitor.

Soda Water Fountains.

The business of manufacturing and dispensing aerated waters has largely developed within the last few years, and the demand for elegant apparatus has kept even pace with the most advanced ideas of the manufacturers, until the whole range of art is explored to furnish designs and ornamentation for the marvels of taste and skill which have replaced the crude designs of former years.

The growth of an asthetic taste in the demand for the various combinations of the counter has led to a greatly extended manufacture in the line of counter draught apparatus, of the most elegant and artistic patterns, combining the elements of purity and safety,

and the great variety of these fountains which were on display at the Centennial, scattered throughout the several buildings, most of them in operation, attracted great notice and well-deserved commendation.

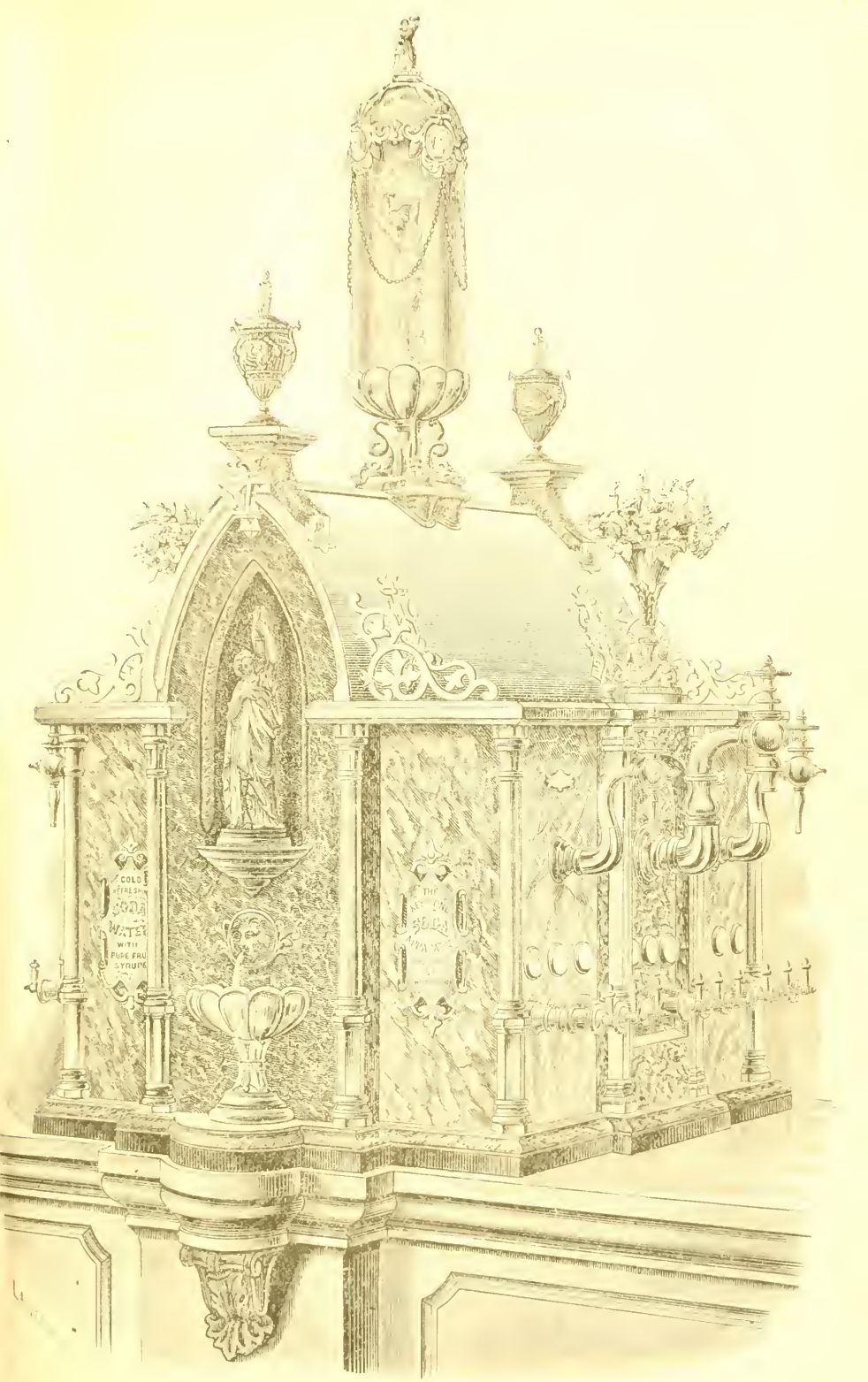
Charles Lippincott & Co., Philadelphia, had a very beautiful assortment of soda water apparatus of chaste and beautiful designs, of two of which we have given illustrations.

One called the "Minnehaha" called forth special praise from the convenience of its arrangement for the supply of syrup and ice without the necessity of removing the ornaments which adorned it. The base was composed of black and Tennessee marbles; the body of Sarrancolin, with projections on front and sides of Tennessee; the corners were finished with beautiful pillars of burnished silver.

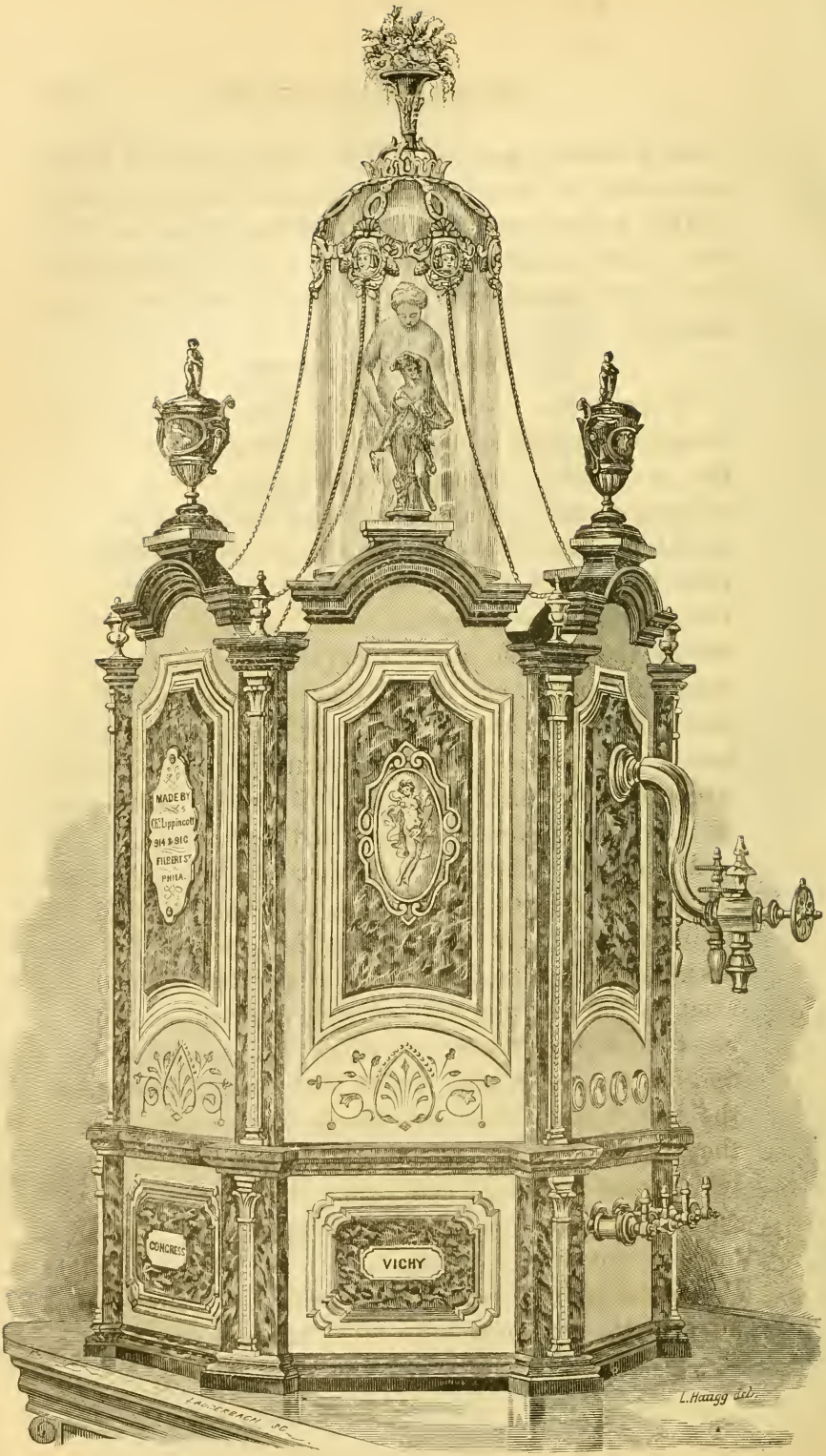
From the body sprung an arch roof of Italian marble, on which was placed a miniature fountain in a fluted basin, supported by bronzed dolphins. A glass vase capped with silver crown enclosed a handsome statuette. On each end of the roof were placed handsome urns in bronze, resting on pedestals of variegated marbles. In a highly-polished niche stood a fine bronze figure, underneath which, from a lion's head, ran the water from the fountain above into a beautiful fluted basin.

The other, the "Fountain," was constructed of four different natural marbles, viz., white Italian, Tennessee, German jasper, and Irish black.

The front panels were made of two-inch stone, from which were worked beautiful raised mouldings, enclosing tablets of rich jasper marble. The columns were of Tennessee, enriched with silver pillars; the caps and sub-base were of black marble, the former tipped



THE MINNEHAHA.



THE FOUNTAIN.

with white statuary, on which rested beautiful figures and urns in bronze. A miniature fountain played within a glass vase capped with silver crown, on which was placed a bronze Mercury, or silver bouquet-holder. The combination was very striking and was much admired.

Telegraphic Apparatus.

Never before in any World's Fair has there been brought together so many new and valuable machines, the very latest inventions and improvements in the telegraphic art. A glance at these evidenced the wonderful progress that has been made, even within the past few years, in the science of electro-telegraphy. Besides the more important machines, there were many which showed the great utility of electricity in its practical application to the domestic purposes of life, and to the wants and requirements of public companies, hotels, mercantile and manufacturing establishments, which rendered this department of the Exhibition one of more than ordinary interest and instruction.

Among the machines exhibited was the new giant sounder, for telegraph lines, shown by Patrick & Carter, Philadelphia. This instrument is intended for producing sound to enable telegraph operators to read the same by the repeated dots and dashes produced thereby at stations upon railroads, where the ringing of bells and other noises makes it difficult to hear the sound of the instrument. The two black spools represented in the cut are bobbins of wire, through the centre of which runs a piece of soft iron. Above the spools of wire, which are called electro-magnets, is placed a piece of soft iron attached to a bar of brass. When the current of electricity is sent through this magnet it attracts the armature with force, causing the screw in

the brass bar to strike upon the centre of the arch and thereby producing a loud, clear sound.

This firm also exhibited a champion learners' telegraph instrument, which contains all the principles embodied in their giant sounder, but has attached thereto a key or lever of brass with a button upon the end for a handle, which is manipulated to produce the dots and dashes, or what is called the Morse characters. The base of the instrument is made of cast-iron, and most of the upright pieces shown in the cut are cast upon the base.

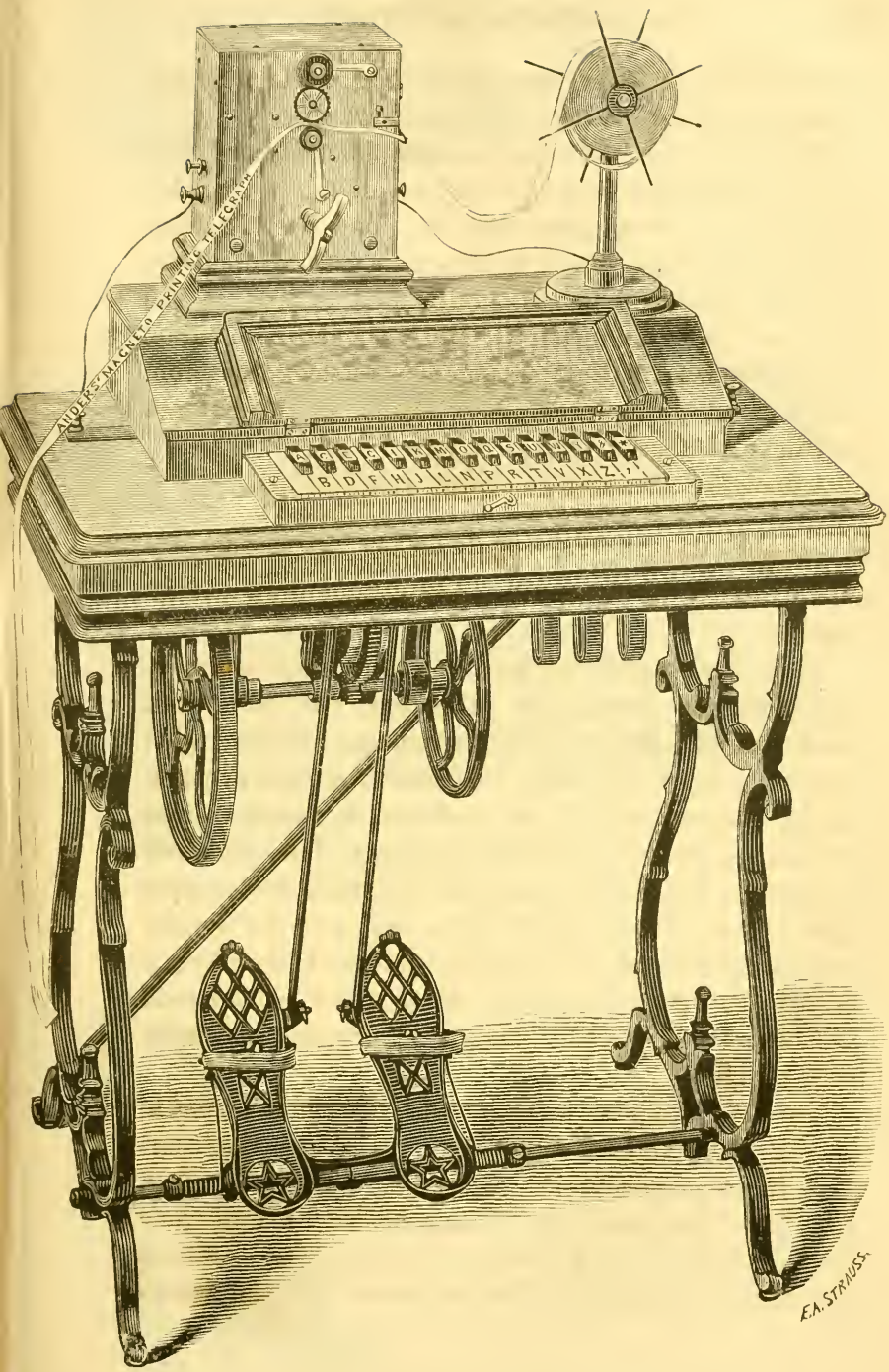
Among the Printing Telegraph Instruments,

Ander's Magneto Printing Telegraph Instruments,

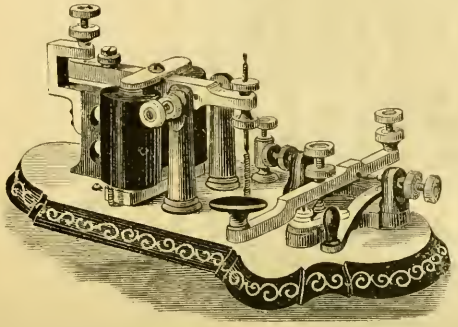
one of which was on exhibit, particularly drew our attention.

These instruments are worked without any batteries. The electrical currents are generated from permanent steel magnets, shown in the engraving (at the right) projecting below the table. Between the ends, or poles, of the magnets, which are U-shaped, is placed an iron armature, supported by brass bearings. This armature is grooved lengthwise, and wound with fine copper wire. It is rotated rapidly by the action of the treadle, and the electrical currents are produced thereby; a positive and negative current being generated by each revolution. The result is that the printers will work very rapidly.

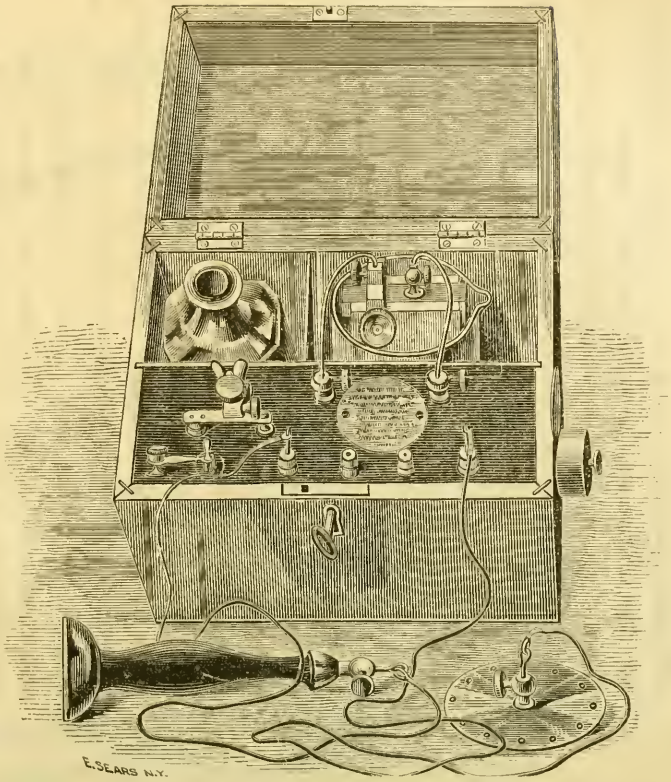
The steel magnets will never change their strength, and so will remain a reliable source of electrical currents as long as steel, brass, and copper will last. Should any part ever wear out, it can be replaced at very little expense. Any person can learn to transmit messages by them in a few minutes. As the words



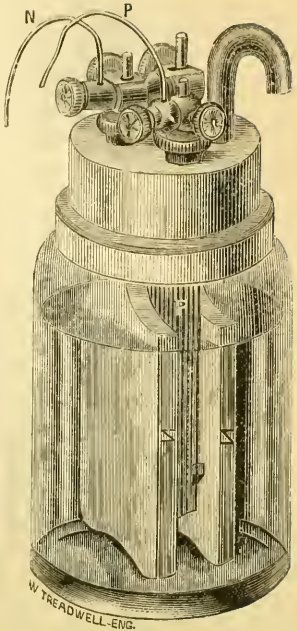
ANDERS' MAGNETO PRINTING TELEGRAPH INSTRUMENT.



LEARNERS' TELEGRAPH INSTRUMENT.



FAMILY ELECTRO-MEDICAL APPARATUS.



ROUND JAR.

are spelled out on the keys they are printed on a strip of paper by each instrument on the line, but any instrument can be cut out of the circuit by a switch if desired.

The advantages of these instruments (as stated by the manufacturers) over any others are, that they save *all* the expenses, as well as the constant care and trouble required to keep batteries in good condition, and that they are more reliable and more rapid in transmitting messages than any instruments that are worked by batteries.

Electrical and Telegraphic Apparatus.

The Western Electric Manufacturing Company, of Chicago, Illinois, made a very full display of their exhibits in the way of electrical and telegraphic instruments of all kinds, some of which we have illustrated for the benefit of our readers. Prominent among their exhibit was Gray's Automatic Printer, which is the printer used by the Gold & Stock Telegraph Company for private line use. This printer is self-starting, self-stopping, and self-correcting, and therefore any one who can spell and read can use it. The sending operator prints out his message in plain letters at the distant end of the line, whether the receiving operator is at the instrument or not. The message is also printed by the transmitting instrument.

Another cut is of a thermostal, or mercurial bulb, part of the system of electro-mercurial fire-alarm, perfected by this company. These thermostals are placed in the ceilings throughout the building, and whenever the atmosphere is overheated the electric circuit is completed at that point; an electric bell placed in the circuit at the office rings to draw attention to the fire, and

an electric annunciator attached to the bell shows just where the fire is.

The thermostat consists of a glass bulb filled with mercury, and placed in a metallic shield for protection. The bulb has two upright tubes, in each of which is a platinum wire. In the shorter tube, which is closed, the platinum wire connects with the mercury at all times. In the other, the wire is set above the mercury at that degree of temperature at which the alarm is intended to be given.

As the temperature rises the mercury expands in the tube, until it touches the platinum. This closes the circuit of the battery, which rings the bell and operates the annunciator, locating the fire in the building.

The third cut shows a private line instrument. These are used on the many private lines from one hundred feet to ten miles in length, which are being everywhere erected for practice and amusement.

And the last illustration is of a patent reservoir battery, Bliss & Hill combination.

Electro-Magnetic Mallet.

This was a very ingenious and useful invention for filling teeth by machinery, exhibited by Dr. W. G. A. Bonwill, of Philadelphia, the inventor.

It is claimed that the work is done in two-thirds the time, and more effectually than by any other method. It operates automatically from three small cups of a battery, at a cost of fifteen cents per week, gives from 500 to 3,000 blows a minute, and is always ready and as easily controlled as the telegraph. It is also used as an autographic pen, and 1,500 copies can be taken in a few minutes from the original manuscript. This is done by punching the paper full of holes, through which

the ink flows. The sculptor too can make it serviceable, and can use it in performing his delicate work with as much ease as the painter with his pencil.

For chasing and raising surfaces on the precious metals; engraving on steel, copper, wood, and stone, and in fact wherever any light blow is needed, in any line of work, this little machine can be used.

Electric Burglar Alarm.

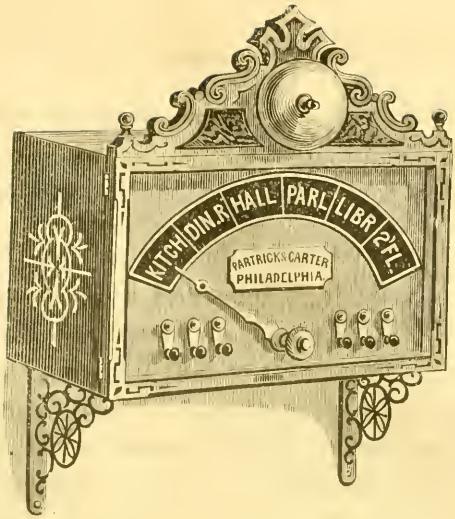
An improved electric burglar alarm was also exhibited, which was marked with six indications or points from which the alarm can be given. To each door and window in the apartments is attached a spring and a wire which leads to the alarm, so that whenever a window or door is opened, the spring which is held in position by the closed door or window is released by opening of either, and thereby makes a connection with the wire that leads to the battery and communicates to the bell upon the alarm, which also releases the pointer upon the face, which immediately turns to the name of the place attacked, there indicated. The pointer upon the face of this alarm is acted upon by an electro-magnet (in the box) which is charged from the battery.

There was a fine display of electric burglar alarms, hotel and house annunciators, bell calls, clocks, batteries, gongs, and other similar instruments, made by Thomas E. Cornish, of Philadelphia, which was very tastefully arranged. Of bank vault and safe protectors, fire signal boxes, signal telegraphs, automatic fire and burglar and fire-extinguishers, electric thermostats, duplex telegraphs, there were two very fine exhibits by the Holmes Burglar Alarm Telegraph Company, and William B. Watkins, both of New York. All the

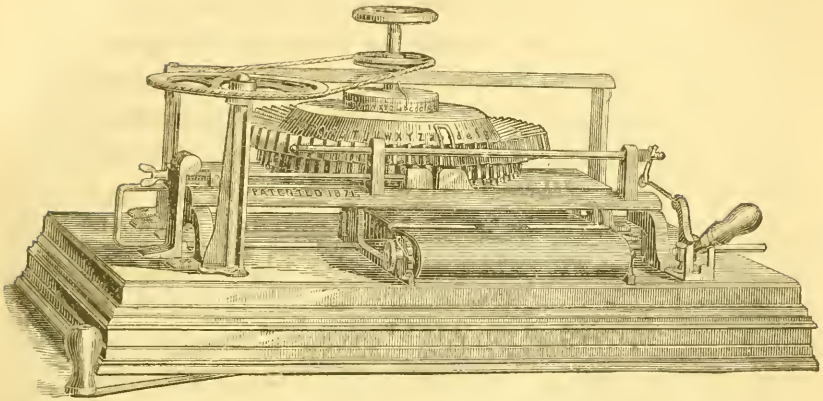
exhibits in this line of scientific instruments were very full, and well repaid an examination by the curious on such subjects.

Typographic Machine.

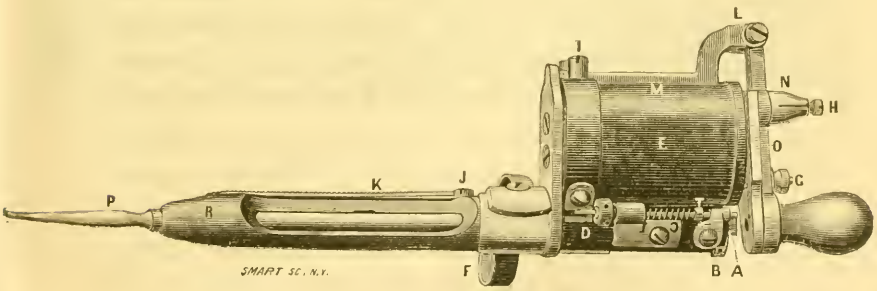
This was a very ingenious and valuable machine, exhibited by Dr. A. Shiland, of West Troy, New York, which received a great deal of notice during the Exhibition. The main features of the American Typographic machine are shown in the illustration which we give. A revolving disk carrying type-arms acting vertically in slots formed in the rim or flange of the disk, is moved rapidly by a band connecting with the wheel at the left. The radiating arms vary in thickness and are bevelled at the part where the type are fixed, and when forced down to make an impression, act against the feed-bar, which is moved a distance corresponding to the thickness of each type. By pressing directly down the key seen at the right of the machine, any letter brought to the index may be printed. The feed-bar moves the carriage beneath at each impression, and a spring throws it back as soon as the type-arm is raised. The arms are held up by a spring acting beneath the arms within the disk. By a simple arrangement not shown in the cut, the carriage is drawn back after a line is printed, and at the same time moved a space ready for another line. Spacing between the words is effected by repeating the final letter of each word, when by a slight movement of the operating key to the right, it acts against a stop, preventing the print of a letter, while the feed-bar is moved sufficient space. A screw at the left end of the feed-bar regulates the spacing, making wide or close work as desired. Several copies may be taken at the same time.



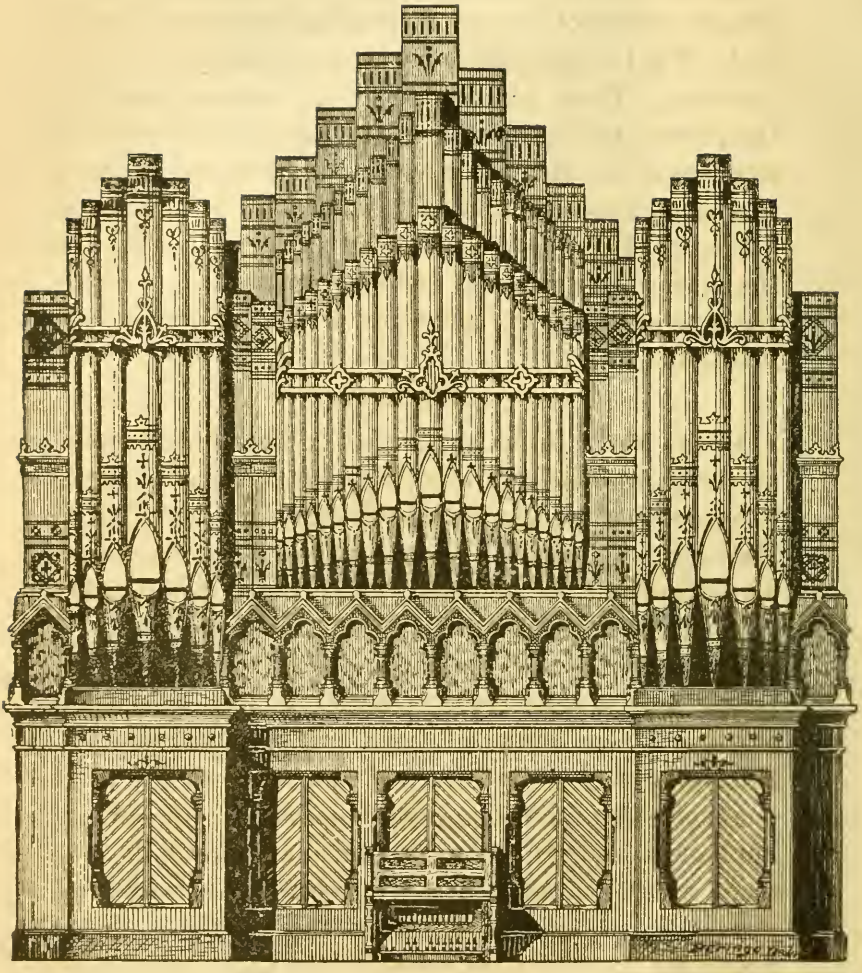
ELECTRIC BURGLAR ALARM.



AMERICAN TYPOGRAPHIC MACHINE.



DENTISTS' ELECTRO-MAGNETIC MALLET.



32 ft. wide, 40 ft. high, 21 ft. deep. 4 manuals, 32 ft. pedals.

CENTENNIAL ORGAN—BUILT BY E. & G. G. HOOK & HASTINGS, BOSTON, MASS.

Musical Instruments.

It was our intention to have entered somewhat at large into the merits of the various musical instruments exhibited. Want of space alone prevents our carrying out our intention. Those who remember the extreme beauty of the pianos, both as to tone and appearance, and the richness of the displays made in all that appertains to this department of fine art, will share our regret at having to dismiss so prematurely any further notice of the musical instruments, which contributed so materially to enhance the pleasure of the visitors to our Exhibition.

Organs.

In the Main Building, located in the central space, on the eastern gallery, was the very large and powerful "Centennial" organ, built and exhibited by Hook & Hastings, of Boston, Massachusetts. This organ was an instrument of gigantic proportions, being much larger than the celebrated Peace Jubilee organ.

The organ had four manuals and a "thirty-two feet" pedal, and nearly 3,000 pipes. It had thirty-nine stops, and four banks of keys. The longest pipe was thirty-two feet in length, and the shortest less than one inch. All the registers were operated by pneumatic appliances, and the stentorian, tuba, and mirabilis stops were controlled by a heavy pressure of wind, which gave them a tone so full that they could be heard above the combined harmonies of the great organ. On the right and left sides of the keyboard were very important additions called the wind and crescendo indicators, while the pedals were so arranged that by one motion the softest sounds could be gradually and almost imperceptibly increased to the thundering tones

of the full instrument. It, in short, comprised every essential principle and device, and produced all the effects of the most delicate instruments, as well as the most powerful and pervading tones.

The exterior comprised groups of metal and wood pipes, sustained by ornamental bands, above a substantial casing of walnut wood. The larger metal pipes were grouped at the sides; between them, raised on a light, open arcade, were smaller pipes; behind and over which appeared the tops of the pipes of the solo organ; while above and back of all were seen the tops of the thirty-two feet Bourdon pipes. Large pedal pipes of wood formed the front corners, and others were ranged across the ends in regular gradation.

Passages traversed it in every direction in each of its four stages, or stories, connected by stairways, which gave ready access to visitors. It was forty feet high, thirty-two feet wide, and twenty-one feet deep. The organ, when boxed, weighed 63,500 pounds (over thirty tons), and required five large freight cars to transport it from Boston.

Three concerts daily were given upon it by eminent organists from all parts of the country, and crowds of delighted visitors continually surrounded this grand instrument, the tones of which filled the vast building —1,900 feet long—from end to end.

There was another organ, which was also of special interest to amateurs as well as to professional musicians. This was the one in the north gallery of the Main Building, built by H. L. Roosevelt, of New York.

This instrument had forty-six stops and three manuals, while the keyboard was connected with the pipes by a combination of the tubular and pneumatic actions. The chief feature in this organ was, that the performer

was not obliged to change his stops with every variation of the composition, for by a simple index at either hand, he could arrange all the desired combinations before beginning to play, and then, by touching one or more pedals, could bring these into action as he proceeded.

The Century Clock.

In the Kansas and Colorado Building there was exhibited a clock, which is the nearest to perpetual motion that we believe has ever yet been attained. It was invented by Mr. J. W. Hile, of Kansas. Less than one-third the power necessary to run a watch is all that this clock is said to require. The weight falls three-fourths of an inch in a year, and it has seventy-six inches to fall when wound up. This clock requires winding but once in 100 years; tells the month of the year, the day of the month, the day of the week, the hour of the day, and the minute of the hour. It was valued at $1,000.

Cotton Goods.

The extent to which cotton is used in the manufacture of goods of all descriptions is absolutely incredible to one who did not examine the textile fabric department of the Exposition. The assortment of goods is so great, and there are so many firms and individuals and companies in Europe, Asia, Africa and America, engaged in working it up, that it really seems as if the fields of the world would scarcely be able to supply the demand. Among all these exhibits the manufactures of North America are very conspicuous, and after comparing the productions of the United States with those of other countries, it seems no wonder that they are pushing their European rivals from the markets of the world, and even invading the markets of their homes,

under their very noses. As a general thing the American exhibits of this class of goods excel greatly in design and color, while the latter will not run, and the whole product is excellent in texture and fine in finish. One display of this kind which attracted some notice was that of the Davol Mills, of Massachusetts. This display was a very tasteful one, and reflected great credit upon the town and Commonwealth whence it comes. The exhibit, which was contained in a handsome showcase, consisted of a fine line of sheetings, shirtings, silesias and fancy cottons.

Bobbins, Spools and Shuttles.

The weaving and spinning industries are eminently progressive; though they had advanced but a very little at the beginning of this century beyond the old spindle and distaff and the old loom, they have since taken long strides which have placed them in the front rank of modern mechanical trades. The ingenious minds which have accomplished this have wrestled victoriously with the hardest problems of their trade, and evolved from the depths of their inner consciousness such beautiful and intricate mechanism as would set the masses of a hundred years ago agape with wonder and admiration could they see the marvels which it daily performs, sending forth thousands of yards where they sent one. Recognizing this, the manufacture of bobbins, spools and shuttles has been brought to great perfection; and there were several exhibits in Machinery Hall, among which we noticed that of Eaton & Ayer, of New Hampshire. Among the goods which they here exhibited was their shuttle for worsted work. They had also a patent self-threading shuttle for cotton or woollen goods which does away with the whole annoyance and trouble

always experienced with the old form of shuttle, substituting therefor a certain movement attended with great saving of labor and time. Another new and useful invention was Sawyer & Rabbett's bobbins, which is also applied to take or bolster roving bobbins.

Horn and Tortoise Shell Combs.

Manufactures of horn and tortoise shell are very old, doubtless reaching back to the pre-historic ages. The horn and tortoise shell industry still remains one of the prominent branches of ornamental effort, and was most fully represented at the Exposition by the work of all nations from the Papuan to the Frenchman. One very attractive exhibit was that of Milo Hildreth & Co., Massachusetts. This was represented by several show-cases filled with tortoise shell combs, pins, ear-drops, chains, bracelets, lockets and buttons. These goods, and especially the lockets and buttons with the gold inlaid monograms, were beautifully designed and executed, and the material was of very fine shades, lights, and tints.

Silver-Ware.

The valuable productions of this class were located in the central portion of the Main Building, and the specimens exhibited were of the most varied and beautiful description. The crowds of people who at all times surrounded the cases was the best proof of the effective objects which were there exhibited, whilst the originality and beauty of the designs eminently displayed the mechanical skill of our workmen, as well as the taste and ingenuity of the designer. It is in these, where the operation of mind is called into play, that we are enabled to discover how far we have really advanced in this department, and the position we hold

in the world's estimation. Keeping this in view we will proceed to describe a few of the most prominent articles.

The Century Vase.

The elegant display of silver-ware by the Gorham Company, of Rhode Island, at the Exhibition, was one of universal interest. Their magnificent display was made in an elegant pavilion, tastefully frescoed and finished, and supplied with cases of black walnut and plate glass.

The *chef-d'œuvre* of the whole collection was the beautiful "Century Vase," made expressly for the Exhibition, which was probably the finest piece of silver art in the building. Its dimensions were as follows: length of base five feet and four inches; height, four feet and two inches; weight, 2,000 ounces, solid silver.

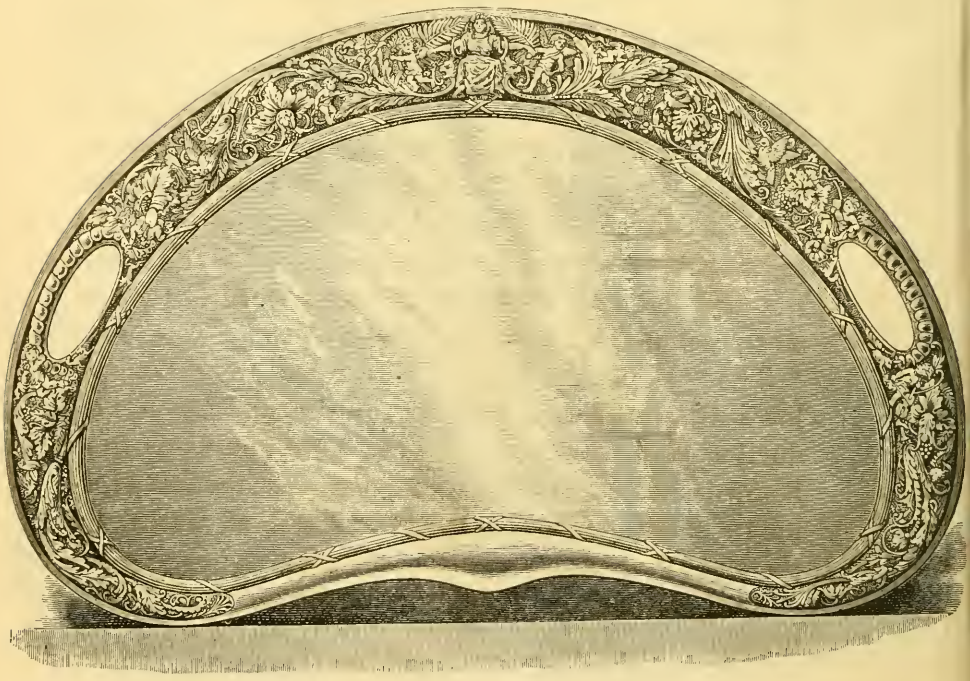
The following is a description of this vase, beginning at the base:

The Pioneer and the Indian represent the first phase of civilization; groups of fruit, flowers, and cereals, the natural products of the soil. The slab of polished granite signifies the unity and solidity of the government, on which rest the thirty-eight States. The band of stars, thirty-eight encircling the piece, thirteen in front, represent the present and original number of States in the Union. The group on the left is the Genius of War, with the torch in her right hand, while the left grasps the chain holding the "dogs of war" in check. A shell has shattered the tree, and a broken caisson wheel is half buried in the debris on the battle-ground. The group on the right, the lion led by little children, musical instruments and flowers strewn on the ground, denotes perfect peace and security. The medallion in front is the Angel of Fame, holding in

THE CELEBRATED CENTURY VASE—SOLID SILVER.
2,000 OZ.—VALUE $25,000.

SILVER COMMUNION SERVICE.

SILVER PITCHER.



THE CELLINI SALVER—VALUE $3,000.

one hand the palm branch and laurel wreath, and in the other a wreath of immortelles and a portrait of Washington. The medallion on the opposite side is the Genius of Philosophy and Diplomacy, with one hand resting on the printing-press, and with the other holding a portrait of Franklin. On either side of the plinth is a head of the bison, the king of the prairie. Having now passed the Revolution and witnessed the restoration of peace, the nation commences its growth, and hence, from the plinth the vase rises. The front panel of the vase represents Genius ready to inscribe on the tablet the progress made in literature, science, music, painting, sculpture, and architecture. On the reverse panel, Genius is ready to record the advancement in commerce, agriculture, mining, and manufactures. The figures denote Europe, Asia, and Africa, bringing in their contributions to the Exhibition, while the central figure, America, is inviting and welcoming all nations to unite with her in celebrating the triumph of her centennial year.

We also give an illustration of the Cellini Salver, a massive silver salver with elegant fretwork border of several inches in breadth, of appropriate designs in the style of Benvenuto Cellini. This was one of the finest specimens of *repoussé* chasing ever executed in this country, and was valued at $3,000, at which price it was purchased by a New York gentleman.

The "Hiawatha Barge," illustrated from Longfellow's Hiawatha, was a very exquisite and novel production, and attracted universal attention, both from its own intrinsic artistic worth, and from the fact of its having been purchased by Mrs. President Grant, for the Executive Mansion, at Washington.

To those who are familiar with "The Song of Hia-

watha" the feeling of the artist will be readily understood. Choosing for his theme the couplet,

"Swift or slow at will he glided,
Veered to right or left at pleasure,"

Hiawatha is seen seated in the stern of his canoe, with shield on his arm, the quiver of arrows slung on his back, and carelessly holding the paddle, which scarcely touches the surface of the water.

"For his thoughts as paddles served him,
And his wishes served to guide him."

He winds his way, scarcely disturbing the water-lilies that lay in his path, and is seen veering to the right of a group of cat-o'-nine-tails, which he is as loth to disturb. A light breeze fills his pliable sail, and he glides smoothly along toward the fishing-ground he so much loves.

The artist, deviating from the strict letter of the poem, has placed the squirrel not "on the bows," but at the summit of the mast, where,

"—— with tail erected,
Sat the squirrel Adjidaumo.
In his face the breeze of morning
Played as in the prairie grasses."

The barge, or boat, is of sterling silver, resting on a plateau whose mirror surface depicts the placid stream; and on its surface rests the water-lilies and other aquatic plants.

The plateau is forty-four inches in length, and the height of the mast of the boat is thirty-five inches.

Besides these more prominent attractions in this display, the contents of the cases were not less worthy of inspection.

Among many other beautiful and expensive articles,

there was a wedding set of ten pieces, adorned with musicians and Cupids bearing flowers, the bride, and groom, and guests, the whole enclosed in an oaken case bound with silver, and costing $2,650.

Then there was the famous set sold to Count Dannfelt, one of the Swedish commissioners, for about $1,000, and by him presented to his daughter, who was married upon the grounds during the Exhibition. The set comprised 153 pieces, enclosed in an Eastlake oak case, and included a dozen each of all kinds of spoons, knives, forks, etc.

The silver pitcher, of which we give an illustration, was very fine. The plaques were allegorical half-reliefs in dead silver *repoussé*. The obverse represented Venus lighting the torches of the Loves. On the reverse she was catching and confining them in a net "for better or for worse." The oval border, a frame of the plaque, was of gold; the concave surfaces burnished, and the convex satin-finished. We also show an extremely rich silver communion service, which we saw there exhibited. The surface was of satin lustre, ornaments and figures, oxide and gold.

Conspicuous among the magnificent display made by Tiffany & Co., of New York, was the

Bryant Vase,

Of solid silver, executed by the *repoussé* process, which was presented by the Century Club to the poet, William Cullen Bryant. The intention of the design is to symbolize Mr. Bryant's life and character, through the medium of a classic form, covered with ornamentation drawn from nature, and suggested by his works.

The heavier lines of the fretwork are derived from the apple branch, which suggests that while Mr. Bry-

ant's writings are beautiful, they also bear a moral; as the apple tree blooms with a beautiful flower in the spring, and in the autumn bears fruit. Poetry is symbolized by the Eglantine, and Immortality by the Amaranth, which is said never to lose its fragrance, and these are blended with the lines formed of the apple branch.

The Primrose for early youth, and Ivy for age, form a border directly above the handles. Encircling the neck at the narrowest part the immortal line, "Truth crushed to earth shall rise again," is rendered verbatim, the beginning and end being separated by a representation of the Fringed Gentian, which Mr. Bryant remembers in one of his poems as always pointing to heaven. Eras in the poet's life are illustrated by a series of bas-reliefs. In the first, as a child, looking up with veneration at a bust of Homer, to which his father points as a model. The second shows him in the woods, reclining in a meditative attitude, under the trees. Between the first and second of these medallion pictures is a portrait of the poet, laurel-crowned.

In a smaller medallion is the Waterfowl, used by Mr. Bryant as an emblem of faith, and introduced for that reason as the key-note of his writings. The ornament around the lower part of the vase is of the Indian Corn, with a single band of Cotton Leaves, and at the foot is the Water Lily, emblematic of eloquence, for Mr. Bryant's oratory. The two great American staples are introduced to complete the ornamentation of the handles, the stalk, leaf and grain of the Indian Corn on the inside, and the ripened boll of the Cotton on the outside. On the base which supports the vase is the lyre for verse, which with the broken shackles point to Mr. Bryant's services in the cause of Emancipation.

THE BRYANT VASE.

Presented by his countrymen to the distinguished poet, William Cullen Bryant, on his eightieth birthday. Value $5,000. Made by Tiffany & Co., New York.

AIGRETTE,

In the form of a feather, containing the celebrated "Brunswick" canary diamond and over six hundred small stones. Part of the celebrated set valued at $120,000. Exhibited at the Centennial. Made by Tiffany & Co., of New York.

The cost of this vase was $5,000. In addition to this there were some extremely rich and valuable precious stones and jewelry. Those which attracted the most notice were the magnificent diamond necklace which was the cynosure of so many eager and wondering eyes, and the Aigrette or Peacock's feather which contained the celebrated "Brunswick" straw-colored diamond, and over six hundred fine white diamonds of smaller size. There was also a magnificent intaglio necklace of antique stones, emeralds, sapphires and saids. It was valued at $25,000. A fine collection of opals was also shown, the largest being heart-shaped and about an inch and a half across. It was set in a locket, and valued at $3,750 in gold. The entire collection of precious stones shown in this exhibit was valued at $300,000.

Another prominent feature in the exhibit of silverware in the American section was the

"Progress Vase,"

Shown by Reed & Barton, of Massachusetts, who had erected a very attractive pavilion for their exhibit. This vase was five feet long at the base, and four and a half feet high. The landing of Columbus, in bas-relief upon the pedestal of the central vase, expressed the date of the beginning of progress. The vase upon the pedestal represents the present attainment of manufactures, gained under the peaceful dove with the olive leaf. The surmounting figure of Liberty, standing upon a broken chain and bearing in one hand a palm of victory and in the other a scroll, was the inspiring genius by which the progress of the four centuries has been accomplished.

Upon one side of the vase was a group in oxidized

silver, marked "XV. Century," representing the primitive state of America. An Indian on horseback and others on foot, among them a woman and child, were seen fighting.

On the other side of the base was a group marked "XIX. Century," which symbolized the present state of America. The Genius of Columbia, bearing the olive branch of peace in one hand and the fasces of just government in the other, clad in the toga of civil life and sitting placidly upon a spirited steed, yet so gentle as to be led by a flower-wreathed bridle, represented our free and peaceful, yet powerful country. Mercury, the god of commerce and oratory, bearing his caduceus, and leading the horse of Columbia with a festoon of flowers, symbolized the guiding influences of learning, eloquence and skilful commerce, by which our free government had been led to prosperity; while Plenty, with her cornucopia, appears as her companion. In the foreground was a group of students, surrounded by symbols of the sciences and arts, and intent upon problems of still further advance, which indicate that the progress already gained has not yet reached its end. This handsome ornament was valued at $10,000.

In the exhibit of jewelry there were various articles made of celluloid. This is an article of recent discovery, and is applied to many different uses—billiard balls and other articles closely resembling ivory in texture and appearance, backs for hair brushes and hand mirrors, in imitation of the fine carved ivory goods of that nature; jewelry of imitation coral so much like the real that it takes an expert to distinguish between them; imitation malachite, marked exactly like the genuine mineral; emery wheels with celluloid for a base, and many other articles of this remarkable material were exhibited.

The Middletown Plate Company had a large black and gold and plate-glass case, in which they made a fine display of silver-plated ware. Prominent among the articles was a model of the State House steeple, with the old bell ringer ringing the bell to announce the signing of the Declaration of Independence.

Messrs. Robbins, Biddle & Co. had a very large case, around the top of which were arranged numerous large clocks, showing the correct time at all the principal cities in the world at the same moment. This was a very attractive feature in this section, and instructive withal.

The Elgin National Watch Company had a small ornamental pavilion in which they exhibited watch movements complete, and also the various parts of a watch separately. Among the movements shown running was one which passed through the great Chicago fire in the company's safe. It was slightly discolored, but otherwise appeared as good as any of the others. In this department we noticed a very ingenious model of a steam-engine constructed entirely of bone, beautifully white and smooth, and closely resembling ivory.

Bronze Goods.

Americans were probably astonished, as well as foreigners, at the rapid development of the products of their own country. So marked was formerly the prejudice among our people against domestic goods, that many articles, and particularly bronzes, manufactured here, had to be sold as French. The exhibits of American bronzes made in the Exhibition showed that the manufacture of these goods in this country is almost fully equal to that of foreign countries. One of the most beautiful exhibits at the Centennial was

that of bronze inkstands and thermometers, shown by N. Muller's Sons, New York. We give some illustrations of these, which struck us as being especially remarkable for novelty, and elegance of design and chasteness of finish, combined with practicability.

Carriage Makers' Forged Irons.

Of the several trades subsidiary to that of carriage-making, a very fine display was that made by H. D. Smith & Co., of Plantsville, Connecticut. These parties showed a fine line of shaft couplings, slat irons, axle clips, step pads and stump joints. These were the larger and most important part of the exhibit, while the rest was made up of clip kingbolts, perch and bed plates, spring braces, patent smooth finish clip yokes, kingbolt yokes and braces, whiffletree bolts, felloe holders, Brewster & Co. patent felloe joint bolts, felloe plates, prop nuts, loop heads, offsets and stay ends.

After careful forging, the articles are all extra finished by melting and a fine file, which requires infinitely more and higher trained skill than a polished or plated finish.

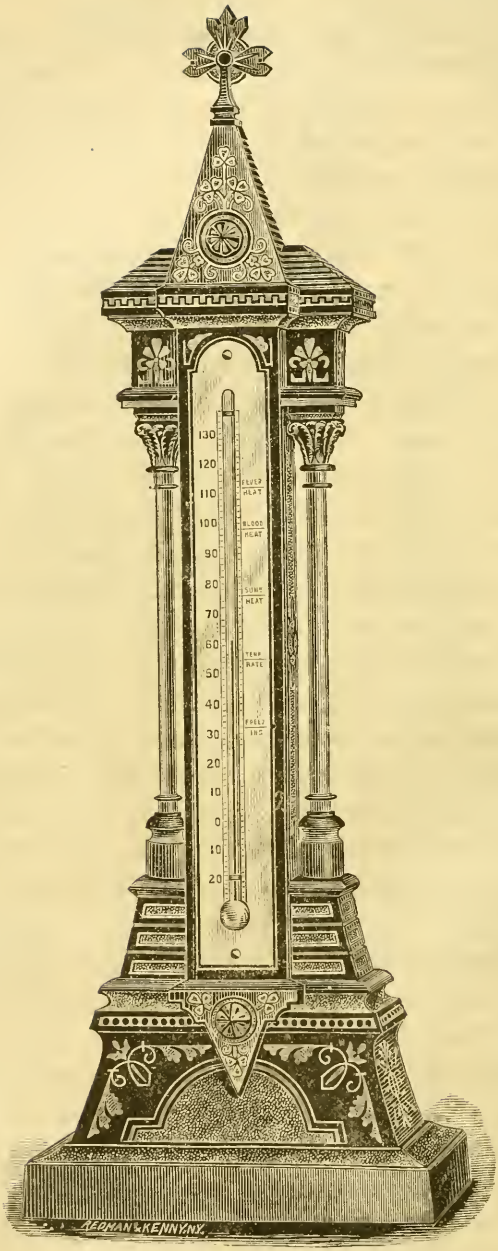
Their patent noiseless shaft coupling has been in common use for three years without the slightest rattle, and is so simple in construction that the shaft will fit the coupling generally used, not requiring a pole expressly for it.

Centennial Brewery.

In the Brewers' Building, located near the northeast corner of Agricultural Hall, and forming one of the annexes to it, Mr. Charles Stoll, of New York, had erected a model brewery in complete working order, with all the latest improvements and appurtenances.

It was known as the Centennial Brewery, and had a

CENTENNIAL BRONZE INKSTAND.



THERMOMETER—BRONZE WORK.

capacity of 150 barrels at one time. Opposite to this display there were two malt kilns, full size, four stories high, one erected by William Hughes, the other by Theodore Bergner, of Philadelphia, the latter a patent arrangement complete in every particular. In various portions of the structure were malt grinding mills, hop grinders, mash machines, vats, tubs, and a beer-cooling apparatus from Austria. One of the vats was lined with enamelled varnish, possessing the peculiarity of not being affected either by hot fluids, acids, or lyes.

There were a number of models, amongst them one of the brewery of 100 years ago, when all the labor was done by hand under a shed, the roof rudely thatched with straw. A neat model of the modern brewery on a scale of one inch to the foot was shown, an elegant specimen of work, fitted with all the machinery in use at the present day. A machine house was attached, where the appliances of a brewery were shown, mash machines, etc., in working order, the latter erected by Messrs. A. & F. Brown.

In this building there was a full display of malt liquors, malt, hops, and all the mechanical appliances used in each branch of the brewing business.

Among the many novelties which struck us were the following:

A patent self-acting barrel-washing machine, by which barrels are washed automatically. Exhibited by the Union Machine & Millwright Company, of New York. A perforated nozzle passes into the bung-hole, and the weight of the barrel, when placed upon the machine, starts the water, which is thrown violently to every portion of the interior.

Frederick Schlich, of New York, exhibited a model of a patent automatic bottle-washing machine. The

washer consisted of a series of tubes, upon which the bottles were placed in an inverted position, and jets of water forced into them with such force as to remove all impurities.

In the east end of the building, south of the main entrance, the Philip Best Brewing Company, of Milwaukee, Wisconsin, had a display, consisting of a number of casks of various sizes, the centre of which was a large storage cask of forty barrels capacity. One of the heads of this cask was removed, and within were seen a number of fantastic figures of gray-bearded dwarfs drinking beer. Directly above was a painting of King Gambrinus, surrounded by a frame composed of bottled beer, and on either side were life-sized paintings of Ceres and Pomona, similarly framed.

John Trageser & Son, of New York, exhibited a number of copper articles for brewers, among them a large copper bottom for a brewing kettle. The bottom was nearly hemispherical in shape, and was ten feet in diameter and four feet two inches deep. Also perforated false bottoms for mash tubs, a brewers' air-pump, the improved pony masher, a machine for mixing the malt and hot water to make the mash, and a copper tubular beer cooler. There were several of these coolers in the Exposition, mostly constructed in the same general manner. They consisted of a series of two-inch copper pipes, about twelve feet in length, arranged one above the other. Ice water was forced into these pipes from the bottom, running through them back and forth and out at the top. The ale or beer after boiling is allowed to run down over the outside of these pipes, and is thus speedily cooled.

Balloons.

There was an exhibit made by Mr. J. Hartness, of Detroit, Michigan, of an improvement in the construction of balloons. The invention has for its object to construct a balloon of much greater capacity and buoyancy than has heretofore been found practicable, without increasing its weight and decreasing its strength to resist internal pressure in the same ratio, and it consists in constructing the balloon of a series of spherical or spheroidal sectors, each being adapted to contain the gas, and provided with necessary valves, all the sections being united and enclosed by the netting from which the car is suspended, the aggregate buoyancy of the sections being greater than in ordinary balloons.

The illustrations represent the sectional balloon, and it will be seen that the body of the balloon is constructed in sections, exactly similar to those of an orange, each one of which is inflated separately, and all joined together complete the sphere.

An axial opening is left at the extremities, at the middle of which the sections (the inner edges of which are made of suitable shape for the purpose) are connected by straps. Through this opening a rope ladder extends, so that the aeronaut may have access to all the valves, one of which is arranged in each section.

The poles shown passing up through the aperture are designed as a support for the balloon during the process of inflation.

Starch.

Among the many vegetable substances used as food which formed so interesting and instructive a class of exhibits, Starch was shown in many different forms and from various sources.

The Oswego Starch, manufactured by T. Kingsford

& Son, deserves special mention in this connection, the manufacture of this delicate article from Indian corn having been the invention and specialty of this firm for more than thirty years, during which time they have brought to bear upon its manufacture all the improvements that skill and science could furnish.

The numberless uses to which it is adapted render this article one of the most important and useful articles in this class of exhibits.

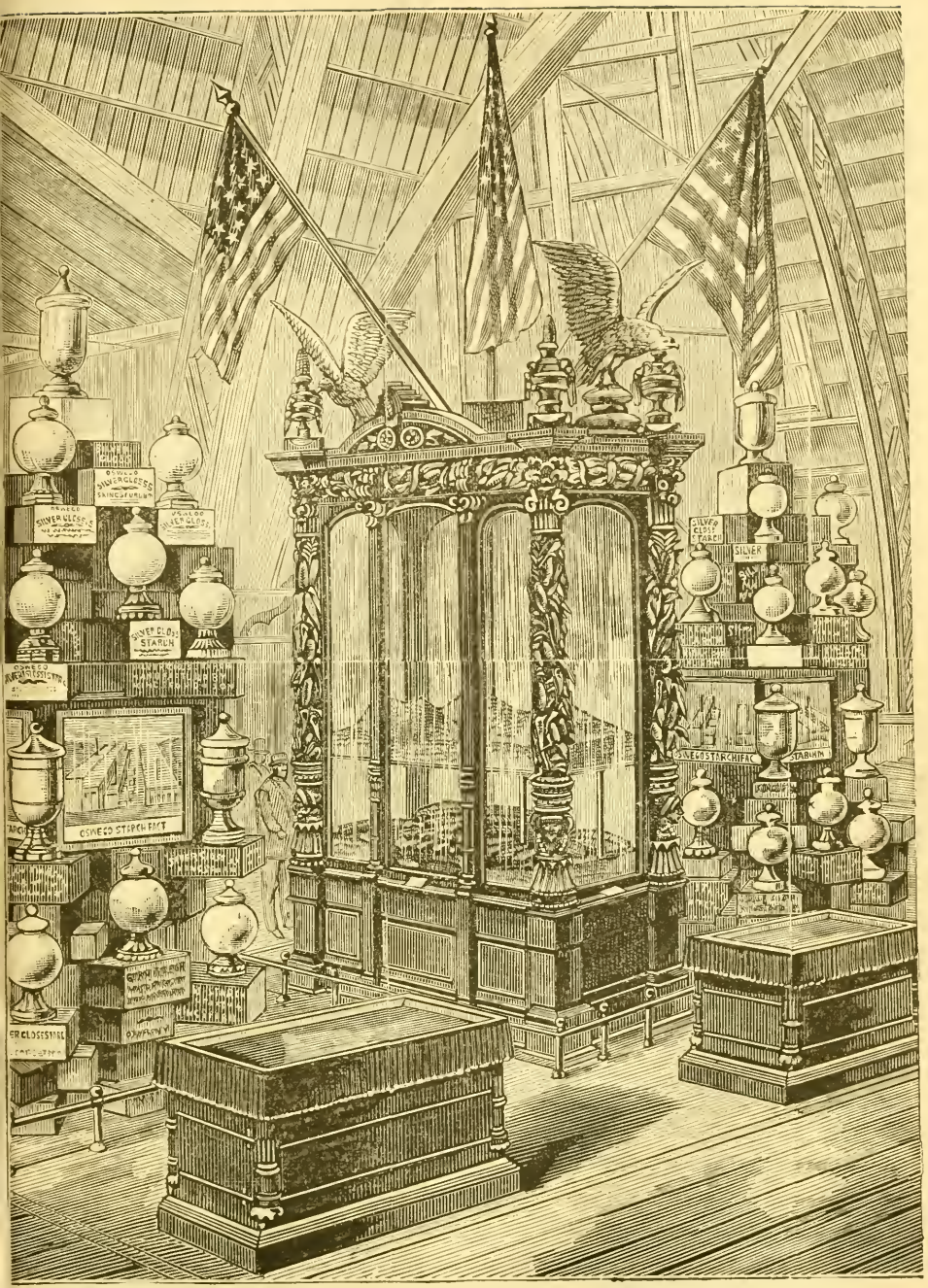
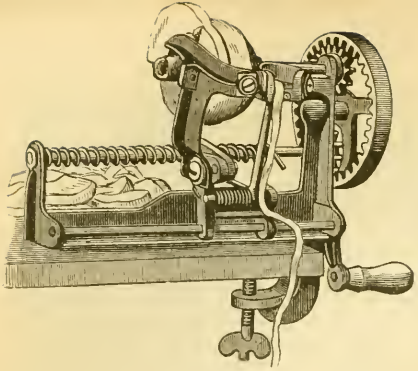
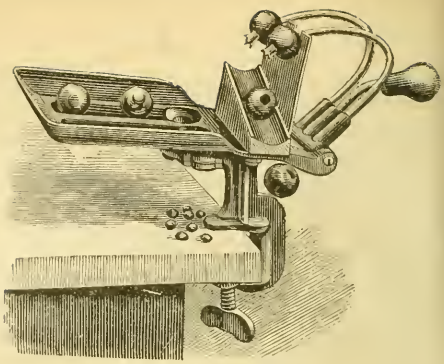


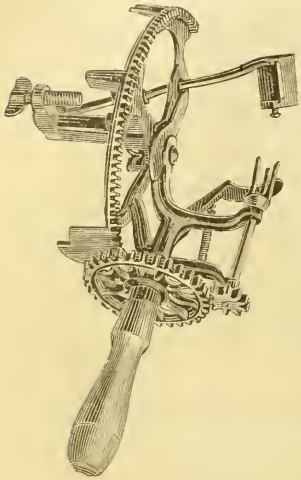
EXHIBIT OF KINGSFORD & SONS.



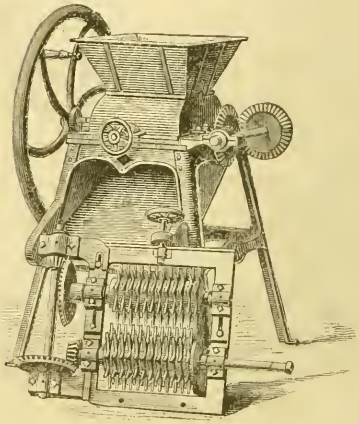
APPLE PARER.



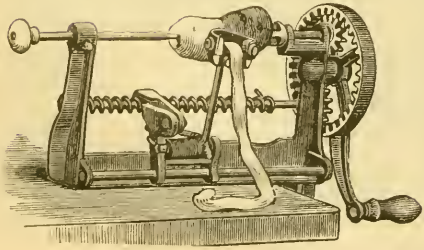
CHERRY STONER.



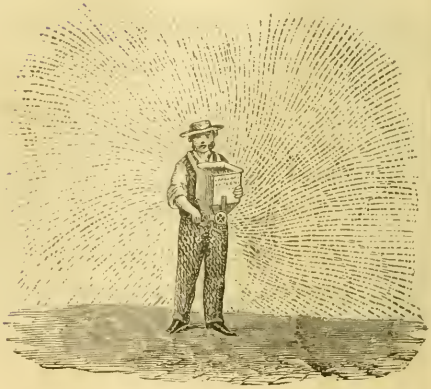
SLICER.



IMPROVED ICE CRUSHER.



POTATO PARER.



CAHOON BROAD-CAST SOWER.

CHAPTER X.

UNITED STATES EXHIBITS.

Ice Crushers.

ICE CRUSHERS have been but little known until within the last fifteen years in this country, and but to a limited extent; for the general use of ice, crushed for ice creams, packing fish, and other purposes, has only grown up during the past quarter of a century. The scarcity and high price of labor and ice of late years have caused those using ice to look around for something more economical than the old method of banging and mashing. In 1862 was introduced the first satisfactory ice crusher, used by the fresh fish packers, since which time improvements have been made to it.

The latest is one that was on exhibition by D. W. Low, of Gloucester, Massachusetts, in Machinery Building. There were three in all shown by him, one for steam power and two others for hand power.

In Agricultural Building was exhibited, as showing the progress in the past century, an ice smasher, used twenty years ago in the Gloucester fisheries, made of iron, handle and all, similar in shape to an old-fashioned axe, the ice crusher of 1862, and the improved ice crusher of 1876, side by side.

This ice crusher is composed of two cylinders of teeth revolving toward each other, one moving faster than the other, one acting as a feeder and breaker, the

other as a breaker with an adjustable frame, so arranged as to move one cylinder to or from the other, by means of a hand screw at will, even while the machine is in operation, thus adjusting the cylinders for breaking or crushing the ice finer or coarser, as wanted.

Useful Inventions.

The Goodell Company, of New Hampshire, had on exhibit a number of useful inventions, which we must notice on account of their general utility and labor-saving advantages, if for no other reason.

First came the Cahoon Broadcast Seed Sower, for either hand or horse power, a very effective little machine. They also showed the Climax corer and slicer and Lightning apple parer, the latter the fastest and simplest machine ever invented for paring apples. The push-off arrangement was simple, and the parings were dropped clear of the machine; with this machine and the Climax corer and slicer, the work of preparing apples for drying or cooking can be rapidly and satisfactorily done. The Lightning peach parer was another ingenious little machine, and so was the Family Cherry stoner, another rapidly working implement, and adapted for domestic use. It is simple in operation, leaving the cherry plump and round, with its juices preserved. The improved Turn-table apple parer is the old, familiar parer, only arranged so as to loosen the apple on the fork after the paring is finished. Another machine exhibited by the company, and one that attracted favorable commendation, was called "the Bay State Apple Paring and Slicing Machine," which pares and slices the apple in one operation. A new attachment to the knife-head cuts the apple into slices, and places them at one side in a dish or on the table. The

Potato parer is another novelty, which the company has just commenced to manufacture. It is very simple in construction, and, no matter how rough the sides of the potato may be, the knife "runs up hill and down dale," working its way through all the crevices of the most obdurate formed murphy.

Centennial Photographic Company.

The Centennial Photographic Company had erected upon the grounds, almost opposite Machinery Hall on the east, the largest studio that was ever known in America.

The building was designed by Mr. H. J. Schwarzman, the architect of Horticultural and Memorial Halls, and was of very pretty design and finish. Its dimensions were sixty-five by one hundred and twenty feet, with a handsome portico around, with panelled sides and ends, and with scarcely any windows, all the light being received from a court inside, around which the building was erected. The interior was divided into the different departments for the various manipulations and business of the company, and was most conveniently arranged.

In the earlier weeks of the Exhibition the reception-room and studio of this building presented a most unique and interesting sight. It was required by all who held free passes, whether exhibitors or others, to have their photographs taken and pasted on their passes, and these photographs were taken by this company. Here a motley crowd used to be assembled. There were Tunisians, Algerians, Turks, Chinamen, Japanese, Africans, Germans, Austrians, Italians, Frenchmen, Spaniards and Arabs, all jabbering in their native tongues, scrambling for their turns in their national way,

showing their international measure of push and enterprise in getting ahead, giving evidence of their several dispositions as circumstances required. A true Babel, indeed, and a most picturesque sight. Day by day, nearly seven hundred heads were taken off for the purpose named.

But the work which the Centennial Photographic Company specially undertook to do was first to preserve a pictorial record of the beauties which were gathered in the Exhibition, and for such parties as wished to retain them for scientific, artistic and educational purposes.

The work of this company was very good, as good as modern photography could produce, and they succeeded in reproducing the many beautiful things of the Exhibition as mementos of the great event.

Stiles' Combination Desk and Book-Case.

While cabinet articles have been a study, and the furniture of rooms has undergone many changes in a few years, that of the Reading Room has remained the same for the past century; and it was in an effort to furnish a room for a public library, and at the same time preserve it suitable for occasional large meetings of committees, that this invention had its origin.

Mrs. Stiles, the inventor of this desk, made search but in vain for furniture that would not occupy much space, when all at once the idea of combination came to her, and after one night of thinking it over, she called a carpenter and desired him to work as she directed. The result was this Combination Desk and Book-Case.

The desk when closed presents the appearance of a cabinet, six feet in breadth, eighteen inches in depth

and about seven feet in height from the feet to the top of the ornamental carving. From the lower part of this apparently close case a section is raised which forms a table, slips from their sockets in the centre, one toward the right and the other toward the left, the two braces, which, hinged at either end, serve as legs to the table. Opening from the centre are two door frames, which, instead of panels, are furnished with paper files, which are also patented. This discloses on the right another door, which being opened shows a secretary case with drawers, boxes, etc., receptacle for papers and letters. The opposite side is similar in construction, the solid panel at the left hand in each case makes the back of the opposite secretary. At one end a door is provided with two slips, one for papers and the other for letters, which fall each into their appropriate box attached to the inside of the door, accessible only to the holder of the proper key. This door, when open, discovers a case of boxes or pigeon holes, twenty-six in all, one for each letter in the alphabet. The open door at the opposite end shows shelves for magazines, etc. Beneath each of these doors is a small sliding desk, and beneath this, three drawers one below the other, the space under the tables and between these drawers being a receptacle for waste papers, and accessible from each side. The centre of each table is furnished with an inkstand, the patented result of some disagreeable experiences on ship-board with writing fluid. The swinging ink-well adapts the desk to marine purposes. An inkstand swings upon a pivot in a metallic ring. This ring again swings in a circular opening in the desk, the second pivot making the axis of its revolution perpendicular to that of the first, so that no matter how a

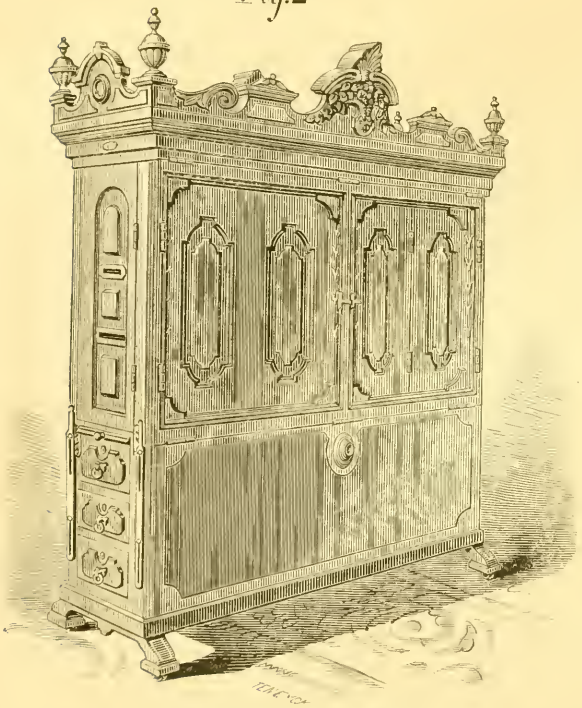
ship rolls, the force of gravity constantly keeps the ink-well cork side up. The seal of the well opens on both sides from the centre, which preserves the equilibrium. The top of the case, surrounded by the carved moulding, forms a safe receptacle for busts, bronzes, or other ornamental library furniture, so that all the space occupied is utilized, while the cabinet, when closed, presents greater facial surface for decoration, painting or carving, than any other known piece of furniture.

This desk which we have been describing was intended for the centre of a large room, where each of its four sides would be used. For private libraries, offices, etc., they are made double and single, in half or three-quarter sizes. They are also made with mirrors and other conveniences for ladies' apartments.

Iron Works.

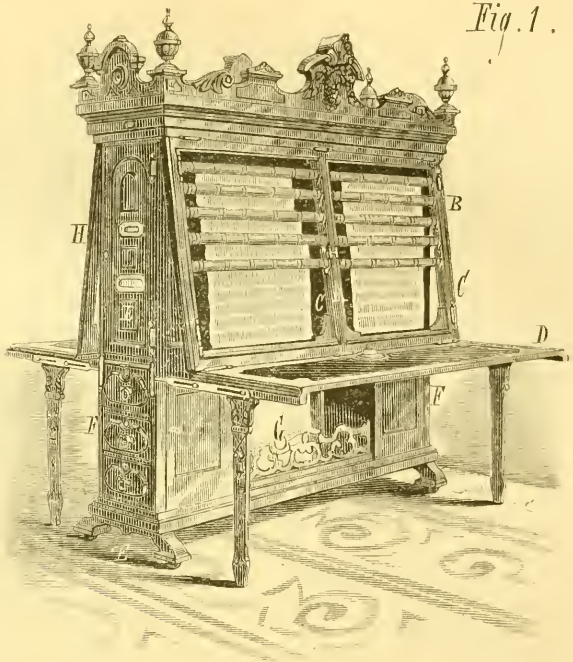
The Bellefonte Iron Works, in Pennsylvania, had a very complete exhibit of their hematite iron ores of the very best quality, free from phosphorus and sulphur; numerous specimens of their cold blast charcoal iron, and of the steel made therefrom, the latter in its crude state, and worked up into various beautifully finished tools. This company take the ore from the ground, owning a territory of some 8,000 acres, and manufacture it with charcoal, first into pig metal, second into blooms or slabs in charcoal forge fires, and, third, roll it into shapes for wire, called billets, afterwards rolled into rods suitable for drawing down into the finest grades of wire. They also roll the iron into shapes suitable for scythes, shovels, planters' hoes, edge tools of all kinds, boiler covers for making boiler plate, and into anything for which the Swedish or Norway iron is used.

Fig.2



STILES' DESK CLOSED.

Fig.1.



STILES' DOUBLE DESK AND BOOK CASE COMBINED.

MRS. E. W. STILES.

Hoop and Band Iron.

The Exhibition, thoroughly considered in all its branches, showed everywhere the tendency of trades and manufactures of every kind to sub-divide themselves into special lines. The iron business has for years shown a fast increasing tendency to divide itself as other manufactures have done, and specialties in the iron manufacture are numerous and well established. One of the oldest and most considerable of these is the manufacture of hoop and band iron, which is well represented at the Exposition among others, by the Solar Iron Works at Pittsburgh. Their exhibit was very complete, and consisted of every variety of hoop iron used by coopers for vessels of every kind, from the immense hogshead to the child's toy pail, and also a fine lot of band iron for the various purposes in which such an article is used.

National and Empire Transportation Company.

These two companies had jointly erected a building at the end of the Main Building, covering about 625 square feet, which might properly have been called an annex to that building.

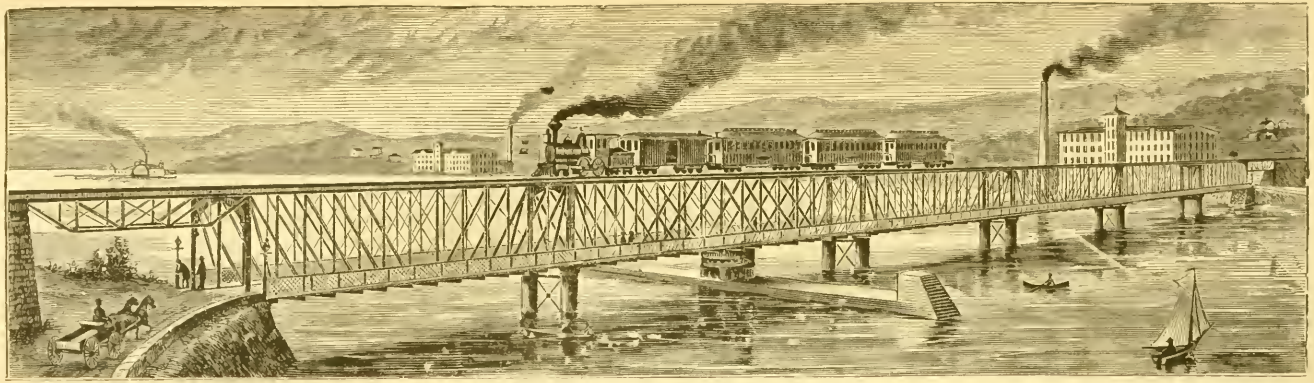
The idea of the companies was to show up the immense traffic done by their lines, and, to do so, they went to the trouble of making working models of their engines, trains, pumps, etc. As we entered the building from the north door, and passed around to the left, we found the model of a grain elevator, situated on the Hudson, New York city; a steamer was lying alongside, loading, and the whole process of loading and unloading was shown through the glass sides of the grain "throat" alongside; and a little farther around

the building was a complete exhibit of the pumps at the oil wells; houses and all complete, were built to a scale, and showed how the oil from the different mines was received in several different tanks, and then pumped to a general reservoir, distant thirty-four miles from the pumping engine; from thence it was loaded by gravity upon oil cars, each, as it becomes full, stopping the supply from the loading *rock* (as the reservoir is called). From them we passed around the building, there showing how the train was made up, then around the foot of the "coal region," a complete exhibit of which they had here, showing just how the coal was hoisted from the mine to the breaker, and thence to the cars, and on towards the great coal and oil marts of the country. A little farther around they gave us an idea of their dock at Jersey City, coal sheds and all, and of their immense freight sheds at New York city, all so arranged with glass, and small wooden lighters floating upon, that one might readily have imagined that he was on one of the Jersey City ferry boats, and looking across the sides at the docks of New York.

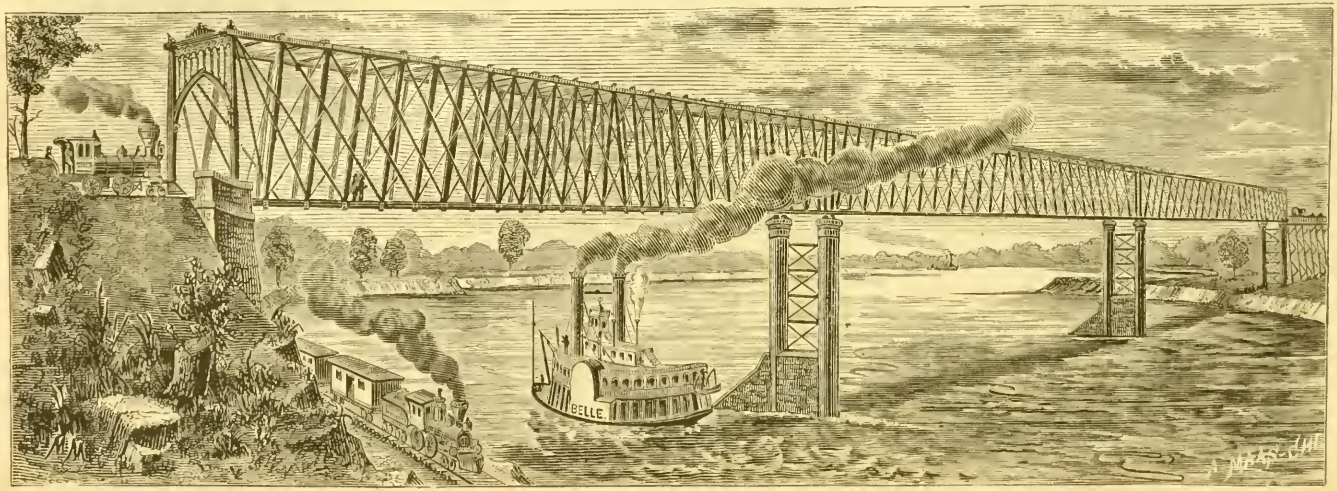
Hot Water Apparatus for Warming and Ventilating Buildings.

In Machinery Hall, not far from the west end, there was exhibited by Charles R. Ellis, his patent self-regulating apparatus for warming and ventilating public and private buildings, etc.

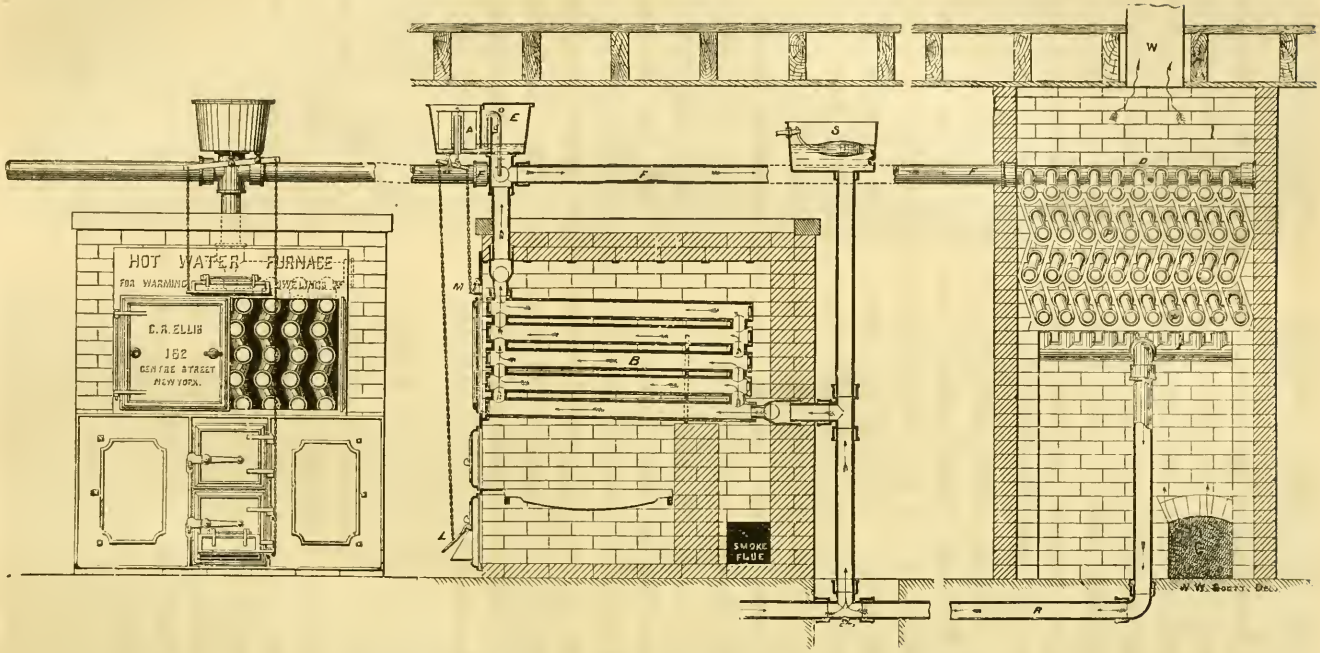
The use of hot water as an agent for warming dwellings, etc., has extended so rapidly and its advantages so widely known, as to render unnecessary to say anything as to the growing importance of this branch of industry. Mr. Ellis' base-burning boiler and self-act-



FALL RIVER BRIDGE.



LEAVENWORTH BRIDGE.



SECTIONAL VIEW OF ELLIS' BASE BURNING BOILERS.

ing draught regulator may be attached to hot-water apparatus of any construction. It is made of cast-iron, a good absorber and radiator of heat; is not worked under pressure; is noiseless in its operation; is self-regulating, and is equally serviceable in moderately cold or in severe weather, and does not introduce noxious gases into the room.

In Horticultural Hall there were also exhibited by Mr. Ellis his Base Burning Boilers for warming greenhouses, forcing pits, conservatories, baptisteries, public baths, etc. This boiler is made of two double cylinders—the water circulates through both. The *inner* double cylinder forms the magazine for fuel, while the *outer* one forms the fire-box, and makes an annular smoke-flue between the cylinders. When not used as a self-feeder, the inner cylinder becomes a flue and increases the heating surface. The boiler may be used to warm the room it stands in, and by circulation of water through pipes will warm other rooms or greenhouses at a distance. Fire may be kept for twelve hours, without attention. The grate may be shaken or dumped.

Bridges.

The American Bridge Company, of Chicago, had on exhibition in Machinery Hall models of several of the most important bridges which they had constructed throughout the country, and a more interesting and instructive exhibit was not to be found anywhere within the building. We give illustrations of two of the finest of these bridges.

The first was the Hudson River Bridge at Poughkeepsie, which is under course of construction at present. This bridge is designed for a double line of railroad,

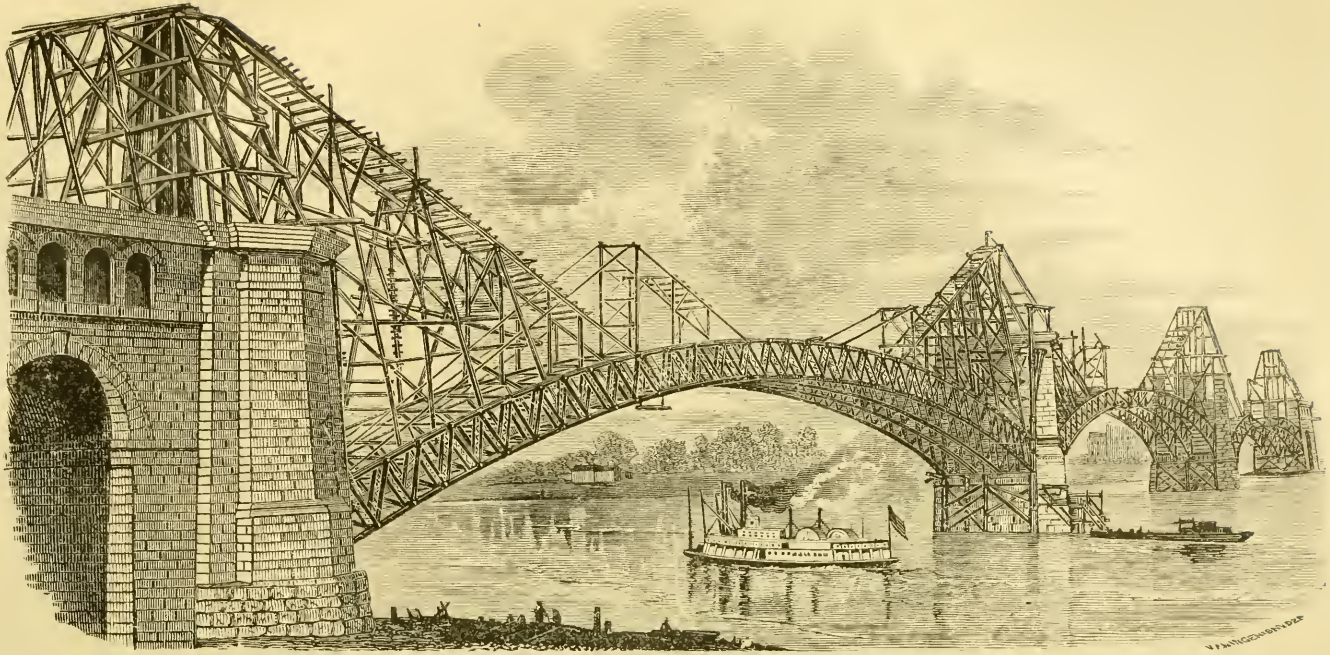
and is of height to allow navigation without the intervention of draw or pivot spans, and has a total length of about one mile, of which one-half, *i. e.*, five spans, five hundred and twenty-five feet each, crosses the river, which at this point is one-half mile wide and of a nearly uniform depth of sixty feet; the other half mile is the eastern (city of Poughkeepsie) approach, and consists of iron trestles and spans, crossing over the New York Central and Hudson River Railroad tracks and the streets of the city.

The great depth of water and foundations and the *unprecedented length* of truss spans (no truss span of equal length having been built in the history of the world) make this structure an especial object of interest to the engineering profession and to all persons identified with great public works.

The other is the Point Bridge over the Monongahela river, at Pittsburgh, Pennsylvania. This is also in process of construction, and is a stiffened chain suspension bridge, with a centre span of eight hundred feet, centre to centre of towers, and side spans of one hundred and forty-five feet each in the clear. The height of the towers above low water is one hundred and eighty feet, and the deflection of the chain is eighty-eight feet. The roadway is twenty feet wide, with double tramways and one track for a narrow gauge railway; outside of the roadway are sidewalks six feet wide each. The piers and anchorages are founded upon timber platforms sunk to a gravel bed. The masonry is of best quality Baden sandstone.

The floor is thirty-four feet wide between the roadway girders, which are eight feet high, forming the handrails. The roadway girders have expansion joints every hundred feet, and are suspended from the chains

FAIRMOUNT BRIDGE, PHILA.—KEYSTONE BRIDGE CO.'S EXHIBIT.



ST. LOUIS BRIDGE, SHOWING METHOD OF ERECTING BRIDGE, BY MEANS OF CABLES, WITHOUT SCAFFOLDING—EXHIBIT OF KEYSTONE BRIDGE CO., PHILA.

by flat bars twenty feet apart. At the expansion joints there are struts instead of suspenders in order to make a rigid connection between the roadway trusses and the chains. Cross-girders, three feet in depth, connect the stiffening girders every twenty feet, and support two lines of iron stringers. The stringers and the roadway trusses form the bearers across which are placed the wooden joists for the flooring. The lateral stiffness of the floor is secured by a double system of tie-rods, and the wind pressure will be taken up by horizontal steel wire cables, placed under and connected to the floor. The towers are entirely of wrought-iron, except the bases of the columns. The chains are carried over the top of the tower on wrought-iron chairs or saddles, which are movable on rollers to allow for expansion and the elongation of the back chains under strain.

The bridge is proportioned for a moving load of 1,600 pounds per lineal foot, under which, together with the weight of structure, the chains will be strained to 12,000 pounds per square inch, sectional area. The suspenders and roadway members are strained only from 8,000 pounds to 10,000 pounds per square inch. The maximum compressive strains in the towers are 9,000 pounds per square inch.

The Keystone Bridge Company, of Philadelphia, had on exhibit models of some of the finest bridges of their construction, two of which we give illustrations of. One is that of the bridge over the Mississippi, at St. Louis, constructed with arches of crucible cast-steel, manufactured and erected on cables, without scaffolding, by this company. The cut illustrates the methods employed to erect the arched ribs, by suspending them by means of guys depending from temporary towers, the towers standing on hydraulic rams, which were auto-

matically moved to compensate for change of temperature in the cables. The other illustration is of Fairmount Bridge, which has a channel span of three hundred and forty-eight feet.

Wood-Carving by Women.

The northwestern corner of the Women's Pavilion was devoted almost entirely to specimens of women's proficiency in the decorative arts. Most of the samples were from the Cincinnati School of Design, and they did great credit to the fair daughters of that noble State. The exhibits included painting on wood, slate, china, porcelain and tile, and carving in wood. Many of the articles displayed rivalled the very best products of Switzerland or the Black Forest. One of the most noticeable pieces of work in the collection was an organ-case, elaborately carved by Miss Fanny M. Boaks, of the Cincinnati School of Design. The Estey Organ Company sent the instrument, which was valued at $500, to the school, with the promise that they would present it to the young lady who would carve and decorate it for the Centennial Exhibition. Miss Boaks undertook the task, and she succeeded not only in winning the instrument, but also in producing one of the most artistically carved pieces of furniture in the World's Fair. Another very creditable piece of work was a rosewood piano-case, carved by Miss Agnes Pitman, also of Cincinnati. The instrument was presented to the School of Design by the Ohio Valley Piano Company, on the same conditions that governed the gift of the organ. The decorations, which were made by Miss Pitman, were exceedingly simple, but exquisite in design and finish. The border of the cover was ornamented with surface carving of snow-drops,

periwinkles, buttercups and daisies, intended to represent Spring, roses for Summer, corn for Autumn, and holly and ferns for Winter. In the enclosure formed by this border were two medallions, representing Spring and Autumn. Upon the ebony legs of the instrument were carved passion-flowers in bas-relief.

Life-Preserving Mattress.

Among the very many useful inventions by women in the Women's Pavilion, one is especially worthy of mention. It is a life-preserving mattress, invented by Mrs. Mountain, of New York, and approved by the United States Board of Supervising Inspectors of Steamboats.

Among the number of models of inventions by American women, of which there were seventy-four in all, were a blanket-washer, a mangle, a frame for stretching and dyeing lace curtains, an ironer, bedstead, easels, a composition building material, window-fasteners, lunch-heater, bureau, travelling bags, life-preservers, dress elevators, flower-stands, etc.

An Improved Flower-Stand.

We noticed a very useful improvement in flower-stands, shown by Mrs. Mary R. Pierce, of New York, in the Women's Pavilion. The object of the invention was to encourage plant and flower culture in dwellings, by the combination, in a flower-stand, of a suitable base and tubular column, with catch basin, moss-bed, hub-collar, trough-arm, and dripping-saucer, arranged to form a self-draining flower-stand that may be attached to a window-sill, movable frame, or their equivalent. Cast and wrought metal was the material employed in constructing the attachments, though other

material may be employed for the purpose. The base of the flower-stand was semi-octagon in shape, the interior being open work, alternately made up of bars and spaces. A hub was located near the centre of the base line to support a tubular column upon the bars. A little distance from the hub was a semi-circular bridge, resting upon the bars to support the trough-arms. The spaces between the bars were filled with metallic plates to form a foundation for a moss-bed; at the base was a provision of baskets and screws to fasten the stand to the window-sill. A pipe rail was provided with an inlet connection to which a hose could be attached to water the plants and supply the aquarium. The stand was also supplied with feet to support it when detached from the window or frame. The catch basin for the drippings was suspended beneath the elevated base, and was provided with a faucet. The water leaking from the flower-pots and caught in the saucer, ran from it into the trough-arm and was finally passed to the provided receptacle, without wetting floor or carpet, and the whole was so arranged that there was no hindrance to the raising or lowering the sash, rolling the shade or folding the curtains.

The Complete Darner.

In the Women's Pavilion was a very useful little article with the above appellation, exhibited by Mrs. Harley, of Philadelphia, the inventor. It was shaped not unlike the long-necked dwarf-gourd, long ago used for a similar purpose, but it had many advantages over the natural growth. The top, over which the rent to be mended must be placed, was concave to accommodate the needle, and could be removed for the insertion of a ball of darning-cotton into the swell of the

"darner," which was pierced lower down to allow passage to the end of the thread, so that the worker need not remove from the top the article she was mending. The handle was finger-shaped for the convenience of glove-mending; the end, like the top, was removable, and uncovered a receptacle for needles in the hollow finger. This toy-like convenience could be used for embroidery or for marking with indelible ink, first covering the concave surface with smooth, stiff paper. A rubber band secured the article worked upon in its place.

Blast Furnace Charging Apparatus.

The Weimer short-stroke blowing engine, exhibited by the Weimer Machine Works, Lebanon, Pennsylvania, belongs to a class which is held in great favor by furnace managers. It is a small, compact, direct-acting, vertical engine, and made to run at high speeds. The steam cylinder is twenty inches in diameter, and has a piston stroke of twenty-four inches. It has an ordinary slide valve, which is operated by a link motion. The blowing cylinder, which is fifty inches in diameter, includes several novel features. In order to admit of the engine being run at the high speed for which it was designed, it was necessary that the valve areas should not only be large, but that they should open and close quickly. The inlet valves to the blowing cylinder are arranged in six sector-shaped boxes, which are keyed into the cylinder heads. These cylinder heads are in plan like a six-spoked wheel, the piston rod passing through what corresponds with the hub-centre. In each of the six valve boxes, which are at either end of the cylinder, there are five valves. Four of these are at the sides, the one nearest the centre being quite

small. The fifth one is placed at the bottom of the box, the top being left open for the admission of air The valves are of the gridiron variety, the leather being held between two gridiron plates, so as to have a play of about three-eighths of an inch. The plates are gridironed, so that when the air is being drawn into the cylinder, holes, which are cut in the leather, correspond with holes in the inner plates. The discharge valves, which are similar to those just described, are placed at the outer side of the sectoral box, from which they convey the air into an annular passage-way which surrounds the cylinder. As will be seen from the description given, much space is left in the inside of the cylinder, both between the valve boxes and the discharge valves, which would not be entered by an ordinary piston. In order to avoid the considerable loss of power which would result from leaving these spaces filled with compressed air at the end of each stroke, the piston has cast upon both its upper and lower sides radial and circumferential ribs, or flanges, so that when the piston is at the end of its stroke, the ribs on one of its sides have entered the spaces between the valve boxes and displaced nearly all the contained air. When working at 100 revolutions per minute, these engines are calculated to discharge 5,000 cubic feet of air at ten pounds pressure. The general construction and workmanship on this engine are of the best kind.

This company also exhibited a "suspended pipe hot-blast stove," lately introduced to the American iron trade. The accompanying illustration gives a fair view of its interior as well as exterior appearance, and to the eye of the intelligent and practical furnace-man needs but little description.

The increasing temperature required by the modern blast-furnace practice has so far shortened the life of

the ordinary standing-pipe stove, that a new departure in this line became necessary. One of the principal objections to the standing-pipe stove is the tendency of the pipe to warp and topple over long before its vitality is otherwise impaired. Another and more serious objection to the old stove is the removal and replacement of injured pipe, generally causing a delay of a few days. This improvement is intended to meet both these objections; the first by suspending the pipe from the roof; and the second, by having the joints of the pipe *outside* of the stove, and so arranged that a defective pipe can be replaced in less than one hour's time, not even necessitating the cooling down of the stove. In addition to these advantages, the upper pipe chamber is divided into two parts with a central wall; the lower or combustion chamber being similarly divided, the flow of gas to either chamber, and consequently the heat, is under the control of the operator.

The other illustration represents a short-stroke blowing-engine and a portable hoisting apparatus, both exhibited by the Weimer Company.

Milling Machine.

We noticed a Milling Machine, embracing all the latest improvements, exhibited by the Brainard Milling Machine Company, of Hyde Park, Massachusetts, which for comprehensiveness and general usefulness is considered by experts to be among the best machines of the kind made.

Rubber Machinery.

About the year 1820 the first pair of India-rubber shoes was imported into the United States; they were brought from South America, and were made of pure

India-rubber, or more properly caoutchouc, and were very thick, heavy and clumsy. They were found very useful in protecting the feet from dampness, and the importation rapidly increased. Experiment proved that they could be manufactured in the United States by importing the raw material, which led to the manufacture of the numberless articles now made from India-rubber.

The first rubber shoes were made in South America by the natives, and were formed on wooden or clay lasts, which were dipped in the sap collected from the caoutchouc trees. They were then held over a smoking fire and thus dried, and when the coating became sufficiently hard the process was repeated until the necessary thickness was obtained; the lasts were then taken out, and the shoes were hung up in the sun and thoroughly dried, when they were ready for shipment.

This crude process was gradually improved upon by the introduction of ingenious machinery, and now the manufacture of rubber shoes and similar articles is about as follows:

The gum, as it arrives in this country, contains a large amount of impurities, and the first process in a factory is to pass it a number of times through the gum washer or masticator, of which we give an illustration. This machine consists of two corrugated or ground rolls, with the necessary gearing. These rolls tear or pull the piece of gum from its first form to that of a long narrow sheet, full of irregular incisions. This allows the water, which is made to flow over the gum on its passage through the rolls, to thoroughly wash and clean it. The sheeting of the gum allows it to be more readily dried.

After thus drying it is taken to the grinding or mill-

room, in which are a number of machines called grinding mills. In these grinding mills is placed a certain quantity of rubber gum, together with various other compounds, which vary with the kind of goods desired to be produced. The mass is then passed through the mill a number of times, and thoroughly mixed; it is then taken to a machine called a calender, and either spread in sheets or on cloth. We show one composed of three rolls; sometimes they are made with four or five rolls. One having four rolls twenty inches in diameter, and sixty-two inches long on the face, is a large, heavy machine weighing from 60,000 to 70,000 pounds, but they are so made that they can be regulated to vary the thickness of the gum to the thousandth part of an inch.

In order to secure perfect smoothness in the goods the calender should be fitted with the spiral connecting gears. With the ordinary gearing there is more or less "back lash," which leaves marks on the goods, being very objectionable in fine goods; with the spiral gear this is avoided. These machines were on exhibit at the Exhibition by William E. Kelly, of New Brunswick, New Jersey.

The sheets from the calender are cut into clothing, boots, shoes, etc., and after being properly made up and varnished, the cloth is taken to the vulcanizing heater, and there cured. This is the finishing operation.

Automatic "Alarm" Gauges.

Among the many useful inventions of the age "Edson's Recording Steam Gauges," and "High-Pressure Alarms," deserve to be specially noted.

These new and valuable instruments afford written charts or steam written "Logs," which exhibit com-

plete diagrams of the height and fluctuations of the steam within the boiler (in addition to the "hand and dial" indications of the same), and ring an alarm gong if danger approaches by the limited pressure being exceeded from any cause, thus averting many disasters from explosions, and saving both lives and property. The instrument also gives evidence of the time when any changes in pressure occur, and defines their continuance.

CHAPTER XI.

UNITED STATES EXHIBITS.

Stone-Sawing Machines.

IN a building located in the southwestern corner of the grounds was a large building devoted to the exhibition of saw mill machinery of all kinds, for sawing logs into lumber.

In this were shown two machines which differed from the others, being intended for sawing stone instead of wood. One of these was called the Stone Monarch, and was built by Branch, Crooks & Co., of St. Louis, Missouri. It had a circular blade, five and a half feet in diameter, around the circumference of which were set eighty-four Brazilian black diamonds or carbons. The arbor or axle on which this blade was set was hollow, and through it passed a stream of water which escaped through small holes in the collar, and by the centrifugal motion of the blade was thrown to the periphery, keeping the blade wet and cold while at its work.

The stone to be sawed was laid upon an iron table and fed against the diamond-edged blade, which revolved at a very high rate of speed. Blocks of sandstone six feet long by twenty-nine inches deep were sawed into slabs in ten minutes, by means of this machine. A smaller machine, with the saw placed in the centre of a table, upon which the blocks of stone

were manipulated, was also shown at work, and cut through stone of almost any hardness. In connection with these machines was also exhibited Squire's combined belt tightener and counter-shaft hanger, for the transmission of motion. It obviated the necessity for loose pulleys, the counter-shaft being moved by means of a lever so as to tighten or loosen the belt upon the pulleys.

Railway and Horse Cars.

The Sharp, Pullman, and Wilmington Car Companies were the only exhibitors of steam railway cars, and from the general excellence of all it was difficult to judge between them, and we could only admire the general regard that was paid to the comfort of the passenger in all.

The different manufacturers of horse cars had several exhibits, only one, however, of which was at all noteworthy, and that was an arrangement to start the car of itself in order to relieve the horses of the sudden strain they are invariably subjected to. It consisted of a spring and rachet, worked by a lever from either end of the car. All railroad men who have examined this patent concede that it is a perfect success: a child can work it, and besides starting the car, one has the chance to use it as a brake, if the real brake gets out of order, thus placing one more safety notch in the way of a car running down hill, as it already has done on the Atlantic Avenue Railroad.

Charging Apparatus for Gas Works.

We all know the rapidity with which gas is generated from coal by combustion, and therefore we can understand how difficult it must be in the large gas

works of our cities, to clear the furnace-retorts in which the gas is generated of the coke, and to keep them supplied with the requisite charges of fuel as fast as the exhausted ones are withdrawn. A very neatly-executed model, exhibited by the Continental Works, in Brooklyn, shows how this difficulty is overcome at the present day.

The model represents the vast charging chamber of one of the largest gas companies of New York, with all the machinery and apparatus for carrying out the process, as constructed and placed in position by Mr. Rowland. The model shows a large rectangular building some three or four times as long as it is broad. On one side are the furnace-retorts, in three tiers, divided into five compartments, there being six retorts in each compartment, or thirty retorts in all. Running along the building, at a midway elevation, a railroad supported on one side by heavy cast-iron pillars, and on the other side by iron stanchions let into the brick face of the furnace wall, carries a travelling platform, on which the working machinery in part rests, and from which it is in part suspended. At one end of the railroad is a large elevator and hopper, by means of which the coal is brought up from below and distributed into buckets, which carry it to the feed hopper of the charging apparatus. These buckets, eight in number, are attached at regular intervals to two endless bands, which run suspended from an upper railroad, and as they come round to the shoots of the elevating hopper, a double cam on the stationary shaft, on which the wheel carrying the bands revolves, regulates the charging of the shafts by the hopper. As the buckets reach the hopper of the charging apparatus the arm of the spring valve at the bottom is caught by a dog, kept in

position by a balance weight, the valve immediately falls, and the bucket discharges its contents into the hopper. Passing round, the arm of the valve is caught by another dog, which, acting in a contrary direction, closes the valve and prepares the bucket for another charge. In case the feed hopper should become overcharged, by swinging the balance weight of the dog the dog is depressed and the bucket passes on without discharging its contents, but on reaching the second dog the valve is caught and the contents of the bucket fall into the coal-bins below, to be again elevated. Thus the feed hopper cannot be filled to overflow, nor can the bucket have a second charge poured on top of one already in it.

Each bucket reaches a shoot of the elevating hopper precisely at the moment that a semi-cylinder, which is at the bottom of the shoot and holds the charge of a bucket, is upset by the action of the cam. Being filled it passes, without stopping, along the endless band, to which it is attached, to the feed hopper and discharges its load. The feed hopper is exactly over the charging apparatus, and as soon as the hopper holds sufficient fuel for a charge work begins. The entire machinery for feeding the charge into the retorts, hauling out the coke, and clearing the retorts, is worked under the government of two clutches and two levers with certain concerted actions; a twenty-five horse-power engine furnishes the requisite motive power. By throwing in clutch No. 1, gearing is set in motion governing a revolving shaft at the bottom of the feed hopper, the shaft being cylindrical, with an open cut in it. This cylindrical shaft turning drops the fuel into the charger; and the moment the charger has received its proper amount of fuel a heavy dog on the main spur wheel

catches an eccentric and the machinery is thrown out of gear. Thus the filling of more than the exact set charge is prevented, though the charge can of course be set to any quantity. By throwing in lever No. 1, and leaving both the clutches out, the charger, which is funnel-shaped, to fit the retort, and has a false bottom, works forward and passes bodily into the retort. By throwing both the clutches in, the movable bottom is drawn out, and then, by throwing out the lever, the charger itself is drawn out—of course leaving the charge behind. Similar machinery, governed by the clutches and lever No. 2, sends the ponderous scraper into the next retort to withdraw the coke and clear it out, a rack raising it as it passes in and lowering it when in, so as to withdraw the coke. The traveller carries both charger and scraper to all the retorts on one tier, but by means of a pillar screw the charger is lowered to all the lower retorts, taking tier after tier. The scraper is worked up and down to the lower retorts by its own elevating and depressing rack. The huge gasometers and vast structures of the gas works of our large cities consume an enormous quantity of fuel. The saving of labor by the use of the machinery, such as we have described, must be immense.

Minced-Meat.

Christmas is approaching with a steady pace, all too slow, however, for the eager juveniles, in whose minds images of his frosty delights are immovably fixed—not the least of which is the mince-pie. Mince-pie is perhaps the oldest Christmas refreshment of which we have any knowledge, its refreshing savor going away back into the Middle Ages, where the squires of rank and the peasants of low degree danced with one accord

under the mistletoe bough, or piled up the brands over the great yule log in the spacious halls of the old baronial mansions.

Not many years ago, at this time, the sound of the mince-meat chopper was heard all over the land, and a savor of brandy and quince and cider went up as from an altar whereon good things were preparing for the sacrifice. Then the prepared meat was set to season, and at the proper time brought forth to prepare the Christmas feast. The results were generally delicious, but to the overworked housewife could scarcely compensate for the inevitable labor of preparing the material.

Minced-meat was prepared for family use by grocers and others, but did not prove a success, owing perhaps to the poor materials used in its preparation as well as faulty and hasty processes of mixing.

About this time, Joshua Wright, of Philadelphia, began to put up his "Ne Plus Ultra" minced-meat, which has now retained its popularity for thirty-five years. It was shown at the Exposition in cans and packages of all sizes, adapted to the wants of all consumers.

Tobacco.

No exhibit in Agricultural Hall was arranged with so much originality as that of American tobacco. It was near the northwestern corner of the building, and covered about a rood of the floor, and was the centre of attraction of the entire agricultural display. The number of samples exhibited was countless. Two manufacturers from Louisville showed no less than 800 various kinds of tobacco preparations. One exhibitor had a semi-cylindrical structure of plug tobacco boxes. The display was made on the concave side.

The end of each box was of plate glass, behind which was plug tobacco. Two hundred and fifty brands were shown, hardly any two being of the same color. The variegation was multiplied by the many different shades in each brand, and the interest was heightened by the introduction of patriotic emblems and other figures formed of tobacco; colors—as in the American flag, for instance—being almost accurately represented by the natural or artificial shade of the plant. One of the curiosities was a cable of "Monitor" tobacco an inch and a half thick, and 300 feet long. The semi-circular court in which the display was made was a miniature tobacco plantation, the plants growing in "Navy" boxes containing earth best adapted to their thrift. In the midst of the plantation rose a thick, tall pole, surmounted by a life-size figure of a bald eagle—all, including festoons and tassels, being made of twisted tobacco. Above the centre of the whole was a large escutcheon, with golden-hued stars and stripes, and the word "Monitor," formed of the same material. Several of the other exhibits were but little inferior in beauty to this. In one place hung a huge imitation of a Moorish chandelier made of twisted tobacco, having, instead of lamps or gas-burners, stands supporting great cones of such tempting cigars as "Londres de Corte," "Opera Bouffe," "Coqueta" and "Regalia del Rey." Another exhibitor had a large show-case which, with the exception of the frame, was made entirely of plugs of navy, varnished. A tobacco fac-simile of the old Liberty Bell, hanging from a tobacco frame, in a belfry of tobacco, was exhibited in another place, and a great, jagged mountain peak of the most enticing "Century," and having an American eagle of "None Such" perched upon the summit in another.

Pacific Slope Exhibits.

There was an exceedingly interesting and instructive display of the agricultural and mineral products of the Pacific Slope made in Agricultural Hall. The collection was well arranged, and showed the wonderful resources of that section of our country. Commencing with the mineral exhibits, there was a collection of gold ores and free gold from the most celebrated mines of California, which was very rich and instructive. Each specimen was plainly labelled with the name of the mine from which it was taken. Silver ores in great variety of form and richness were shown, representing the well-known mines as well as those less known. There was one mass of ore composed of silver ore and copper which weighed about 200 pounds, and which assays about $300 per ton of silver.

There were specimens from the "Great Bonanza" which yield over $1,000 a ton; and a still richer one of ruby silver, which assays $2,000 per ton.

Mercury, copper, sulphur were all shown in this collection.

Specimens of the coal found in California were on exhibit, all bituminous, no anthracite coal having as yet been found in that region.

Iron is found in abundance, but the industry has not been much developed as yet. There was a large collection of building stones: among them were slates, flags from Placer county, serpentine from Lake county, which was as fine as any of the mantels shown in the Russian department. The quarry has lately been discovered and is not yet worked. Soapstone used in lining furnaces, hone-stone found in extensive deposits in Los Angelos county, and marbles from various sec-

tions were shown. A very fine dove-colored or mottled marble was shown, which is used principally for tombstones and vaults. A very beautiful mottled and striped marble, nearly the same as what is called Mexican onyx, was shown. A fine monument, made of a clouded black and white marble, was exhibited. One very fine white marble was shown, which equalled in texture the best statuary marble.

The agricultural exhibits, especially the specimens of wheat and barley, were very fine. Stalks of corn, nineteen feet high, with the ears twelve and thirteen feet from the ground, were shown. Mustard plants, one and a half inches in diameter at the base, and twenty feet high, made us understand more clearly how "the fowls of the air" could "roost in the branches" thereof. Of vegetable fibres, rami, flax and jute, there were several very fine specimens; also of cotton, which is cultivated in a small way. The country being particularly well adapted to grazing, the wool industry is one of the most important. Sheep husbandry is a very profitable business; the animal weighs the increase of the flock twenty per cent. heavier, and heavier, the fleece is a hundred per cent. greater than in the Eastern States. The amount of wool raised is not far from 35,000,000 pounds annually. There were merino fleeces on exhibit weighing twenty-eight pounds each.

The small fruits of the Pacific coast are so well known that we need hardly say much regarding them, though they were not shown to any extent in this collection.

The big trees of California, for which the country is famed, were here represented by a piece of bark about eighteen inches thick taken from one of these monster red-woods. Photographs of them were shown, which

gave a very good idea of their gigantic proportions. Specimens of over four hundred varieties of woods were shown, many of them of great value in cabinet work—such as, for instance, rosewood, mahogany, California walnut, and maple. There was one beautiful specimen of bird's-eye maple, which was so hard and fine that it resembled marble.

The great seal of the State of California, made of the more ornamental woods, attracted much attention. It was in a frame about three feet square and had an obverse and reverse side. Upon one side were the arms of the State, and upon the other an eagle. The whole was carved wood-work, and the lights and shades were produced by the various colors of the woods used. It was designed by D. W. Standeford, of Oakland, California, specially for the Centennial Exhibition.

The remainder of the exhibit was made up of antediluvian animal remains, petrified woods, etc.; fossils, among which was a petrified oyster weighing twelve pounds; a case containing 4,000 shells, representing over 1,200 species, found on the Pacific coast, some exceedingly beautiful; and a number of stuffed birds.

We must not forget a display of silk cocoons, which was one of the largest of the kind in the Exhibition. The cocoons were very large and of various colors, from white to deep yellow. The worms were also shown, feeding on mulberry leaves. The industry has not made any great progress yet, as so many other branches of industry make better returns. That this will some day become an important element of wealth there can be no doubt, as the climate is every way favorable to the enterprise.

The entire display was very interesting, and showed the prominent characteristics of the Pacific coast and

its boundless resources in all that go to make up the wealth of states and nations.

Jacquard Looms.

The Phœnix Silk Manufacturing Company had some looms in their exhibit, which, for work done, were deserving of the highest commendation. The company showed four Jacquard looms. One very large one was making various Centennial book-markers, containing portraits of Washington, Abraham Lincoln, Cardinal McCloskey, the President, and others. Their Washington portrait required 5,500 cards, the Lincoln and McCloskey portraits 4,500 cards each, and the President 1,500 cards. The weaving was exquisite, and it was no matter of surprise that they could not produce them fast enough to meet the demands of the hungry visitors to the Centennial, all of whom wanted to take home something made in the Exhibition. This same company had a loom making ten ladies' neck-ties in two and three colors, which were very tasteful and pretty in design; also two looms for making silk pocket-handkerchiefs, one kind figured all over, and the other with figured borders. They were not only fine in texture, but strong and durable, and were excellent specimens of the fine work of a Jacquard loom. These two looms made four dozen of these silk handkerchiefs in a day.

Messrs. John D. Cutter & Co., New Jersey, exhibited a small Jacquard hand-loom, on which black silk dress goods were being made, the only pattern and the only use of the Jacquard apparatus appearing in the name and address of the exhibitors in a continuous line along the edge of the goods. The material was rich and the weaving fine. Mr. Cutter also exhibited a silk spool-

winder, which is similar in most respects to that of the Nonotuck Company, which we have already described.

The Jacquard loom is just the same as the inventor made and left it. It has neither been altered nor improved. The thousands of visitors who saw these pattern looms at work were probably more or less mystified at the enormous number of perforated cards joined at their edges and forming an endless chain, which were perched on the extreme top of the loom. These cards and the machinery governing them are the whole secret of Jacquard's invention.

The first operation in pattern weaving on a Jacquard loom is to draw out on paper the design of the ribbon in the exact size it is to be woven. It is then drafted on to sheets of paper, the size being multiplied fifty times on the first drawing. These latter papers are ruled and dotted at the time of drafting, the number of lines to correspond with the number of threads in the warp to be used in weaving the ribbon, and the dots to correspond with the number of perforations afterward made in the cards which are used on the loom as a pattern. These cards, joined together in a chain, pass around a hollow, prism-shaped cylinder, and, with the aid of a box containing 100 or more needle wires, pointing outward, help the weaver to produce his marvellous patterns. The object of the box of needle wires is to raise the warp threads below in the order and number required for the passage of the shuttle, according to the pattern. These threads are attached to the lower ends of long, perpendicular wires arranged in rows, the upper ends of the wires terminating in hooks. The hooks can catch upon a series of bars, the bars being attached to a frame which is alternately raised and lowered by mechanism. If the bars are all raised at the same time, and every bar,

while rising, carries up its appropriate hook, of course all the warp threads will be elevated; but if some of the hooks are pushed aside they will not catch on their respective bars, and their warp threads will not be elevated when the others are. The method of pushing the hooks aside is this: The shanks of the hooks are passed through loops in horizontal wires, the wires being kept in position in the box, with their points protruding outside of it. The other ends of these wires terminate in spiral springs, which are supported against the inside of the box. It follows that if one of these horizontal wires is pushed to the right, compressing its spring, one of the vertical wires will be so displaced that its hook will fail to catch the bar; but when the force pushing the horizontal wire is withdrawn the spring will bring back both wires so that the hook can catch the bar and the corresponding thread of the warp be raised thereby. The flat, four-sided revolving cylinder is to the left of the box of wires. Each of its sides is pierced with holes corresponding in number and position with the points of the horizontal wires.

The cylinder is so placed that each of its sides is brought successively against the points of the wires as it revolves. If the sides of the cylinder were alone opposed to the points, the wires would simply enter the holes, and no effect would be produced; but if some of the holes are stopped while others are left open, the wires which touch the stopped holes will be driven back and their hooks disengaged, while the wires which enter the holes remain undisturbed, and the warp threads attached to them are raised. The stoppage of some of the holes in each face of the revolving cylinder is effected by covering it with a card containing holes corresponding to those in the bar, but fewer in number;

so that when the points of the wires come in contact with an unperforated part of the card, they are pushed aside; but when the points enter the holes of the card, the wires are not moved, and consequently the hooks remain on the bars. By this contrivance the intended pattern is made out. If the pattern be complicated, the number of cards is very considerable. The revolving cylinder presents a new card to the points of the wires at every quarter of a revolution, the holes in the cards being so arranged as to raise in succession those threads which will make out the intended pattern, and it is necessary that there shall be as many cards as there are threads of weft in the pattern.

The finest Jacquard loom—that is, the one making most ribbons and having most shuttles—in the Exhibition was that of Mr. Stevens, of Coventry. During the Exhibition he made a vast number of Centennial memorials, with a portrait of George Washington, and suitable mottos, etc. The weaving was fine and delicate to a degree, as much so as the touch of the artist's brush in the finest water-color portraits in miniature. To produce these ribbons, Mr. Stevens had 5,000 cards on his loom, and each ribbon had the same number of threads in it.

Needlework.

To the ladies the Women's Pavilion was one of the chief points of attraction, while the ruder sex could not but admire the many beautiful and artistic specimens of woman's handiwork with which the place was adorned. Fine needlework, laces light as gossamer and as delicate in design as any ever spun by Arachne herself, paper and wax-flowers, and wax fruits that were works of art, with a bewildering array of other

productions of woman's skill and genius, were displayed on every side, to the glory of womanhood and the delight of feminine eyes. All sorts of curious little boots and slippers, and caps and baby-dresses, and frills and tucks, and plaits and flounces, there were without number.

Indeed the American women had great reason to be proud of the display made of needlework in the Women's Pavilion, which, for tasteful design, delicacy, and elegance, far surpassed any other display of the kind.

Among the more prominent articles we may mention two panels worked in silk, upon a groundwork of golden satin. One was the blossom of the flag in its regal beauty, a veritable fleur-de-lis, and the other a bunch of cat-o'-nine-tails, so rich and brown and velvety one knew not which to admire most. These exquisite panels were the work of Mrs. W. G. Weld, of Boston, Massachusetts.

There was a piece of tapestry work by Lina Fuldner, of Milwaukee, Wisconsin, representing a sailor making a toy ship. It was the very best specimen of American worsted tapestry in the Exhibition.

A lady from Alabama exhibited a rich crocheted bed-quilt, containing 7,000 skeins of silk, the result of two years' labor.

In the southeastern section was a collection of admirably-executed portraits in silk embroidery or worked in worsted. Notwithstanding the difficulty of securing delicate shading by the employment of these materials, the artist had succeeded in producing some pieces which, at a distance, closely resembled etchings. A picture in worsted work, representing the "Death of Douglas in Defence of Mary Queen of Scots," was

probably one of the most elaborate works of the kind in the collection. There were several cases of embroidery on silk, one of the designs representing Masonic emblems on one side, and an eagle with the liberty shield on the other. Here were also specimens of very fine needlework, carriage robes, embroidered garments of various kinds, child's afghans, etc. An interesting exhibit was a pair of old-fashioned mittens, such as the boys of not many decades ago will remember, knit by an old lady seventy-eight years of age. This representative American woman was a granddaughter of Major Clapp, of the Revolutionary war, and her photograph, which was exhibited, showed her to be still young in health, if not in years.

Useful Inventions by Women.

There were some inventions in the Woman's Department which were especially noticeable for their originality and practical utility. One of these was a sewing machine. Ladies who are in the habit of doing much work on any of the sewing machines now in use are well aware of the exhaustion which accompanies a prolonged sitting, and the invention alluded to enables the foot to be dispensed with, the hand furnishing all the power required. This was the invention of Mrs. G. L. Townsend, one of the executive ladies. It consisted simply of a lever attached to the driving wheel and passing through the top of the machine in such a manner as to be readily worked.

Another invention which proved of considerable interest to the ladies was the open-eye, easy-threading needle. The eye of this needle was so constructed that the thread may be inserted without any trouble—in fact, no one who can feel the needle can fail to thread

it. That this is a great desideratum no one who has ever tried to thread a sewing machine needle need be told. The needle is the invention of Mrs. Suplee, and like most other ladies' inventions was the result of an effort to obviate her own discomforts.

Another invention was the Coston telegraphic night signals, which, although not original with Mrs. Coston, owed to her its perfection and introduction into public use. Her husband died leaving her a rough chart of the idea, and it was not until after many fruitless experiments in combining the chemicals and other materials to be employed, with year after year of patient toil, that she was able to present the idea perfected to the world. She has now the gratification of seeing 300 sets of her night signals distributed through the United States Navy, honored by government approval. An exhibit of the invention was also made in the Government Building.

Although not properly coming under this head, still the following exhibit was such a remarkable specimen of woman's skill in wood-carving that we cannot omit it altogether. We allude to the large, handsome bedstead, richly and elaborately carved by the Misses Johnson, which attracted so much attention.

This was made of walnut, inlaid with ebony; the panels at the head were carved to represent the lattice work on the porch of their childhood's home, and on this were carved the familiar trumpet flowers and Virginia creeper. On the posts were fine carved copies of the poppy and lily, typifying sleep and innocence, and above the central decorations were two exquisitely painted panels of slate, on which were morning-glories closed for the night. At the front were the same flowers, opened by the vivifying rays of the rising sun. The

inlaid ebony was all of pretty designs, and every inch of remaining space was rich with intertwining vines and flowers. This one piece of furniture was valued at $500.

Whistle from a Pig's Tail.

In the Women's Pavilion was a most curious article, no less than a whistle made from a pig's tail. This caudal appendage had been hardened by some mysterious process, and from it had been made a whistle. The musical instrument was very much twisted, as might be expected when the material from which it is manufactured is taken into consideration, but still, it gave forth a shrill noise, and was in every respect a veritable whistle. Over this strange exhibit were inscribed the following lines:

> "There's a proverb as ancient as Scotland's thistle
> That out of a pig's tail you can't make a whistle;
> We believe we've accomplished the wonderful thing,
> And all who may wish can make this tail sing."

It is to be presumed that this triumph had been achieved by some one of the fair sex, but the lady had modestly withheld her name from an anxiously-inquiring public.

Sculpture.

The most imposing works exhibited by American sculptors were, the "American Soldier," designed for the Antietam monument, which stood between the Main Building and Memorial Hall; and the bronze group, entitled "The Navy," designed for the Lincoln monument, at Springfield, Illinois. The first was a performance of very considerable merit, and if not absolutely satisfactory as a specimen of skilful modelling, it at least compared favorably with the colossal

bronze "Bismarck," which was the most important piece of sculpture in the German section.

The bronze group consisted of three figures, of a naval officer, a sailor, and a boy, which were grouped about a mortar, were all good studies of typical Americans, and were modelled with great vigor.

A more spirited work than the colossal "American Soldier" was "The Minute Man of 1776," by D. C. French, in the Annex. This represented a powerful young New England farmer in his shirt-sleeves, who has dropped the handles of his plough and grasped his gun at the sounding of the note of alarm. The figure was a most characteristic one, and the action was very finely expressed.

To come down from great things to little, there were no works of American sculpture more interesting than the groups of Mr. John Rogers, which were shown in the east and west corridors of the Annex.

The group entitled "The Council of War," for instance—representing Lincoln, Stanton, and Grant—was admirable in its unaffected ease and naturalness. These Rogers groups have enjoyed an immense popularity, and they have deserved it, for they have a particular value as indicating a pathway that American sculptors in the future must travel if they expect to achieve anything that will have genuine vitality and that will be, as all true art must be, expressive of the nation and of the age.

The most admirable nude study in the American section was Mr. Howard Roberts' "Premier Pose," in the main American gallery in the Memorial Hall. The attitude of the young girl, who was shrinking from exposing herself in the studio of an artist, was a very difficult one. The workmanship throughout the entire

figure was remarkably fine, and the firm yet delicate manner in which the markings of the legs—to mention one noteworthy point out of many—were made out, was a triumph of skill that was unrivalled by anything in the Exhibition, except perhaps a few of the best works in the Italian and French sections.

The most remarkable piece of sculpture in the American section was perhaps that in marble of the Death of Cleopatra, by Edmonia Lewis, the sculptress and *protégée* of Charlotte Cushman. The great queen was seated in a chair, her head drooping over her left shoulder. The face of the figure was really fine in its naturalness and the gracefulness of the lines. The face was full of pain, and for some reason—perhaps to intensify the expression—the classic standard had been departed from, and the features were not even Egyptian in their outline, but of a decidedly Jewish cast. The human heads which ornamented the arms of the chair were obtrusive, and detracted from the dignity which the artist had succeeded in gaining in the figure. A canopy of Oriental brightness in color had been placed over the statue.

Paintings.

In the United States Department of Memorial Hall, was a picture which attracted a great deal of attention, "The Battle of Gettysburg," by Rothermel. It was very large, the largest on exhibition, and occupied the entire eastern end of the hall. At first sight it presents a confused mass of men, but five minutes' quiet examination begins to develop its points. The foreground depicts the shock of a bayonet charge made at the battle of Gettysburg. During the night a low stone-wall had been thrown up as a breastwork, and

over this the struggle was being enacted. All over the field the conflict rages, shells are bursting, horses rearing, men struggling, and to the casual observer there is only the direst confusion.

The works of American artists, in all exhibited, amounted to in number 360 in Memorial Hall, and 940 in the Annexes, making a total of 1,300, without including etchings, lithographs, and other forms of applied art. The first of these collections had a historical as well as a technical interest: the works presented included specimens of our most noted painters, from Copley to the present time. Vanderlyn's "Ariadne," which took the gold medal in Paris nearly seventy years ago, deserved particular notice; and there were a number of good representative pictures by modern artists. Page's "Shakespeare" was at least very curious; Nagle's portrait of "Gilbert Stuart," and other portraits by Healy, Hicks, Anna M. Lea, Elliot, Sully, Inman, Hunt, and Baker, with landscapes by Gifford, McEntee, Whittredge, Cole, Bierstadt, Sonntag, and Moran, and Eastman Johnson's "Old Stage Coach," contrasted very favorably with other works in their several fields of art.

In addition to the names already mentioned, there were pictures by the older painters, Gilbert Stuart, Copley, Washington Allston, Professor Morse, Smibert, and Stuart Newton. This collection of ancient portraits was of great interest and value. Of modern artists we had, in addition, Boughton, Colman, Gray, Suydam, Irving, Hubbard, Wood, Loop, La Farge, Hamilton, and many others. Although, of course, there was much inequality of talent in such a number, almost every artist in some one picture gave his best work. Allston's portrait of himself, Copley's of "John

Adams," Newton's of "Washington Irving," Johnson's "Old Kentucky Home," Hicks's portrait of an old lady, Gray's "Model from Cadore," and most of the landscapes well repaid a careful inspection.

Among the excellent pictures which particularly pleased us were Gifford's Adirondack and Venetian landscapes, McEntee's "Winter" and "November," La Farge's "St. Paul," Eastman Johnson's "Sabbath Morning," Shattuck's "White Hills," Church's "Chimborazo," and Hays' "Bison at Bay."

Needles and Buttons.

The age and progress of improvement has been of such laudable character, the advancement of business pursuits of the people of such positive service to the community, as to make us deeply sensible of the unremitting study and application of individuals, who have, in a measure, brought it to the fine perfection it has arrived.

The business indicated by the heading of this article is one of very great and constantly increasing magnitude. The wonderful increase in the use of needles in the last few years has made that article one of the most important in our commerce. The needle about which we intend to speak is manufactured at or near Redditch, England, by the firm of James Smith & Son. The superiority of this needle is proven by the fact that in the year 1851 it took the first premium at the World's International Fair in London.

When we consider the simplicity, smallness, and moderate price of a needle, we would be naturally led to suppose that this little instrument requires neither much labor nor complicated manipulations in its construction; but when we learn that every needle, how-

THORNTON'S NEEDLE EXHIBIT.

ever small, passes through the hands of some 120 different operators, before it is ready for sale, we cannot fail to be surprised. The best steel, reduced by a wire-drawing machine to the suitable diameter, is the material of which needles are formed; and which is brought in bundles to the factory, and carefully examined. Among the different operations through which this must pass before a perfect needle is turned out, is that of scouring. This is the longest and most expensive process in needle manufacture; this is done upon bundles containing 50,000 needles; and the same machine, under the guidance of one man, polishes from twenty to thirty bundles at a time; either by water or steam-power. It is easy to distinguish good English needles from spurious imitations; because the former have their axis coincident with their points, which is readily observed by turning them round between the finger and thumb. The construction of a needle requires, as already stated, about 120 operations; but they are rapidly and uninterruptedly successive. A youth can trim the eyes of 4,000 needles per hour.

One very important point which has helped to gain for this needle its world-wide reputation is the improvement, made some years ago, in the eye, which is made smaller than its body, thereby producing a kind of spring when the body of the needle is passing through a material; this is done by grinding them off from the head towards the body. All the needles manufactured by this firm, and coming into this country, have, in addition to the firm-name, the name of Mr. Thornton on them, as a guarantee of their genuineness. Mr. Thornton, of Philadelphia and New York, is the agent in this country for these needles, and by him they were shown at the Exhibition.

Homœopathic Medicines.

There was quite a large display made by the different Homœopathic Pharmaceutists of their preparations, books and periodicals in the Main Building, and conspicuous among them was the exhibit of Boericke & Tafel, of Philadelphia. This comprised a complete assortment of all medicinal preparations from plants indigenous to this country on the one hand, and all preparations in the form of triturations or powders on the other. In addition thereto, there was a very full line of homœopathic books, and a large assortment of elegant medicine chests and cases for professional as well as family use.

The case containing their publications was flanked by slender glass tubes filled with medicated sugar globules from the size of millet-seed to that of a large pea. We were also shown a very interesting display of metals in the form of impalpable powder.

William Tims, of Paterson, New Jersey, and Smith's Homœopathic Pharmacy, of New York, also had very fine exhibits in the same line of goods.

Gas Fixtures.

Among the most interesting class of exhibits in the Exhibition was that which included a vast number of objects in which beauty and utility were wedded. Among these may be mentioned articles which come under the comprehensive heading of Gas Fixtures. They were very tastefully arranged, and formed a very striking and attractive feature in the Main Building.

Messrs. Baker, Arnold & Co. had erected for the purpose of displaying their exhibits in this line a very handsome

Ornamental Pavilion,

With open sides and a French roof, elegantly decorated in polychromatic designs and carpeted with Brussels carpet. In the centre of this pavilion was suspended a circular brass corona, with ten branches, each having three small burners projecting from a flower. Long ornamental chains hung from the centre at the top to the circumference of the lower circle. Pendent from the ceiling of the pavilion were some of the prettiest and most elaborate chandeliers we ever saw, the designs of which evidenced a very high advance in this most useful art, and the fine gilt fixtures contrasting very attractively with the gay and lovely colors mingled here and there.

Among the novelties in this exhibit was a new pattern, English in character, which particularly drew our attention. The metal, which was light yellow gold, was worked in broad flat straps, and bent and engraved into fantastic designs.

The American Button Hole and Sewing Machine Company had erected a

Handsome Pavilion

Of solid black walnut, which occupied a conspicuous position about midway between the avenue in Machinery Hall devoted to sewing machines. This pavilion was elegantly furnished throughout, while suspended from the V-shaped niches or arches were numerous flower and plant baskets, which gave it a homelike and cheerful appearance.

The machines exhibited were made expressly for the Exhibition, gold and nickel plated, and inlaid with mosaic work and pearl ornamentation. One of these machines, a "carpet machine," attracted considerable

attention from its novelty, being intended to sew the breadths of carpets together by the "over and over" stitch.

In the centre of the pavilion, enclosed in a large glass show-case, was a life-size wax figure, representing the Goddess of Liberty, and in another case were two other life-size wax figures, representing the different styles of dresses worn in 1776 and 1876, showing such a marked contrast that they were much admired and excited considerable amusement.

In this exhibit we saw the smallest model of a sewing machine that was perhaps ever made, being about one inch square and yet perfect in all its details.

Musical Instruments.

Considerable curiosity was excited by the sight of an historical curiosity in an old-fashioned harpsichord made in London, in 1789, for Charles Carroll, of Carrollton, Virginia, one of the Signers of the Declaration of Independence. The wires in this instrument, instead of being struck by hammers, were picked by pieces of quills, producing a tone that was suggestive of the German toys which make music by means of a similar string and quill device whenever a handle is turned.

A "Violin Piano" was another novelty exhibited by a California manufacturer. This instrument, in addition to the ordinary tone, gave a prolonged note similar to a violin, and produced by the same means, by drawing the bow of horsehair across the strings. The stringing consisted of ordinary steel piano strings of seven octaves. Each tone has a string, and each string has an upright violin bow. The bow arrangement was made of a steel frame, between which the violin bows were placed. This frame is put in motion by a pedal, caus-

ing a perpendicular movement of the bows. A small upright lever, fastened in the hind part of the key, pressed against the bent lever with a small roller, and this against the bow, producing, by this means, the tone, the power of which depended on the pressure on the keys. Above the strings three wooden forms were suspended, which could be raised or lowered through different pedals. In these forms damping buttons were placed, which rested on certain points of the strings, thus originating flageolet tones.

Among the string instruments was shown a violin which was said to be the original violin used by Mendelssohn, the great composer, when composing music. It was a very peculiarly-shaped instrument, with a neck like an ordinary violin. The body was barely wide enough on the centre to support the bridge, and it widened abruptly at the end so as to resemble somewhat two oval boxes connected by a narrow wooden passage. The tone was very soft and sweet, but without power.

American Furniture.

The display of American furniture was very fine indeed, and though it had an appearance of solidity and permanence which distinguished it from the French, still there were many articles which were fully equal, in point of elegance and artistic finish and design, to any of the English or even the French exhibits in the same line. In exquisite carving and tasteful and beautiful upholstering especially the American furniture contrasted most favorably with any other, and afforded a striking evidence of the advancement of our people in manufacturing skill and correct artistic taste.

We shall mention briefly some of the more ingenious

devices in furniture, which we think should be noticed in a work of this kind.

The Folding Bedsteads, shown by Hale, Kilburn & Co., were always surrounded by crowds of interested spectators watching and inspecting the operations of folding and opening these bedsteads. When folded up against the wall they look exactly like a very handsome wardrobe, and take up no more space. The head of the bedstead is weighted, which allows their being lifted easily even by a child without any exertion of strength. When folded up, the mattress, bed-clothing, and pillows all remain in their place, so that when taken down they are ready for immediate use. They are made in all sizes and styles, even to children's cribs, which have high sides, folding away on the same principle. Another of these folding bedsteads had a washstand attachment, and which, when folded up, presented exactly the appearance of a handsome desk with a bookcase top.

From Crete, Illinois, we saw some very handsome extension-tables, the extra leaves of which were packed away in grooves in the legs when not in use. These tables were most elaborately inlaid with different colored woods, and attracted considerable notice.

Another very ingenious device was an adjustable sleeping apartment, shown by Reeves & Eastburn, which can be folded away—bed, washstand, and all—into a space of about eighteen inches deep against the wall of a room in which it stands.

Geo. J. Henkel exhibited a set of chamber furniture in the style of 1776, made from the wood of an old maple tree that grew in Independence Square, and was over two hundred years old, having been planted about 1650 and cut down in 1875.

Dental Goods.

American dental goods have obtained a world-wide celebrity, and are sought after by the practitioners of dentistry wherever located on the face of the earth. Manufacturers of these goods in this country find a market for their porcelain teeth in France, and for their steel instruments in England—coals to Newcastle. The extent of the business may be inferred from the fact that every year over four millions of teeth are manufactured by one establishment alone, that of Samuel D. White, who made a very interesting and instructive exhibit of his specialties in this line in the Main Building. It was really a very curious sight to see the variety of teeth in form, size, and color which were arranged in cases. But what more than all bewildered us was the immense number of different kinds of instruments in the shape of forceps, scolers, excavators, pluggers, etc., the names and purposes of which we were fortunately ignorant of—a marvellous combination of mechanical appliances by which both operator and patient are saved so much of the fatigue and pain of dental operations.

A novel feature of the modern dental establishment was an ingenious little dental engine run by foot-power, water, electricity, or steam, which does away with the use of hand-force, and which excavates, drills, burnishes, or files, at the will of the operator. In this display were also seen the materials of which false teeth are composed, and the spar, silex, kaolin, and oxides used for coloring.

Manufacture of Felt Hats.

One of the most interesting processes which we saw at the Exhibit was that of making felt hats, and we

think it is worthy of a description, as so few persons are aware how these common articles of wear are manufactured.

A felt hat is a compound of hair and hot water, the hair principally used being that of the European rabbit and hare, the beaver, and the nutria, the latter a native of South America, and, though smaller, somewhat resembling a beaver. The different kinds of hair are mixed together in a machine which is called a "devil," and the fluffy heap resulting from the mixtures is weighed into small parcels of about four ounces each, which are placed in partition boxes by the side of the operating girls.

Each parcel contains material enough to make one hat, and on being spread out by the girl on the machine before her, the hair is drawn slowly through a picker which separates it. A blast of air carries it on in single particles through a tube which widens towards the mouth. Opposite the aperture a perforated hollow cone, inside of which is a powerful exhaust, revolves in a vertical position, and, catching the hair, holds it by means of the exhaust till the quantity of hair put into the machine has all been equally distributed over the surface of the cone. A wet cloth is then wrapped round it, a metal cap is put over it, and the whole is immersed in very hot water.

On the removal of the cap and cloth the cone is turned upside down, and the embryo hat easily peels off without breaking, the natural action of the blast and the revolution of the cone intertwining and weaving the hair together after the fashion of the nests of some small birds. At this stage the hat very much resembles in appearance those long sugar-loaf headpieces which are generally supposed to form an item in

the regular outfit of a negro minstrel. But by continual soaking in hot water, and friction, in which consists the process of felting, the hat shrinks, becoming "small by degrees and beautifully less," till it has assumed the proportions deemed to be correct by those who make the laws of fashion.

The Eickemeyer Hat Blocking Machine Company exhibited some very ingenious machines which take up the manufacture just at the point which we have reached. The first of these machines was called a tip-stretcher. The body of the hat, having been soaked in hot water, is placed on a stretching-cone attached to the top of a vertical spindle immediately under a series of adjustable stretching-fingers. These fingers have an independent upward and downward motion, which is produced by a crank driven by a pulley making a hundred revolutions a minute.

After each operation of the fingers upon the hat body the hat is shifted on the cone, and the process is continued until the tip is satisfactorily stretched or drawn out. The stretching-cone is gradually pushed up while the stretching-fingers are in operation. So far, however, that part of the hat which will hereafter be fashioned into the brim has not been reached by the stretching-fingers. This part of the hat is stretched on another machine of somewhat similar construction and general working to the tip-stretcher, except that the hat is put upon a metal block, which is adjustable to the height of the crown by means of a screw handle, one complete return of which reduces or increases the height of the hat-box one size.

When the machine is in operation the block is raised to the proper height, bringing the stretching-ribs into working position, and the supporting-ribs of the brim

are also spread out. After ten or fifteen stretchings have been made the block is lowered and the hat is turned on the block so as to bring the stretching-fingers into position to act where the supporting-ribs acted before. The stretching is then repeated until the purpose has been answered.

Another process through which the hat passes is shaving and pouncing. This is also done by machinery. Three conical-shaped rollers point to a common centre, two of them being feed-rollers and the third the cutting-roller; and as the hat is fed into the machine it is shaven as close as may be desired, there being machines for the brim and machines for the body of the hat. A section blower, which is attached to the end of the spindle of the cutting-roller, and is connected by a jointed pipe with the cutting-roller, carries off the cuttings—to the advantage of the machine and especially to the advantage of the health of the operator. Then there are machines for ironing the brim and crown, and also for blocking the hat. In fact an inspection of this machinery only shows how thoroughly hand-work is being superseded by labor-saving machinery in every department of manufacture.

CHAPTER XII.

THE EXHIBITS OF GREAT BRITAIN.

THE British Empire, including the Colonies, occupied one-fifth of the entire space in the Main Building, and more than half of this was taken up by Great Britain and India.

Under the head of

Machine, Tools, and Apparatus for Mining,

Metallurgy, Chemistry and the Extractive Art, the British exhibit in the Machinery Building was very fine indeed. Work in iron on the most gigantic scale formed its distinguishing feature, and our cousin John Bull figured as the Cyclops of the modern world. Steam-pumps, steam-hammers, machinery for mines, road engines, wrecking engines for railways, enormous power looms, and some scraps of his work as a builder of iron clad men-of-war, were especially worthy of notice in this department.

Portable Steam Cranes.

In Machinery Hall, prominent among the exhibits were three portable steam cranes, shown by Appleby Bros., London. One was designed to work loads up to three tons, and was specially constructed for use on railways. It was mounted on a wrought-iron carriage fitted with axle boxes, bearing springs, buffers, and draw springs the same as on an ordinary railway truck

or carriage, so that it might be coupled up behind a locomotive, and rapidly taken wherever required; this rendered the crane a far more useful tool to railway companies than if it were mounted on axles running in *rigid* bearings. It is claimed by the manufacturers that much saving of time and money might be effected by the employment of a few cranes of this type in place of the many fixed cranes now employed at railway stations, some of which are not required for service perhaps once a month, and it must be evident to any one that it is far more convenient to be able to bring the lifting machine to the load to be dealt with than to have to take the load to the crane. The framework of the crane carriage is built up of wrought-iron, and a strong cast-iron plate is fixed on the centre of carriage into which the crane post is keyed, and on which the turned roller path is situated. The crane performs four distinct operations by steam, namely, lifting the load, travelling along the lines, altering the radius, and revolving round the post. The cylinders through which the power to perform these various operations is obtained are fitted with link reversing motion, and are fixed at a slight angle outside the side-frames. These side-frames are strong A-shaped castings, on which are carried all the bosses and bearings required for the various motion shafts, etc. There are four speeds of lifting for loads of varying weight, and the loads may either be lowered by steam, or by means of a powerful brake provided on the barrel shaft, which is actuated in the usual manner by a strap and foot lever. The brake lever is furnished with a pawl to hold it down, so that the heaviest loads dealt with may safely be left hanging for a short time. The travelling motion is obtained by a shaft passing through the centre of the

crane post, this shaft giving motion to a horizontal one under the crane carriage; from this latter shaft the power is conveyed to the axles by pitch chains, which allows for the deflection of the bearing springs. When the crane is coupled up behind a locomotive the motion just described is thrown out of gear. The jib is a straight wrought-iron lattice jib, combining the requisite amount of stiffness with the minimum weight compatible with safety. The radius of the jib is altered by means of a double chain and worm, and tangent wheel; this arrangement not only forms an easy plan of obtaining the large power necessary, but the worm locks the jib in any required position. The turning or slewing motion is obtained through a set of bevil wheels and friction clutches on the crank shaft; and can be worked in either direction simultaneously with any of the three other motions. The friction clutches drive a vertical shaft, which in its turn through a train of gear drives a turned roller running on the roller path, and situated at the foot of the jib. This motion being obtained entirely by the friction of surfaces and not through the medium of toothed gear on the base-plate, the risk of breakage due to careless driving is entirely avoided.

The two other cranes exhibited by the same firm were each capable of dealing with loads up to five tons; and, although very similar in general appearance to the three tons crane described above, they varied from it somewhat in detail. One of these cranes was fitted with all the four motions detailed above, whilst the other had only three of the four motions, the travelling motion being omitted. They were both mounted on plain cast-iron carriages, with *rigid* bearings for axles, and were not adapted for running at very high speeds.

The various operations were performed by exactly the same means as in the three-tons crane, excepting the travelling motion, in which the pitch chains were replaced by bevel gearing, the whole of the parts being of course proportioned to the loads to be handled.

Agricultural Locomotive Engine.

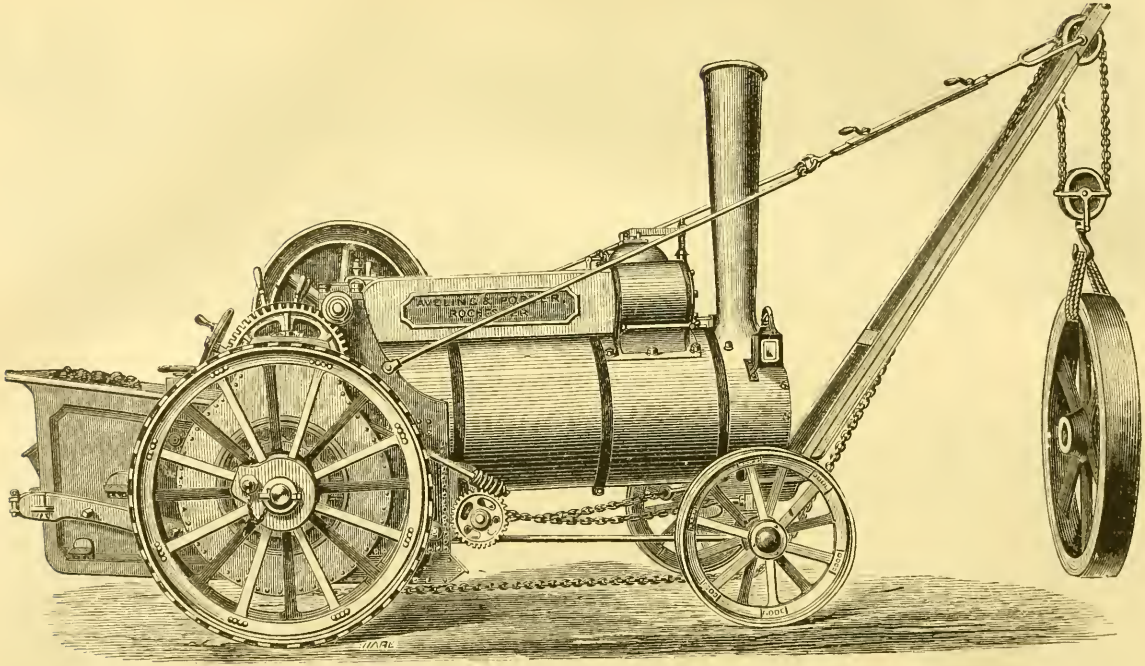
Aveling & Porter, Rochester, England, exhibited their agricultural locomotive engine, fitted with their patent side-plate brackets.

These engines were designed expressly for steam cultivation, threshing, sawing, pumping, and removing agricultural produce.

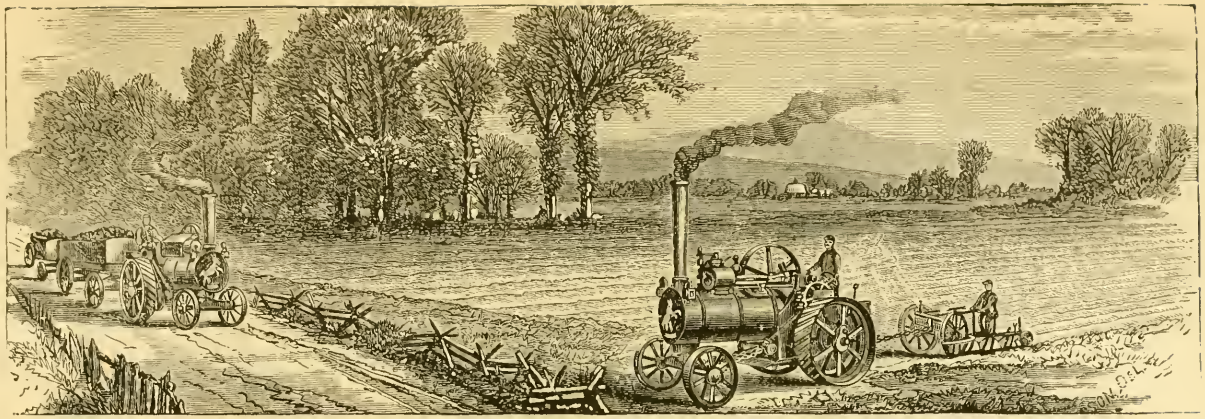
It had a *single* steam-jacketed cylinder mounted on the fore end of the boiler, to prevent priming and to economize fuel. The bearings of the crank-shaft, counter-shaft, and driving-axle were carried by the side plates of the fire-box extended upwards and backwards in one piece for this purpose. The patented arrangement is an improvement in the construction of engines of very great value, as it saves the boiler from the strain otherwise put upon it by the working parts, and minimizes the risk from strained bolt holes. The driving-wheels are of iron; the engine is steered from the foot-plate, and in short the general characteristics of the agricultural locomotives are the same as those belonging to Aveling & Porter's road locomotives.

Two of these engines, fitted with cranes, were employed by the Commissioners of the Centennial Exhibition in removing and lifting heavy material, and were found to work admirably.

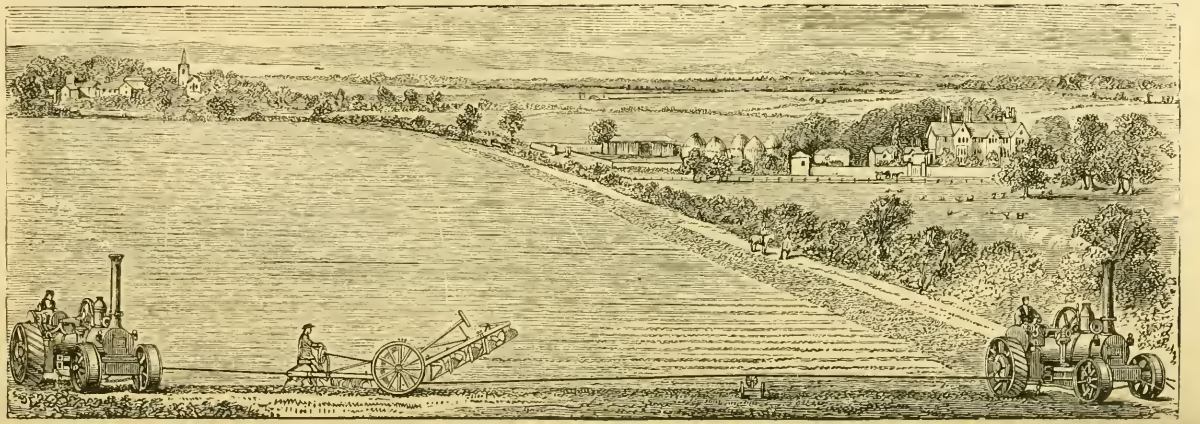
This firm also had on display a



AVELING AND PORTER'S ROAD LOCOMOTIVE CRANE ENGINE, WITH PATENT SIDE-PLATE BRACKETS.



AVELING AND PORTER'S FARM LOCOMOTIVE ENGINE.



DOUBLE ENGINE STEAM PLOUGHING TACKLE.

Steam Road-Roller.

This machine was a special adaptation of Aveling & Porter's ordinary road locomotive to the purpose of road rolling, and in its design and construction every improvement suggested by long experience had been adopted.

The engine was carried upon four rollers of equal width, the two hind ones acting as drivers, and the two in front as steering-rollers. These latter covered the space between the two driving-rollers, and were made slightly conical in order that on the ground line they may run close together, while leaving room above their axle for the vertical shaft which connects them to the engine, and which serves to support the forward part of the boiler; at the same time play was given to the vertical shaft for the rollers to accommodate themselves to the curved surface of the road. The machine can be turned round in little more than its own length, thus enabling it to roll steep hills without injury to the fire-box, while retaining the manifold practical advantages of the horizontal over the vertical boiler for locomotive purposes; amongst which may be enumerated absence of priming, economy in fuel, wear and tear, and much lower centre of gravity. It may be also noted as important features of these rollers that they are adapted for driving stone-breakers or other fixed machinery most economically when not required for rolling and for use as traction engines. They are managed by one person.

Among the

Rock Drilling Machines

Was one exhibited by Wm. Baird & Co., of Scotland —a coal cutting machine, to be propelled by steam at

fifteen pounds pressure, which particularly drew our attention.

Dillwyn Smith, of Liverpool, showed some mechanical stokers for supplying fuel to furnaces automatically, and removing the cinders therefrom, rendering the opening of the fire-doors unnecessary and greatly reducing the temperature of the stokehole. No. 1, as used in the ordinary two-flued Lancashire boiler; No. 2, as used in boilers of steamships, or other boilers constructed on the marine plan; No. 3, "fire bars" used in connection with mechanical stokers, by means of which the clinkers are broken up and removed without opening fire-doors.

Another very interesting exhibit was that of M. MacDermott, of London, who illustrated the complete system of getting coal by three classes of machines: 1, rock and coal perforators; 2, machine for undercutting coal; 3, screw edge for breaking down coal.

The celebrated engineers, B. & S. Massey, of Manchester, had a splendid display of steam hammers for heavy forge work, tilting steel, smith work and forging files, cutlery and light work; special steam stamps for forging in dies at one blow; circular saw for cutting hot iron and steel; models of steam hammers and samples of forgings.

Among the machines and implements of spinning, weaving, felting, and paper-making were some extremely valuable and interesting inventions. One especially deserves a notice. It was a

Self-acting Reader for the Jacquard Loom,

And is adapted for all kinds of ornamental figured textile fabrics, from the most delicate lace or ribbon to the stoutest carpet or tapestry. The invention is founded on a principle of arithmetical progression and geometri-

cal exactness, and dispenses with skilled labor of adults, and places the manipulations of the operation of the "Reader" under the control of juvenile hands. One of its motions exhibited a combination of mechanism of a new construction, having a compound parallel and perpendicular movement, which is applicable to a variety of other purposes, among others bracing and ruling papers, doing the two sides of the sheet at the same time without change of pens.

Among the principal exhibitors in this special department we particularly took note of machines by Booth & Co., spindle and flyer makers, Preston, Lancashire; Platt, Brothers & Co., of Oldham, Lancashire, who exhibited a patent double Macarthy roller cotton gin, for cleaning different varieties of seed cotton, by separating the fibre from the seed; Samuel Lawson & Sons, Leeds, etc.

Sewing Machines.

There was an excellent exhibit, chiefly by Wilson, Newton & Co., of London and Birmingham; Smith and Starley, of Trafalgar Works, Coventry; and Kimball & Morton, of Glasgow. Besides those of the "Wheeler & Wilson," and "Singer" class, there were many with English names, new to us over here. We allude to "Queen Mab," "Queen of Scots," "Cleopatra," "Princess of Wales," "England's Queen," "Queen of Hearts," "Little Dorrit," "Europa," and several others adapted for domestic or manufacturing purposes.

Prominent among the steam boilers were three

Galloway Boilers,

Exhibited by Galloway & Sons, of Manchester. These boilers were contributed by the makers at the request of the British Executive Commissioners, to enable them

to exhibit a type and form of steam boiler of acknowledged excellence, and which is extensively used in Great Britain, and at the same time to supply steam to the engines in connection with the British section. This boiler has been in use in England for upwards of twenty-five years. It is regarded as the most economical and efficient steam generator now made, having rapidly superseded the ordinary Cornish plain cylindrical boiler, with one circular flue running from end to end, and the Lancashire boiler, which is of a similar description but having two flues instead of one.

The construction of the Galloway boiler is as follows: the cylindrical shell is placed in an internal flue, consisting of two furnaces at the front end, united into one back-flue of an irregular oval form.

This flue constitutes the chief feature in the Galloway boiler, and in it are placed thirty-three conical water tubes, each ten and a half inches in diameter at the top or large end, and five and a half inches in diameter at the lower end, fixed in an upright position, in such a way as to support the flue, and to intercept and break up the flame and heated gases, when passing from the fire-grate or furnaces to the chimney. Along the sides of the flues there are also placed several wrought-iron stops or bafflers, which deflect the currents of heated air and cause them to impinge against the tubes, so as to absorb all the available heat possible.

The conical water pipes, or Galloway tubes, as they are generally called, present a *direct* heating surface to the action of the flame, etc.; this effects a great saving of fuel; they also promote rapid circulation of water, and thereby maintain that uniform temperature which is so essential to the durability and safety of all steam

boilers. Unequal expansion or contraction is avoided, and its attendant evils—undue strains and eventual rupture.

An important improvement has just been effected in the construction of the original Galloway boiler, which the makers have patented, and which is introduced in the three boilers now exhibited.

This improvement consists in the arching of the bottom part of the oval back flue, by means of which greater facilities are furnished for cleaning and examining the lower part of the boiler when required. A further advantage is also obtained by having the conical tubes all radiating from one centre; they are consequently one uniform length and are *interchangeable*.

The three boilers shown were each twenty-eight feet long by seven feet diameter, and were made suitable for an ordinary working pressure of seventy-five pounds to the square inch. The shell or casing was made of Bessemer steel plates three-eighths inch thick, double-riveted in the longitudinal seams. Each of these boilers was capable of supplying steam to drive a condensing engine indicating 300 horse-power.

The two furnaces were each two feet nine and a half inches diameter by seven feet six inches long, made of steel plates in three rings, flanged and riveted together so as to prevent any seam or rivet-heads being exposed to the action of the fire.

The exhibit of Minton, Hollins & Co., of England, of their well-known

Encaustic, Plain and other Tiles,

Was a very beautiful feature in the British section.

The general description of tiles made by this firm are here enumerated. Encaustic and tesselated tile

pavement; encaustic glazed tiles, one inch thick, of numerous and rich designs, for hearths; majolica and enamelled tiles, one-half inch thick, for grate cheeks; wall linings; flower-boxes, etc.

There was a very beautiful

Ornamental Pavilion,

In cast and wrought-iron, exhibited by Barnard, Bishop & Barnards, of Norwich, England, which attracted considerable notice and which deserves special mention.

This pavilion, which was intended for use upon a lawn or ornamental grounds, was thirty-five feet long by eighteen feet wide, by thirty-five feet high to the extreme ridge. It was mounted upon a dais of four steps. It had two floors, the upper of which was reached by a spiral staircase. It was supported by twenty-eight square columns, placed two feet six inches apart.

The ornament in the shafts of these columns was of a very rich and varied character. At a height of seven feet six inches from the ground, a transom bar connected the columns. The lower verandah was supported by cast-iron brackets, firmly secured to the columns.

The outlines of these brackets were in all cases alike, but the enrichment of their spandrils was varied by bas-reliefs, the subjects of which were studies from the "Apple Blossom, with flying Birds," "Whitethorn with Pheasants," "Scotch Fir with Jays," "Sunflower," "Chrysanthemum, Narcissus, Daisy, and Grass, with a Crane and rising Lark," etc., etc. These brackets further supported the gutter and cresting of the lower roof; the cresting forming a wavy line, which was surmounted at intervals by fans richly carved, having for their subjects studies from the rose, honeysuckle,

chrysanthemum, hydrangea, etc. Between each column, beneath the transom bar, was a richly-carved pendant ornament forming an arch. Above the transom bar, and between it and the gutter, were richly-carved open-work key pattern panels, in which were numerous medallions of various designs, being studies from butterflies, bees, birds, fish, with many quaint and geometrical patterns.

The upper floor was surrounded by a wrought-iron balcony railing, four feet high, of a light and severe design, exhibiting how much grace can be produced by mere straight lines when they are properly arranged.

The upper roof was supported, in its turn, by twenty columns of a similar design to the lower ones. These were connected by a transom bar, above which was a rich, open-work fish-scale panel, supporting the upper gutter, with cresting and fans of a like character to the lower ones. The brackets, however, upon these columns were of a different outline to the lower ones, and the spandrils were filled with many designs of a bolder character. Between each bracket, both upper and lower, was a richly ornamented ceiling of a combined floral and geometrical pattern, the chrysanthemum being taken as the type of its ornament.

The roof (the rafters of which were of wrought Tee iron) was covered with zinc, in curved tiles, and was surmounted by an elaborately carved cresting. The fascia and pendant ornament beneath the balcony, and overhanging the lower roof, were of a quaint and effective design.

One of the most important and novel features of this work was the railing which surrounded the entire building. This was four feet six inches high, entirely of wrought-iron. The sunflower had been taken as the

type of its ornament. The railing was divided into seventy-two panels, each of which was occupied by a sunflower three feet six inches high, the flower itself being eleven inches in diameter, having carefully veined leaves, six in number, to each flower.

The appearance of this railing was of a most striking and unusual character, and as a piece of workmanship it is believed to be unrivalled of its kind.

Textile Fabrics.

In textile fabrics the British section made, on the whole, a finer exhibit than that of any other country. It was not as extensive as the display of our own exhibitors, or as rich in silks and velvets as that of the French, but it embraced a wider range than either, including the most delicate lawns and the heaviest woollen cloths, the pretty bookmarks from Coventry, the cheviots of Scotland, the linens and poplins of Ireland, and the multiform fabrics that go under the name of dress goods. Very beautiful were the terry and brocaded poplins from Pim Brothers, of Dublin, fabrics that for beauty of pattern and color were not surpassed in the Court of the Lyons silk weavers. An excellent line of curtain silks was made by Morris & Co., of London. Of English broadcloths and other woollen goods we need not speak, except to commend the orderly and convenient method of installation, the different materials being arranged in broad perpendicular plaits in cases having no glass fronts, which made it easy to examine the texture. A case of military cloths was radiant with more hues than the rainbow can show. A great case full of lay figures costumed in elegant dresses, from Hitchcock & Williams, London, was a centre of attraction to lady visitors, and rivalled in this respect the cases of Irish laces.

Among the display made by British jewelers was one by James Aitchison, of Edinburgh, whose specialties of cairngorm stones and pebbles set in silver so often figure in tourists' collections as souvenirs of Scotch travel, were universally admired. Among his curiosities were rams' heads, with the horns tipped with amethysts, and cigar cases of chased silver buried in the wool above the eyes. They cost from $200 to $400. The gem of the collection was the largest cairngorm stone yet discovered—a stone as big as a small apple, and of the color of a smoky topaz. John Neal, of London, showed quite a general assortment of jewelry, some fine cutlery, plated by a process that drives the silver into the steel, so that it cannot be worn off.

Whoever has visited Ireland will remember having his curiosity awakened in Dublin by a sign in one of the principal streets that reads, "Goggin, Bog-oak Carver to Her Majesty, the Queen." Of course he went into the shop, as all inquisitive Americans do, and came away with some of the pretty ornaments sold there. The house made a large display at our Centennial. Bog-oak is a brownish-black wood of very solid grain, and is worked into brooches, bracelets, caskets, card-cases, and an infinite variety of other ornaments. Close to the case of Mr. Goggin was an exceedingly artistic exhibit of

Whitby Jet,

Made by Francati & Santamaria, an Italian firm domiciled in London. Some of the larger pieces, intended for wall ornaments, bore exquisitely carved medallion heads in high relief, and in sets of jewelry the jet was used with admirable effect as a setting for cameos and

mosaics. A display of needles and fish-hooks, made upon a paneled screen of ornamental woods and gilding, was so strikingly novel and tasteful that it arrested the most hurried visitor, who was sure to pause also before the neighboring case of pens which rivaled it for uniqueness. There were fourteen exhibitors of watches and chronometers, including some of the most celebrated London and Liverpool firms. Frodsham & Co. showed, besides their fine modern instruments, the original chronometers made by the inventor, John Arnold, about 100 years ago.

Chemical Preparations.

The show of chemical preparations was one of the strong features of the section. Eighty-five exhibitors combined to make it. Among the articles that most delighted scientific men were beautiful crystallizations of cafeine, aloine, and codetae sulphas, from J. H. Smith & Co., London; iridescent crystals of chlorate of potassium from Furgeson Bros., and a large roseate mass of bichromate of potash from J. & J. White, Glasgow. The perfumers and toilet soap makers were well represented in this group. So were the makers of inks, of soda in its various forms, and of paints. Among the novelties was spirit of eggs in pint bottles, and an indelible ink that required no heat to bring it out. Very creditable specimens of landscape and figure drawing on linen and cotton were done with the ink.

A full-rigged model of the Inman steamship "City of Berlin" was one of a very large collection of models of river and ocean boats exhibited in Machinery Hall by the British. The workmanship of this model, like that, indeed, of all, was remarkably fine and exquisite.

Perhaps the single exhibit in the British department

of most interest to the general public was that of Saxby & Farmer, the railway signal engineers. This handsome working model showed the system by which signals and switches are worked from an elevated station at all the important centres in England. These gentlemen are the constructors of the machinery at Waterloo station, in London, where there are 110 bars which work twenty switches and ninety signals. There are no accidents there, and there is probably no other single station in the world where half so many trains are received and despatched in a day.

In the Book Department some cases of writing and printing paper attracted the notice of dealers in these articles. *The Illustrated London News* sent a large screen covered with engravings. The London *Graphic* had an office partitioned off for the use of its artist and correspondent. In the centre was a small press run by a gas-engine, on circulars for distribution. The walls, inside and out, were hung with the original sketches of hundreds of the best *Graphic* pictures, among which were sketches taken in Paris during the siege, and sent by balloon or pigeon post. Bradbury, Agnew & Co. had a tasteful pavilion of glass and wood filled with their publications. Around the cornice, in gilded church-text letters, was this apt quotation from Shakspeare: "Come and take choice of all my library, and so beguile thy sorrow." The hexaglot Bible of Dickman and Higham, in six quarto volumes, excited the enthusiasm of bibliomaniacs. The kindred group of scientific and philosophical instruments was tolerably full, many of the best London makers being represented. There was also a good collection of objects mounted for the microscope.

Carpets.

The display of carpets was exceedingly fine, and in the way of Axminsters, woven in a single piece, about the best in the entire Exhibition. A series of enclosures under the gallery on the north side of the portion of the building occupied by the British section were covered on walls and floors with these beautiful fabrics. Much the largest exhibitor was the Glasgow house of Templeton & Co., but there were at least a dozen firms that made creditable displays, including John Crossley & Sons, of Halifax, Yorkshire, who are probably the best known in this country of any English makers. In the line of floor oil-cloths the display was remarkable for the immense size of the cloths made in a single piece. Under these useful articles was hung an object which, though classed with them, was intended solely for decorative purposes. It was a painting of the "Last Supper," on a material which, if not the oil-cloth of commerce, closely resembled it. The piece was about nine feet long by four feet wide, and the price was £150. An explanatory card recommended this kind of work for churches.

The two classes of goods that may be regarded as representing the leading industries of England, and which formed the most striking features in the late Centennial, were

Ceramics and Furniture.

The principal display of pottery, porcelain, etc., was placed on the main transept, and filled the whole space from the north entrance to the silversmith's show-case, which fronted on the nave; but it was not all included in this territory; specimens were found in conspicuous

places almost everywhere; they were built up as trophies along the middle of the nave; they were borrowed by exhibitors in other classes to decorate their enclosures; and they were to be seen in some of the buildings besides the Main Hall. Agriculture, architecture, chemistry, metallurgy, the garden and the drawing-room, the church, the kitchen, and the dinner-table, all call into use the skill of the ubiquitous potter.

Mr. Doulton, of Lambeth, England, exhibited a large collection of the peculiar stone-ware to which he has given his name, and the terra-cotta ware which has a world-wide reputation. It comprised articles for practical use as well as ornamentation. There were, for instance, immense stone-ware utensils for manufacturing purposes—heavy jars, crucibles, stills, smelting-pots, tankards, vases, platters, drinking-cups, etc. It is an interesting fact that most of these articles are designed and ornamented by women, principally the wives and daughters of artisans, who evince great taste, artistic skill, and invention in this department of design. The wonderful variety of the different shapes into which this Doulton-ware is manufactured is rendered still more so by the fact that no one form is ever repeated. It is the pride of the makers that they have never willingly duplicated a single article, or knowingly repeated the same form.

The peculiar charm of these wares consists in their beautiful colors—blue, gold, green and brown—that were so harmoniously blended.

The Doulton-ware is made out of a very common stout clay, capable of resisting an excessively high temperature. The modeler draws his shapes upon paper, and these are handed over to the decorators, who consider in their minds what form of decorations will

best conform with them. Having determined upon this, the potter is next consulted, and he throws upon the wheel the desired shape. Then the decorator seizes it while still wet, and proceeds to ornament it in three different ways. The highest style of ornamentation is the *sgrafiate*, or "etched." Besides this kind there is the bossed and dotted, and there is the carved. In the first order the decorator takes the wet clay and with an etching tool draws freely on the surface groups of animals in every variety of posture, storks flying or wading, trees stretching their umbrageous branches over pleasant meadows and running brooks, deer lying down among high ferns, lambs suckling their mothers, cats watching with eager eyes the heedless hops of unwary sparrows, and in fine every variety of incident of a picturesque and pastoral character.

There was a vase nearly two feet high, which was decorated in this style, the effects produced being really those of an excellent landscape. To obtain this result blue coloring is rubbed into the lines made by the graving tool, the throat and base of the vase are decorated by bosses and dots, and by wreaths of natural leaves treated freely as the Greeks did the acanthus, and then the vase is put into the kiln to be baked in company with hundreds of others. When they have arrived at a white heat salt is thrown down the chimney and in the fire-holes, producing these changes. The chlorine escapes as gas, and the sodium is precipitated as in antediluvian times in fine showers upon the substances below, where, falling upon the clay at a white heat, the metal unites with the molecules on the surface and converts them into a vitreous substance. The sodium does not form the glaze, but the surface clay does through the action of the sodium on it. The re-

sult is, a glaze is obtained which cannot craze or crack, and which is substantially identical with the body of the thing. The etching now shows almost like black upon white, or, to be more precise, the brown of the body bears just the same relation to the deep blue of the etched lines as white to black, the consequence being that one gets the effect of a genuine etching.

The second method of decorating is by bosses, dots, disks, and etched outlines of floral forms and wreaths of leaves. Here it is not the lines that are filled with color, but the whole mass within the lines. The groundwork or body is also colored with various substances, and bosses are applied round collar bands and bases, and in the nodes of leafy garlands. The coloring was the attractive feature in this order, and won to the highest admiration artistic observers. The fire and the salt glazing are elements whose importance cannot be thoroughly estimated, nor can the designer know with any certainty exactly how his children will issue from the kiln. The sulphur vapors of the coal fuel have a wicked way of uniting with the cobalt and ultramarine, changing blues to the most exquisite greens and browns. Then the sodium has a queer habit of giving what are called cloudings to large spaces of color, producing to a certain extent the effect that is noticeable in the folds of velvet dresses. Sometimes the frightful heat eats away the coloring, save a fine film through which the natural color of the clay shows, but with a deepened richer glow. This often happens on the edges of etched floral decoration, giving a beauty of which the decorator never dreamed. In fact, one may say with truth that the caprices of the elements that defy calculation are beneficial nine times out of ten. And this is especially true of the applied

bosses and dots whose effectiveness in decoration is much enhanced by accidents that cannot be foreseen.

The third kind of decoration is carving, in which Frank Butler and George Tinworth showed some most wonderful work. The latter has great power as a modeler, and frequently introduces into his vases human forms in high relief. The majority of these were Scriptural, mostly from the life of the Saviour, and some of the groups contained numerous figures, all of them very spirited and many of them full of an expression which is worthy of the term, inspired. There was a jug about two feet high in this exhibition which contained various scenes of the life of Christ, told with so much energy, earnestness, and religious feeling that it could not fail to interest and impress the spectator in a high degree.

The applicability of the Doulton-ware to fire-places was illustrated by a construction showing the whole side of a room. A mantel-piece and mirror-frame of buff terra-cotta, with hand-painted tiles in the panels, reached up to the ceiling; the sides and back of the fire-place were of colored and figured encaustic tiles. The hearth was formed of tiles, and a parapet of terra-cotta around it served as a fender. A beautiful little clock, in brown and indigo ware, and a few vases and other ornaments on the mantel-piece, completed the structure, and the whole produced a very pleasing effect. There was also a mantel-piece in dark oak, the wood-work being, in fact, simply a large frame for the exhibition of a set of Shakspearian tile paintings.

In the principal nave of the Main Building there was a temple of terra-cotta columns and arches, devoted to the exhibition of Doulton-ware, and near this temple stood a terra-cotta pulpit of great size, red and buff,

with indigo ornamentation. The back consisted of red terra-cotta alcoves, against which were relieved groups of whitish figures. There was a font to match the pulpit, and on this were some unique products of the Doulton potteries. These were small panels, about four inches wide and twelve inches long, deep sunk, and showing in high relief a series of Scriptural groups with appropriate legends. There were ten or twelve figures in each panel, and the attitudes and expression in many instances were wonderfully good, considering the unhandy material in which the idea had to be expressed.

Of the finer kinds of porcelain the rarest collection was contained in the enclosed court of A. B. Daniell & Son. In the centre of their principal show-case stood the

"Prometheus Vase,"

A noble piece of work about four feet high, of a rich turquoise blue body. The figures of Prometheus and the vulture were on the cover, but perhaps the most remarkable parts of the vase were the handles, which consisted of chained figures in scale armor; the armor imitated so exactly the appearance of metal that one could hardly believe it to be, as it was, entirely of china. A still more interesting study was afforded by a variety of vases of pure Greek shape, modeled from specimens in the British Museum, and decorated by the *pâte sur pâte* process by L. Solon, formerly of Sèvres. There were two pairs of especial magnificence, the body a rich dark bronze color, the chief decoration a series of exquisite figures, on one pair emblematic of the elements Fire and Water, on the other representing a race between the three Graces, with Cupid cheering them on. The delicately molded forms, seen through the

flying and half-transparent drapery, were instinct with life and movement. There were smaller but hardly less beautiful vases enriched by the same artist, and also plates with medallion centres bearing *pâte sur pâte* figures. The peculiarity of the process was that the figures are painted upon the body of the article with liquid china, which after firing becomes either semi-transparent or opaque, according to the thickness with which it is laid on. In its wet state, however, it is uniformly opaque, and the nicest touch and judgment are necessary to regulate the application.

Furniture.

The display of furniture was not less interesting than that of ceramics. Several manufacturers had arranged their space so as to give a representation of a suite of rooms furnished and decorated in different patterns. James Shoolbred & Co., London, presented for instance in this way the Jacobean, Queen Anne, and Anglo-Indian styles in five or six complete little rooms with carpets and wall hangings. There was a dining-room set of carved oak, with a superb sideboard, and another of carved mahogany of a beautiful warm color. Wright & Mansfield, of London, who took the only gold medal for furniture awarded to any English manufacturer at the last Paris Exhibition, had several rooms with cabinet furniture in the old English style of the eighteenth century—an inlaid mahogany sideboard, a mahogany and satinwood secretaire, and a writing-table of the same material, a beautiful satinwood wardrobe, side-tables of satinwood, and the soft gray harewood, and a satinwood cabinet richly inlaid. Mahogany has been driven out of fashion in this country, but those who visited the British section at Philadelphia

must have seen what an exquisite wood it is—even while new—in the hands of an artisan who understands its character. Cooper & Holt, of London, showed a grand sideboard of dark oak, elaborately carved. Wm. Scott Morton & Co., of Edinburgh, had a sideboard in stained wainscot with panels of embossed leather. Cox & Sons, London, exhibited a carved oak sideboard, a carved oak chair of the "Glastonbury form," small hanging cabinet of many beautiful styles, and a wall-cabinet of oak, with brass mountings and highly elaborated panels of real bronze. The feature of their show, however, was a huge chimney-piece, forming the greater part of the end of a room. It should have been described rather with the ceramics than the furniture. The fire-place was of stone and marble, inlaid with tiles painted by hand in white and red, with birds, foliage, and four figure pieces, representing the Song, the Tale, the Jest, and the Book, fit amusements for the fireside. The framework was of carved oak, with mirrors and three painted panels, the subjects being Maternal Affection, Conjugal Affection, and Filial Affection. Many of the cabinets which abounded in this region of the building, and most of the sideboards also, were set off adroitly with specimens of porcelain, Doulton-ware, or terra-cotta, in the shape of plaques, vases, and ornamental tiles. Ebony or ebonized wood was extensively used, and some colored woods were employed which we do not often see. A combination of oak with polished ash-root made a splendid contrast. Harry Herns, of Exeter, sent a sturdy oak chest made out of beams nearly 600 years old from the choir of Salisbury Cathedral. It was about five feet long and four feet high, with a ridge-roof lid and enormous iron mountings.

For the great majority of persons, the central point where the music pavilion and the famous sounding board stood, in the middle of the main pavilion, was the chief attraction. And the great object of interest there was (after the music, perhaps) the great displays of

Silverware,

Made just at that point by England and by America. On the one side was Elkington, on the other side the Gorham Manufacturing Company; of the latter we shall speak in their proper place.

The silverware of Great Britain at the Centennial Exhibition was represented by a single firm, that of the Elkingtons, but by them it was nobly and fitly represented, and in their exhibit we had the highest expression to which fine-art metal-work has attained in this nineteenth century.

"The Helicon Vase"

Was certainly the most striking object in the Elkington display. This magnificent work of art was the result of six years' labor on the part of the well-known metal sculptor, Morel Ladeuil, and was made for the Vienna Exhibition.

The subject of the composition was the "Triumph of Music and Poetry," and was in the Italian renaissance style of art. It may be described as an elongated plateau, enriched with sculptured plaques or panels, and supporting in its centre, between two seated figures, a tall and stately vase, ornamented in the repoussé style.

On the left of the Helicon Vase was a plate or circular plaque twenty inches in diameter, representing a "Pompeian Lady at her Toilet," and was specially made

by the artist of the Helicon Vase for the Philadelphia Exhibition.

The scene showed a court in the women's apartment of a Pompeian house; the court is surrounded by marble pillars round which the most luxuriant creeping plants mingle gracefully with the sculptured ornaments of their capitals, and we behold a beautiful maiden, evidently the daughter of a wealthy Pompeian gentleman, who can deny her no luxury either for her toilet or personal adornment. She is discovered reclining semi-draped on a couch, having just quitted her morning bath. Her handmaidens—female slaves, but scarcely less beautiful than herself—are grouped around her, performing various offices of the toilet; one with great nicety is poising an elegant gold circlet round her brow and entwining her hair negligently about it, having just placed round her neck a necklace composed of beads of the shape of the favorite Greek amphoræ; another, of the Nubian type, is just attaching her sandals; while a third holds the virgin robe which is to hide from the outside world the charms at present disclosed.

The lady herself holds in her hands a polished metal mirror, in which she is smilingly surveying the progress made by her handmaidens. The scene is completed by the elegant works of art disseminated about the apartment, mingled with vases containing rare plants and delicate flowers. The work was of the greatest delicacy and of the highest artistic merit.

To the right of the Helicon Vase was the renaissance mirror, from the designs of Mr. A. Willms, the celebrated artist, to whom was intrusted the honorable but responsible duties of director of Messrs. Elkingtons' art studios. Under his guidance were produced the designs and models of the beautiful dessert services, the

repoussé plaques, and the enamels of which the Elkington court was full. The small vase in front of the mirror was an illustration of an entirely new method of decorating silver. It was inlaid with copper ornamentation. Beautiful examples of this we had already seen in Tiffany & Co.'s display; but the peculiarity in the new method invented by Elkington & Co. was, that the copper was in high *relief above the surface* of the silver, thus forming a very beautiful effect by showing a dark bas-relief on a light oxidized ground. Another fine example of this process was also shown by Elkingtons at their case. It was a Grecian-shaped vase in steel, with raised ornaments in silver and copper.

Among this collection was a larger shield in repoussé iron, wrought in the style of the armor of the Middle Ages. It represented the devastators of the world—War, Famine, Pestilence, and Fire, embodied in the shape of allegorical figures, while in the centre was the dread head of the Medusa. The design of this shield, like all the other articles composing this group, was due to Mr. Willms, who has shown that he can deal with the terrible and bold as well as with the graceful and tender. An example of the latter, and contrasting well with the shield, was a small plaque representing an Arcadian shepherd extracting a thorn from the foot of a shepherdess. The treatment of this little pastoral poem in metal was exquisitely soft and beautiful. The rock frowning in the foreground was effectively relieved by the quivering foliage in the background, which represented a forest scene, faintly fading away to a horizon of distant hills.

Another repoussé plaque to the right represented a classical scene—Penelope sleeping under the care of Pallas, whose statue stands solemnly in the background,

while a Cupid undoes the web which the wife of Ulysses has woven during the day. Above the latter plate was a square inkstand produced by the niello process, the sharpness and delicacy of which were equal to any of the celebrated "Toula" ware exhibited in the Russian section. A fruit stand in the style of Benvenuto Cellini, a classical tankard, and a small epitome of war, in the shape of two belligerent cocks, completed the metal-works in this group, leaving us only the enamels to deal with, which, though also metal-work, were so gorgeous in colors and realistic in design as to approach ceramic productions. In the tall cylinders and vases, with the smaller flower stands and vide-poches, the natural colors of tropical birds and foliage were obtained similar to the ceramic productions, but with this advantage over the latter, that they are imperishable. Examples of this attractive ware were shown in the Chinese and Japanese courts; but the Elkington enamels, besides being more pleasing to the eye, were decidedly superior in manipulation.

In the exhibit of Carriages, in the building known as the "Main Annex," the lead in the lighter styles was taken by the United States, but, in the heavier and more convenient household carriage, or travelling coach, England took the palm. They had several different kinds of what they call "Derby and Epsom" coaches, and when one viewed them thoroughly, he was forced to confess that they were models of convenience and comfort, capable of holding from ten to fifteen persons inside and half as many more on top, having an arrangement front and rear that would allow the transportation of nearly a week's supply of necessaries, including wine, ice, etc. We could not help letting our mind run back to the earlier days of travelling, and in

imagination we saw the coach before us, hurrying along, drawn by "four stalwart grays," and just as they pass out of view in the distance we fancied we could hear the silvery note of the old "post-horn." One passed from one extreme to the other when he saw the comfort of travelling in summer in England, as shown by the before described coach, and was confronted by almost identically the same thing in the exhibit of sleighs used throughout the Canadas. We must concede the superiority in the manufacture of this article to the Dominion, for, judging from their exhibits, they undoubtedly understand how to provide for the "creature comforts" of mankind. From the small "cutter," for two only, to the large family sleigh, all were arranged so that if the occupants were caught in a storm they could have as good shelter as if they were travelling in the summer coach. By raising the seats out and pulling up the sides, they had everything prepared to put the roof on, and that they do by taking from a compartment under the driver's seat a neat rubber "roof." They all carried small charcoal stoves with them, and were thus enabled to make the heat suit the temperature of summer.

CHAPTER XIII.

ENGLISH PICTURES IN ART GALLERY, AND EXHIBITS OF BRITISH COLONIES.

THE Art Department in the late Centennial Exhibition gave us many excellent specimens from most of the countries represented, and perhaps the characteristic features of English Art of this nineteenth century were more prominently and favorably represented than those of any other nation. The works of the different artists were so carefully selected, and so compactly arranged, that the stamp of nationality was everywhere apparent.

The Central Gallery of Memorial Hall was occupied conjointly by the United States, Great Britain, France, Germany, and Italy. As we have said, the selection of works had evidently been made with the greatest care and intelligence. Some of the artists gave us their best achievements, and hardly one was represented by an inferior specimen. Few distinguished names, from Reynolds, West and Fuseli, down to our own day, were wanting.

Among the works which most particularly attracted our notice, and which deserve mention on account of the place which the artists held in their day, are the following:

The large Michael-Angelesque figure of "Thor Battering the Serpent of Misgard," by the late Henry Fuseli, R. A., a Diploma picture, lent by the Royal Academy, London.

Occupying the centre of the rotunda, in the same building, was a

Colossal Group of America,

Being a reproduction in terra-cotta from the original marble upon the Albert Memorial in London, from the Lambeth potteries of Messrs. Henry Doulton & Co.

The life-size figure of a boy teaching a dog to do some tricks (in Carrara marble), entitled "Il Guiocatore de Castelletto," by John Adams Acton, was an exceedingly clever work. The modelling of the figure was very refined, and the action skilfully expressed.

North of the Memorial Hall stood the Art Annex, in which the display of art consisted of a very interesting and valuable collection of statues in marble and bronze, oil paintings, water-colors, architectural drawings, etchings, lithographs, photographs, mosaic and pietra-dura, terra-cottas, etc.

Canada had a room to herself, on the west side. She sent 156 pictures in oil and water-colors, a few of which are by old painters, notably Vandyck and Sir Peter Lely, while a number of others appeared to be copies from English subjects. Those illustrative of Canadian scenery and life were of course the most valuable contributions. Among the best were several by Verner, and a few misty and golden autumn landscapes.

The British colonies rivaled the mother country in many respects, and the display made by some of them was really wonderful.

Canada made no exhibit whatever at the Vienna Exposition, the Dominion Government not having been officially invited to participate in the Exhibition sufficiently early for an appropriation to be made. Here, however, the resources, products and industry of

Canada formed a leading feature, and were very imposing in character.

A handsome arch, ornamented with the national colors and flags, and bearing the inscription,

Dominion of Canada,

Marked the entrance to the varied and creditable exhibit.

The main features of the Canadian display were

Furs and Educational Exhibits.

The principal industries of the Dominion—agriculture and the lumber trade—were represented in Agricultural Hall. The country possesses enormous mineral wealth, but it is only partly developed. The mineral display, however, was third in prominence, and highly interesting. In the manufacture of furs Canada claims to lead the rest of the world, and for most of the material required for the best articles of this kind she is independent of all other countries. Among the principal articles here exhibited was a gent's coat of Canadian otter, trimmed with sea otter—price, $350. The sea otter is of a grayish brown, and much finer and more valuable than the other, which is of a dark brown. There was also a gent's coat of South Sea seal, dyed black—price, $175. The most valuable seal is the Shetland, the South Sea ranking second. In their natural state both are of an ugly, dingy yellow, which prevents the development of the exquisite gloss of which they are susceptible.

The principal minerals of the country are iron, coal and gold. She produces yearly about 800,000 tons of bituminous coal; $2,430,000 worth of gold, and 59,000 tons of iron, of which 47,000 tons are shipped to the United States.

The bulk of all the gold mined in British Columbia from 1858 to 1875, inclusive, was represented by a gilded pyramid nine feet two inches in height and five feet eight and a half inches square at the base. The value of this gold was $38,766,970. The pyramid was surmounted by an octagonal block, measuring two feet on each side, and representing the quantity mined in 1875.

Saddlery, leather, and marbleized slate hearths and mantels were specialties among the manufactured exhibits. These hearths and mantels, while having an appearance and durability almost equal to that of marble, were twice or three times as cheap. The quality of the slate was shown by a piece seven inches wide and only three-eighths of an inch thick, lying flat on two supports that were two feet nine inches apart, and bearing on its centre a cubical block of granite weighing 172 pounds.

A solid and somewhat rectangular block of almost pure plumbago, weighing 4,870 pounds, was a specimen from the mines near Ottawa. A fac-simile of the old Liberty Bell, made of fine, grayish Dorchester (N. B.) sandstone, showed Canada's respect for the Declaration of Independence. This stone is of carboniferous formation, and, when freshly mined, is easily carved; but, upon long exposure to air, becomes adamantine in nature.

Object-teaching, which figured so prominently in the Canadian educational system, was extensively represented, the display comprising a complete gradation of specimens, from a paste-board model illustrating the interior of a mine, up to cards giving descriptions of trees or plants to which the natural leaves and branches attached to them belong, and still higher to anatomical

models and specimens showing the results of chemical action. The exhibit of philosophical, chemical, and chronometric apparatus and of musical and mathematical instruments was very thorough and extensive. A very important part of this exhibit was a model of a steam-engine divided into sections longitudinally, so that a student could see at a glance the entire working of the machinery, from the generation of the steam to its final escape. Another model of a high-pressure engine was even more interesting, as it showed all the appliances for condensing.

The exhibits of

New South Wales,

A continent that was discovered a few years before the commencement of our Revolution, and received its first white settler about the time our nation elected its first President, were of special interest.

New South Wales, a colony that originally composed about two-thirds of the entire area of Australia, is about 9,000 miles due southeast from Philadelphia. The colony now comprises 350,000 square miles of territory, with a population of over 600,000. There are over 10,000 miles of common roads, 8,000 miles of telegraph line, and 450 miles of railway in operation. There are five harbors, one of which, Port Jackson, is one of the best in the world. The soil is varied, and the productions, both agricultural and stock, as shown in their exhibit, are extremely good.

The first objects that attracted our attention were some specimens of the cereals, the wheat and corn being very fine. This wheat, which was large and plump, will average under good conditions twenty-five bushels per acre, in new cleared ground with the stumps still in.

There were four enclosed spaces mainly devoted to

Native Wools and Woollens,

Which exhibited many varieties of the wool grown in the colony, showing it in the raw state and after being washed and bleached. Some specimens from the Angora goat were very fine. There were many different cloths shown, principally of tweeds, with some shawls of creditable design and finish.

Right in the centre was

A Gilded Trophy

Representing the amount of gold that has been dug within the limits of New South Wales since its discovery in 1851 to 1874. It was a fac-simile of a mass of gold representing the total product of $8{,}205{,}232_{10}$ ounces, and valued at over $150,000,000. It stood on a high double-stepped platform, and was a rectangular prism with square section six feet six inches to a side and eleven feet three inches high. At its foot were piles of ingots of tin and copper. Alongside of this great trophy was a case with many specimens of gold as taken from the washings, and also small nuggets and pieces of rich auriferous quartz.

There was

A Mineral Trophy,

The contribution of the Colonial Department of Mining. The central column, eighteen feet high, represented the four principal seams of coal of New South Wales. Four large buttresses at right angles to each other were built of specimens of coal from all the different collieries in operation. The length of side of the base of this trophy was about twenty feet.

The North Wing

Of the exhibit was principally devoted to the different manufactures of wool and leather and the horticultural resources. There was also a large pyramidal stand of the many different kinds of wine made in the colony. As the soil and climate are admirably adapted to wine culture, this has become one of the leading industries. There were many beautiful specimens of leather shown here, some of which, tanned from kangaroo skins, was remarkably soft and fine, and the sole-leather was of unusual size and fine grained.

The Ornithological Collection,

Although not large, was very complete, and embraced several hundred specimens, some of which were remarkable for their beauty of form and plumage, and others for their oddity. Amongst this latter was a bird called

The "Jackass," or the "Settlers' Clock,"

But known in ornithology as the Dacelo gigantea. It was generally received as a fact that the hyena was the only animal except man that laughs. But the Dacelo always salutes the rising sun with a sonorous guffaw, as if he considered it an amazing good joke. Another curious bird was the "Herodias," that looked like a great white crane. From the middle of its back sprung a few long skeleton feathers that were capable of being erected by the bird. The entire exhibit, which was very large and complete, showed that New South Wales can maintain her claim to be the oldest and the richest of the Australian colonies. It is a new country, with amazing resources.

Queensland,

The most northern of the Australian group of British colonies, was very richly represented at the Centennial, especially so in regard to specimens of the gold, tin, copper, and coal which abound in that part of the world. The gold yield of Queensland is very great, and to give the visitor an idea of its importance, an obelisk was placed in the court representing the product of eight years. It was three feet six inches square at the base, twenty feet three inches high, and measured fifteen inches at the apex. If it had been solid, as some wonder-stricken visitors imagined, it would have weighed over sixty-five tons, and its value would have been more than $35,000,000. But it was only a gilded show.

One of the most interesting portions of the Queensland court was the display of wool, in cases and bales. The wool was from three and a half to four inches long, and was remarkable for strength and fineness. It was the product of the Australian merino, a distinct and excellent breed. One fleece weighed over twelve pounds, and as there are 7,000,000 sheep in Queensland and 40,000,000 in Australia, wool has become one of the principal exports of that part of the world.

There was also a fine show of hemp and cotton, although the cost of production prevents the latter from becoming an important industry of the colony. In a small case on the south side of the court silk cocoons of Japanese, European, and Spanish varieties were shown, and the raw silk which they produce. The climate has been found favorable to the silk-worm, and some beautiful scarfs were shown, manufactured from the silk for home use merely, it not having yet

risen to the dignity of a national industry. At the north side, near the west entrance to the court, were specimens of metamorphic, volcanic, and Devonian rocks, quartz, ores, slates, and bows and arrows used by the tribes of aborigines along the northern coast.

At the western entrance to the court there was a trophy consisting of sections of timber, polished on sides and ends, with the bark on, arranged in tiers. The botanical name was upon each, and the common name, with a detailed description of the quality of the wood and its uses.

There was also a fine display of agricultural products —wheat, barley, oats, corn, etc.; and on the walls of the court outside were hung illustrated maps of the colony, with the natural divisions, and on the inside were pictures (photographs) painted in oil of scenery in the mining districts, in the cotton fields, sugar plantations, and grazing plains. Tobacco-growing and its manufacture were also shown.

Australia is noted for its curious animals, specimens of which were shown in the Queensland court. Among these were shown the skull and tusk of the dugong, a huge marine animal found on the coral reefs. It is of the seal order, but of immense size, some specimens weighing not less than a ton. The skull shown was seventeen inches long, not measuring the tusks, and eleven inches across.

Tasmania.

From Tasmania there was much to interest, prominent among the exhibits being some curious photographs of aboriginal women, one of them being the sole survivor of the Tasmanian aborigines. There was also a companion portrait of "Billy Lanney," the last Tasmanian

aboriginal man. There were also shown some pretty tables painted in groups of native ferns, wreaths of flowers, etc., the handiwork of some Hobarttown ladies.

Australia.

Among the exhibits from Australia was a wonderful fac-simile, in plaster of Paris and gilding, which represented a nugget from the Melbourne diggings.

There was a fine display of rocks, minerals and fossils. Ceramics and potteries were also creditably represented; New Zealand flax in its natural state, with materials made from it; cocoons and silk in the hanks; also what is called Victoria silk, worked on Brussels net.

The native birds and animals, stuffed, formed an attractive feature.

The Emu and Cassowary,

Resembling somewhat the African ostrich, were both shown.

A pretty fancy in silver and gold work was exhibited as a specimen of the advancement of the colonists in mechanical art. A real emu egg was mounted in silver, and occupied the centre. A small golden lizard was crawling upon it. Around were grouped in gold and silver the native ferns of immense size (comparatively here of course), kangaroos, emus, and many native plants and vines. The chasing was very delicate, and the contrasts of the polished and frosted silver, the gold and the dark-green of the egg in the centre, made it an exceedingly artistic ornament.

The Bahama Islands.

The articles on exhibition from the Bahama Islands consisted of specimens of manufactured woods, sponges,

shells and shell-work in epergnes, crosses, wreaths, fruit-baskets, and sets of jewelry, articles made out of palmetto leaf, and other staple products, fairly representing the resources and manufactures of these islands.

The Bermudas.

Among the articles exhibited from the Bermudas was the finest display of corals in their natural state that were to be seen in the Main Building, their size and symmetry of form being unsurpassed. There was a beautiful stalagmite taken from the floor of a submerged cave, which latter was two and a-half feet below low-water mark. This stalagmite was in the form of a pillar. Just by it was a piece of a stalactite, taken from the top of the same cave, when submerged below low-water mark.

A large display of native woods was the principal exhibit from

Trinidad,

Not less than 235 varieties having been shown.

Spices, wood fibres, sugar, molasses, cassada, starch, etc., comprised the display.

Jamaica

Made a very fine display of her products, considering her size and population. Of tobacco, in leaf, cigars and cigarettes, there was a fine exhibit by Soutar & Co., and also by the Government Botanic Gardens in Gordontown, who also showed different vegetable products of the island. The articles may be briefly enumerated as follows: articles made from the lace bark, ornaments from the dagger plant, sugar, perfumes, furniture, woods, dye-woods, specimens of native

coffee, liqueurs, rum, fibres, preserved fruits, cocoa, spices, gums and other lesser articles, which all went to make up a very complete and attractive exhibit.

In the Woman's Pavilion there were exhibited specimens of embroidery and other kinds of handiwork, the most prominent among which were objects in needlework exhibited by the

Royal School of Art,

Needlework executed by Her Royal Highness the Princess Louise, Marchioness of Lorne and her sisters; and also some etchings by Queen Victoria. These last were mostly copies of animals from Landseer, but there were among the number several original etchings.

CHAPTER XIV.

THE GERMAN EXHIBITS.

THE exhibit of Germany in all the leading branches of industry, of scientific discovery, as well as fine arts, was very large and complete in nearly every department of the Exhibition.

Great as was the interest which Germany took in the Centennial, various circumstances prevented her from making as full a display of her arts and industries as might have been wished. The rapid succession of World's Fairs, and the simultaneous occurrence of other exhibitions, especially at London, Brussels, and Munich, all had an unfavorable influence on Germany's participation in our Exhibition. But on the whole the display she made was, we consider, very creditable indeed, as will be seen from the following description of some of the more striking and valuable of her exhibits.

The space occupied by Germany was, in the Main Building, 27,705 square feet; in Machinery Hall, 11,219 square feet; in Agricultural Hall, 4,878 square feet; in the Art Gallery, about 8,500 square feet of wall space; and in Photographic Hall, about 1,500 square feet of wall space. There were in all these buildings about 1,000 exhibitors, many of whom joined together in collective exhibits of special industries.

The Royal Porcelain Manufactory of Berlin made a very handsome exhibition in the centre of the Main Building—a very prominent feature in the German

Department, immediately opposite the Music Stand, near the main arch of the building. The decorations were of the most interesting character, and the forms copied from the most classical models. Especial attention was called to the fact that there is great difficulty in manufacturing articles of china over a certain size. Many of the vases were of such dimensions as to be a great triumph of the potter's art. This was especially the case with the immense Victoria vase, which stood in the centre of the exhibits. This was decorated with the picture "Aurora," after Guido Reni. Another very large vase stood at the front of the collection, and revolved on its pedestal, so that the whole of the beautiful painting could be seen. It was called the "Germania vase," and was decorated with two beautiful pictures—"Germania cultivating the Arts and Sciences," and "Borussia, the Shield and Protectress of the Empire," after Heyden. A large vase called the "Crater vase" had a panorama picture, "Triumphal Procession of King Wine," after Schrodter. A large vase in the Persian style, both in form and decorations, had a painting, "The Primeval Forest," after Bellermann. Three vases were in the Japanese style, and one large vase was in imitation of the Chinese style.

There were a considerable number of souvenirs of the Exhibition in the shape of decorated plates, which were very rich in coloring, and which had a medallion in the centre containing views in Vienna and other cities of the empire. The rim and a portion of the centre was of a beautiful dark blue color, with the decorations of gold. There were several table services, baskets for fruit or cake, tea and coffee services, punch bowls and tankards of various patterns, antique, renaissance, and rococo, or florid and fantastic styles.

In the rear of the case containing the above-mentioned ware was a quantity of porcelain belonging to the same collection, consisting of jugs, brown-glazed, painted with figures and ornamentation of blue under glaze. Also imitations of majolica ware, among which was a basin or wine-cooler, oval, with figures in relief. There were also articles in white biscuit, or ware that had undergone the first baking before it was subjected to the process of glazing. There were also apparatus, of every description, for chemists and apothecaries' use, such as evaporating basins, crucibles, stew-pans, retorts, measures, jars, funnels, mortars, etc.

Bronzes.

Of bronzes a very beautiful display was made by Count Stolberg-Wernigerode's works, at Ilsenburg, of bronze cast reproductions of works of art, especially those of Benvenuto Cellini.

These consisted of helmets, shields, sword-hilts, pitchers, urns and plates with figures in bas-relief. The casting was remarkable for its perfection in details. One plate was left just as it was taken from the sand, with much of the moulding sand still clinging to it. The pieces were rubbed smooth and coated with bronze powder; they closely resembled the best bronzes and were afforded at a very small cost. Among the pieces on exhibition were an armor-piece of Henry II., of France; a basin representing satyrs with Bacchantes; and a basin with the wedding of Amor and Psyche, decorated with jewels.

On a pedestal near the main aisle, among the exhibits made by Conrad Felsing, of Berlin, stood a reproduction in imitation bronze of the monument erected to Frederick the Great, which was very fine,

and closely resembled bronze. Frederick the Great was represented on horseback, while about the four sides of the pedestal were figures mounted and on foot, the scenes being emblematic of the achievements of the hero, both in war and in the arts of peace.

Busts of the Emperor, the Crown Prince, Bismarck, and Humboldt, met the eye at every turn.

A Bavarian joint exhibition of

Metal Foils and Bronze Powder

was also very interesting. The former are to the greatest part exported to East Asia, America, Italy, Russia and the Orient, while bronze powders are mostly consumed at home.

The leonic goods are articles of very fine rolled, and gold or silver plated, or colored, copper wire. These goods are used mostly for military equipment, and the bronze powders in lithography.

One of the handsomest ornaments in this department was the pavilion for the display of

Ivory,

Being unsurpassed for symmetry of form and for the taste in the disposal of the articles therein exhibited. It was constructed entirely of ebony, and was very ornamental.

A large square case with glass sides stood in the centre, from the corners of which other cases projected. On the top was a tall case, in which were exhibited a huge pair of elephant's tusks, surrounding which were smaller tusks, graduated according to length down to very short walrus tusks. In the large case were sections of tusks sawed into lengths suitable for piano keys or knife handles. In the corner cases were bun-

dles of sawed piano keys and billiard balls, combs and brushes, personal ornaments, chessmen, crucifixes, etc. The whole case was placed upon a raised and carpeted platform, and surrounded by a cable cord. At the entrance to the enclosure were the long, straight, spiral horns of the narwhal, or unicorn fish of the northern seas, in some instances five feet long.

Jewelry and Plated Ware.

In jewelry and plated ware there was a great deal to interest, though compared with the Italian and French, the German jewelry was decidedly heavier and of less graceful forms.

There was a great preponderance of fine cameo sets, which had exceptionally fine settings. The principal centres of this manufacture are at Hanau and Pforzheim.

One of the cameos showed three profiles in as many colors, each being cut on a different layer of stone.

The art of working agate into jewelry forms a prominent feature in German manufacture. At first there were beautiful agates found at the foot of the Hundsruch, near Oberstein and Idar, but a constant draught upon the mines has exhausted the supply, and in order to meet the demand the raw material is brought from Brazil.

The manufacture is said to employ 190 mills, 1,600 grinders, 270 bores, 700 jewelers, and 300 cutters.

A joint exhibition of cut agates was made by nine exhibitors in a small polygonal case of ebony.

In silver ware there were two sets in imitation of that found at Hildesheim, in embossed silver, which were very beautiful on account of the classic shapes of the articles and the grace of design. One large

salver among these articles represented Minerva sitting upon a sort of dais or throne.

There were some very beautifully painted and enamelled lockets, together with chains and sets of jewelry.

Many fine amethysts were shown, some of the rich violet color so much prized.

Schwarzwald Clocks,

From the great clock which struck the passing hour upon a large bell down to the tiniest plaything of a time-keeper, formed a very attractive display, which was a collective one. The clock industry is centred in the Badish Schwarzwald, where it was started about the end of the seventeenth century.

The works are made either of wood or of metal of various grades of preparation. They are running from a day to several weeks; worked by weight or spring. In striking clocks, the bell or sounding spring is frequently replaced by a small music-work, producing the song of a bird, fanfares, and the like. The size varies from that of a little fancy clock (smaller, often, than a watch) to that of a steeple clock. There is a like variety in the outer completion, which is generally accommodated to the destination of the work (as ship clocks, regulators, etc.), and the taste of the buyers. Due regard is paid to the most various claims. Thus we saw in the exhibition the quite simple cabinet clock, and again the regulator with its fine carvings, or the stand clock, glittering with gold, to meet the wants of a more refined taste, and act at the same time in a decorative manner.

Owing to this variety, enormous quantities of clocks are exported to the most distant countries, the annual production amounting to about 1,800,000 clocks of the

value of nearly $4,500,000, and about 14,000 persons are engaged in clock-making and the trades aiding it. Much of this work is done in the domestic circle, instead of at the factory, no less than thirteen branches of the work being done in this manner.

In no other section in the Exhibition was to be seen so fine and so varied a display of

Musical Instruments

As in the German, which was to be expected, since Germany is the home of classical music, and indeed all kinds of music; for it seems interwoven with all the threads of German life.

The manufacture of musical instruments takes a prominent standing in German industry. Building of pianos is developed above all. The chief seats of this industry are Berlin, Leipsic and Stuttgart. Some very fine instruments were exhibited by J. Bluthner.

German organ building enjoys an equal reputation. It was represented in the Centennial Exhibition only by Walcker & Co., of Ludwigsburg.

It was a church organ in an oaken casing, and built in the Gothic style, and the third in size at the Exhibition. It had two keyboards, forty stops, and 1,098 pipes. The keyboards were so arranged that the player sat with his back to the organ and faced the audience.

The manufacture of stringed instruments takes place in the entire of Germany. It is especially carried on in Mittenwald, Bavaria, in Leipsic, Markneukirchen, Klingenthal in Saxony. The industry of Markneukirchen was represented in the Centennial Exhibition by a joint exhibition of harps, guitars, and all kinds of like instruments.

Brass instruments, flutes, clarionets, and other wind instruments were shown in this joint collection.

As a specialty, the production of mouth harmonicas may be mentioned here, for which the Würtembergian towns of Trossingen and Knittlingen are famous. The productions of this industry were represented by the joint exhibition of the towns just mentioned.

The most important display made by Germany, representing, as it did, a great element of wealth in that country, was that of her

Chemical Manufactures.

A joint exhibition was made by nineteen exhibitors of technical-chemical and pharmaceutical-chemical substances and fertilizing agents. These were situated near the aisle running through the transept of the building, and were tastefully arranged in several cases. One of the most important of these products were the potashes.

Oxalic acid is now also manufactured in many places in Germany. Among the pharmaceutical preparations the alkaloids constitute the most important articles of exportation. The consumption of chloral-hydrate seems to have reached its zenith, though large quantities are still exported to England and America. Tannic acid, bromide and iodide of potassium are exported to some extent. A specifically German branch of industry consists in the production of chemical preparations, important and interesting in a scientific point of view. Among these products may be mentioned salycic acid and vanilline. The former is an organic acid, usually obtained from wintergreen oil, which is now prepared from phenole, and so cheaply that it has become an object of lively trade. The aroma of vanilla, which

until the past year was the exclusive monopoly of southern climates, is now obtained from the pine trees and other conifers of the German forests. In the case of Dr. Wilhelm Haarmann were several tall bottles containing this new extract, which was in the form of powder, and also dissolved in alcohol. This collective exhibit contained chemicals for bleaching, dyeing, etc.

Among the new preparations since the Vienna Exhibition are the hydrochlorate, sulphate and salicylate of phenylaquinine, cinchonicine oxalate, phenylcinchonidine sulphate, quinicine oxalate, sentoninic acid, cotoine, echicerine, chinamine, echitine and echiteine.

Under the head of

Essences and Perfumes,

There were fifteen exhibitors of essential oils, extracts, perfumes, etc., among whom were prominent the descendants of the famous

Johann Maria Farini,

The inventor of Eau de Cologne in 1709. They made a very handsome display of the perfume in a pyramidal structure, containing packages of every size and shape. They claim to possess and be the only possessor of the original secret of its composition, and that all others are only imitations.

The display of

Bavarian Toys

Was very large, and delighted the hearts and the eyes of the little ones who saw it. In the manufacture of children's toys the Germans excel, and here were seen specimens of toys of wood, pasteboard, sheet-iron and tin, in great quantities, and of all imaginable descriptions.

Nuremburg and Fürth are the chief centres of the trade in toys and small goods; the former possessing over a hundred, and the latter over fifty exporting houses, all of which export a million of dollars' worth a year, half of which comes to the United States alone.

One case contained specimens of

Raw Amber,

Looking for all the world like pieces of rosin, rough and of all shapes. Amber belongs to the earlier strata of the lignite formation, and was of old obtained on the coasts of the Baltic, by fishing and diving, and lately also by regular mining on the downs of the coast district. The specimens were exhibited by Stantien and Becker, of Berlin and Königsberg, who obtain their supplies by means of dredging, diving and mining, employing for the purpose nearly three thousand workmen; the annual joint production amounting to 2000 cwt.

Textile Industry.

The textile industry is one of the most important branches of the German manufactures. Germany manufactures cloth from that of the highest finish, not surpassed by that of England or France, to the most simple. As regards quality, the cloth industry of the Lower Rhine Province has the pre-eminence; especially the towns of Aix-la-Chapelle and Düren. It was fairly represented at the Exhibition by the Rhenish joint exhibition of woollen cloths, arranged in several cases and including billiard cloths, overcoatings, military cloth, satins and figured goods, broadcloth and other fine cloths. Two establishments exhibited wool felts fashioned into shoes, slippers, saddle-cloths, etc. A larger

number of samples of felts were shown, some of which were fully an inch and a half thick.

Next to the manufacture of cloth, that of fabrics for dress or worsted woollen yarn, and that of mixed fabrics are of prominent importance. The yarns used for these stuffs are, for the greatest part, spun in Germany; in part they are imported from France and England.

The Elberfeld manufacturers made a very large joint exhibition of these semi-woollen goods, in which eight exhibitors joined. Especial prominence was given to what was called zanella, or Italian cloth, which is an article made of double cotton warp and fine combed wool. This manufacture has rapidly developed in the last decade, and as many as 5,000 power looms are engaged in its production. Other semi-woollen cloths were exhibited in many colors, which were tastefully draped and arranged in the large case. In the centre they were so arranged as to form the German and American colors. Another case contained coatings in plaids, diagonals and stripes, and in a third was a collective display of cotton mixed goods, made by twenty-five exhibitors from the Gladbach district, which were of a very fine quality.

German silk goods manufacture has its chief seat in Rhenish Prussia, especially in the district of Crefeld, and forms an important factor in the industrial activity of the country. The market for this manufacture is not only in the inland, but also in England, France, Austria, Russia, and North America. In the district of Crefeld alone there were, in 1872, 33,310 looms in use, with an average business capital of $19,750,000 a year. The most various kinds of fabrics, black and colored dress stuffs from the heaviest faille textiles to

the lightest lining stuffs, figured or striped dress stuffs, church paraments, figured and plain trimming articles in silk and semi-silk, satin, stuffs for cravats and umbrellas, and also one of the most important articles of this industry—black and colored velvets and velvet ribbons—are manufactured there. The progress which this industry has made in the last ten years is best illustrated by figures. In the year 1867 the number of looms in Crefeld was 20,450; the average business capital $11,000,000; in 1872 the number of looms had increased to 33,310, and the business capital to $19,-250,000. Next to Crefeld comes the silk and velvet manufacture of Elberfeld, Viersen, Süchteln, and Mühlheim on the Rhine. The silk and velvet manufactures of the Rhenish provinces were represented at the Exhibition by the firm of Gebhard & Co., of Elberfeld, in a very long case filled with silk goods.

At the end nearest the aisle was the display of silk velvets. These were hung in long folds from the top of the high case, and were arranged with delicate gradations of shade, so as to produce a very beautiful effect.

In another large case Gresshard & Co., of Hilden, exhibited floss silk, spun and woven, printed and smooth foulard taffeta and satin, pocket and neck handkerchiefs in a great variety of colors. Some of the designs and colors were especially adapted to the India trade and were very gaudy. There were two exhibitors who showed cases filled with silk plush for hats.

The total value of the silk production of Germany in 1872 was estimated at $37,900,000. In the better kinds of plain silk goods the goods of Crefeld, the centre of the silk industry, successfully compete with French silks; in velvets and mixed silk goods Crefeld's industry is said to be pre-eminent.

Linen Industry.

The linen industry of Germany is an ancient and a very important one. Only a short time has elapsed since flax spinning by machinery was adopted in Germany, and thereby the possibility of German textiles competing by exactness and price-worthiness with those of other countries brought about. Power looms have now come into use in this branch of industry, also, although hand weaving still continues to hold its ground to great extent. The principal districts of production in this branch are Silesia, Saxony, Westphalia, Bavaria, and Würtemberg. Bielefeld has a highly developed manufacture and ranks first, furnishing especially linen and damasks, and distinguishing itself advantageously by good wares, essentially improved by the great progress in spinning and bleaching. Next on the list comes Silesia with a really grand linen industry, which is carried on not only by power looms, but also by hand weaving. It has also a fine damask industry which finds a ready market in America. The Würtembergian manufacture has taken Ireland's hand weaving for a pattern to go by; the product is beautifully and closely woven, and on an average prepared of the best material. It excites especial interest by a rapid development based on a resolute adoption of all progressive measures in the technical department. The productions of this industry were shown in the Würtembergian joint exhibition of linen goods, and consisted of handkerchiefs, table linen, towels, bed-fustians of satin, twilled and damask goods, shirt fronts, bed-ticking, corsets, collars and cuffs, hosiery, etc.

The German Cotton Industry

Is highly developed, and employs at present about 5,100,000 spindles, which may be reckoned as amounting to eight per cent. of the number of spindles in use in all civilized countries. The chief seats of this industry are the Rhine Province, Westphalia, Saxony, Hanover, Bavaria and Würtemberg; but above all others Alsace, possessing alone no less than 2,100,000 spindles. The importation of raw cotton, which has been worked up in Germany in 1873, amounted to 2,412,700 cwt. The import of foreign textiles amounts to about sixteen per cent. of the whole consumption, and comes chiefly from England, and to a small extent from Switzerland.

The principal exhibit of these manufactures was the joint exhibition of cotton and mixed fabrics of the circuit of Gladbach, which included the goods of many large manufacturers. The most prominent feature was the display of cotton velvets, which was shown in a large case thirty-five or forty feet high, octagonal in shape and filled with every style and hue of cheap velvets and corduroys. Around the sides were boxes with glazed lids, in which were samples of the goods convenient for general inspection. The goods in the cases were hung in folds from the top of the case, and arranged in pleasing combinations of colors.

There were exhibited many novelties in the *passementerie* industry (braids, fringe and trimmings), in which Berlin and Saxony excel. The manufactured goods in metal threads of Nuremberg are most worthy of mention in this line.

Laces and Embroideries

Were displayed by seven exhibitors, one of whom, C. G. Dorfel's Son, showed a lace embroidery frame on which was a partially finished pattern, and a cushion with a partially finished piece of lace, showing the method of making it.

The Hosiery and Glove

Exhibit was also a large one, and included all varieties of bleached and unbleached cotton hose, and merino and heavy wool socks and woollen gloves. Kid gloves and glove leathers were shown by several exhibitors, a very large display being made by J. L. Ranniger & Sons, represented in this country by Harris Brothers, whose reputation for gloves is well established. A. Lehmann and Ellsleader & Urbino also made fine displays of gloves and lambskin leathers. Lambskins are generally used in making fine gloves in Germany, whereas in France kid gloves are used in preference. The manufacture of wool and silk gloves is carried on principally in Saxony.

The carpet industry is well developed in Germany, and her chief exports in this line are to Austria and Russia. Especially to be noted were the imitations of Smyrna carpets, which are produced in the oriental style in very fine qualities and patterns, and possess valuable markets in America, England and France.

There was a very handsome display of these Smyrna carpets by Gevers & Schmidt, of Schmiedeberg, Silesia, who manufacture endless carpets of a breadth up to thirty feet.

In Machinery Hall Germany made a very brilliant display.

First and foremost among her exhibits, of course, was that of Frederick Krupp, of Essen, the famous gun-maker, whose

Monster Cannon

Was the most prominent feature. This was twenty-five and a half feet long, with a calibre of about thirteen and a half inches. The weight of charged steel shell was 1,122 pounds, of chilled iron shell 1,155 pounds, or of a common shell 902 pounds. The charge of prism powder was for either of the first two shells 275 pounds, or for the common shell 242 pounds. The gun was provided with hydraulic buffers to check the recoil and automatic apparatus for running out the gun after the discharge. The projectile was raised to the gun by a movable crane. The gun and carriage weighed eighty-one tons, the gun without the carriage weighing about fifty-seven tons. Another gun on coast carriage was about sixteen and a half feet long, and about nine inch calibre. It throws a shell weighing about 350 pounds. Three field guns with carriages, two mountain guns, the saddles and harness for the smaller mountain gun, and a collection of shot were also exhibited. The other exhibits of Krupp consisted of a collection of ores and raw products, axles, wheels, pistons, piston and coupling rods, flanges, volute and spiral springs, etc.

His establishment at Essen has over 1,100 furnaces of different kinds, 275 coke ovens, 264 smiths' forges, 298 steam boilers, 77 steam hammers of from two to 1,000 hundred weight each, eighteen rolling trains, 294 steam-engines, of from two to 1,000 horse-power each, giving a total of 11,000 horse-power and 1,063 machine tools. 612,000 tons of coal and coke were consumed

in 1875. The works have twenty-three and a half miles of usual gauge railway, with fourteen locomotives and 537 wagons (cars), and eleven miles of small gauge railways, with ten locomotives and 210 cars. The carriage department also includes 214 wagons and eighty horses. The works also have thirty-seven miles of telegraph lines, having thirty-one stations, with forty-five Morse apparatuses, and thirteen stations with inductors for the railway traffic. The firm has organized a chemical laboratory, photographic, lithographic, and printing and book-binding establishments. General supply stores, where provisions, etc., are sold to the workmen for cash at cost prices, are under control of the firm. These stores take in about $67,500 monthly. Under the same head are also classed a hotel, three beer houses, one Seltzer water manufactory, a flour mill, a bakery and slaughter house. 3,277 houses are inhabited by the officers and workmen, and boarding-houses offer board and lodging to 2,500 unmarried workmen. This immense establishment employed in April of this year 10,500 workmen, who have sick and burial funds to which the firm contributes one-half the amount paid by the members, and a fund which provides for the medical treatment of a family for one year for one dollar. Hospitals, schools, etc., are also maintained by the firm.

Besides the great steel works above described, the firm owns and operates four coal and 414 iron ore mines and five smelting works, in which 5,000 workmen are employed, and possesses important concessions in other mines. For the importation of ores from mines the firm possesses four steamers, of 1,700 tons carrying capacity. In the dwellings attached to the mines and smelting works there are living 3,200

individuals. The firm also has proof butts for testing guns and carriages at Essen, and a range near Dulmen, in Westphalia, more than eight and a half miles in length.

In Machinery Hall, the mine proprietors of the Siegerland made an excellent display of

Minerals and Ores,

On a stand opposite the Krupp guns. At each corner of the collection was a bronze figure of a German miner, or of a spiegel iron-worker. Close by this exhibit there was a very fine, imposing pyramid of

Spiegel Iron,

From the mine and smelting companies of the Siegerland, which glistened like silver in some lights.

Chemicals.

Among the chemicals was a beautiful pyramid of ultra-marine, for the manufacture of which Germany is so justly celebrated. A more exquisite tint than that of this pyramid could hardly be imagined. There were shown three tints—blue ultra-marine, which is the most beautiful, green ultra-marine, and violet ultra-marine.

Plate-Glass, Mirrors, etc.

The manufacture of plate-glass, mirrors, etc., was well represented by several firms of Fürth, who had on exhibition some immense plates for store bulks, heavy glass for skylights and screens, and a very large mirror.

The manufacture of glass by casting and blowing does not take place in Fürth, but in the glass works of Thuringia and the Bavarian forest. The plates are

ground and polished in widely scattered establishments, water power being exclusively used. The machinery for this purpose is still rather primitive; improvements, such as the round grinding table, and the new polishing machine, being but slowly adopted. The coating, or foliating it, with an amalgam of tin, or with silver, the framing and finishing, are performed in Fürth only.

One of the most valuable and instructive exhibits in the German section of the Main Building was the display made by the publishers of the

Book Trade, and Graphic Art.

The enclosure stood at the southeast corner of the section, and was arranged so as to make the most of the space for the beautiful display. One hundred and forty-five publishers united in this exhibition. The enclosure was made of black wood with gilded ornaments, and was sixty-four feet long by thirty wide, and twelve feet high. A sloping counter five feet wide surrounded it, and ran also around the interior. It was divided into many sections, in which special classes of books or prints were shown. There were six broad entrances, on the sides of which were shown plain and colored lithographs and engravings.

On the top of the enclosure were busts of Guttenberg, the inventor of printing; Durer, the father of illustration on wood; Sennefelder, the inventor of lithography, and Konig, the inventor of the machine press.

Such publishers as Justus Perthes, F. A. Brockhaus and J. G. Cotta made magnificent displays of their world-renowned publications, the former exhibiting the accurate and minute geographical charts, for which he is so well known, and the last-named house classical and technical publications.

One of the most interesting and curious publications on exhibition was a large work, in two volumes, of "Eber's Papyros," which consisted of fac-similes of the ancient papyrus writings, a number of pages having an interlinear translation in Latin. There was also a book composed of photographic copies of the pages of the first book ever printed, which is dated at Cologne, in 1428, and of which there is but one copy known to be in existence.

The publishing house of Mr. Brockhaus is the largest in the world, and the exhibits from this house were characterized by a very great variety, consisting of books, with and without engravings, wood and metal plate engravings, chromolithographs, maps, and specimens of a variety of bindings. This exhibit was on the western end of the section, and prominent among the books was the very large volume of illustrations accompanying Schlagenlwert's great work, which is four by two and a half feet in size. Among the finer illustrated works were the Schiller, Goethe, Lessing and Shakspeare Galleries, which had beautiful plates.

In wood engraving Germany excels all other nations as regards drawing and execution. The specimens on exhibition were remarkably fine. Some of the best were from the house of Brend'amour, Dusseldorf, which won the medal at Vienna in this department.

In the country of its invention, lithography is employed in various ways, and of late especially in connection with photography, and within the limits of lithography, the perfection of color-printing excites the greatest attention. In chromo-lithographs we do not think Germany can be surpassed. Some of those which adorned this section were truly exquisite. In one case the reproduction of a picture called "The

Young Fortune-Tellers," representing a group of young girls seated upon the grass in the woods, with a pack of cards spread out, reading the future, was placed beside the original, and so accurate in drawing and color was the print, that it was exceedingly difficult to believe that they were not both chromos.

The well-known house of A. W. Faber, of Stein, made a beautiful display of lead pencils, artists' pencils, colored pencils, water-colors, book slates, etc. The reputation of these pencils has for many years given them the precedence in this and other countries, which they still maintain. Schwanhausser, of Nuremburg, had a similar exhibit, and made a very fine show.

There was also shown a photographic album, containing views of the more prominent objects exhibited at the Vienna World's Fair, of 1873, as also models of the apparatus used in the German military hospital service, under

"The Red Cross."

Under this head were stretchers of various designs, ambulances of a large variety, a collection of appliances used in cases of fracture, photographs of field hospitals and several models of barracks and permanent hospitals.

In the Agricultural Hall, the most important and striking feature was the display of

German Wines and Beer.

The importance of this branch of industry may be judged of, when we state that there are 310,000 acres of land in Germany devoted solely to the culture of the vine.

The greatest production is achieved in Alsace and

Lorraine, where 80,000 acres are planted with vine; the most valuable spots in this new province of the German Empire are on the western slope of the Vosges.

The total production in the German Empire, excluding Alsace-Lorraine, amounted to about 53,000,000 gallons in 1870.

The German sparkling wine industry is gaining ground daily. The chief seats of the same are Coblentz, Treves, Creuznach, Mentz, the Rhine Lands with six establishments, Freiburg, Esslingen, Würtzburg.

These sparkling wines were exhibited on a platform which stood on the main aisle, and consisted of a platform about three feet high, from the corners of which rose square towers filled with wine bottles lying upon their sides. The two rear towers were much higher than those in front. On the top of each was an immense champagne bottle ten feet high, and artificial grape-vines, loaded with ripe fruit, trailed all over the place.

The case in which the bottles were shown was a tall ornamental one, and was divided into sections labelled with the names of the sections where the wines were produced. The bottles were of all shapes, each characteristic of some particular brand of wine. The collection consisted largely of what is generally known as Rhine wine, which is the pure juice of the grape without the addition of sugar. Many of these wines are popularly known by the name of the locality where they are grown, as Rudesheim, Moselle, Geisenheim, Johannisberg, Oestrich, Rauenthal, Hockheim, etc.

As might have been expected from the land of Lager, the exhibition of

Hops and Beer

Was large and important.

Bavaria ranks prominently among the hop-producing

countries of the European continent. The culture occupies an area of about 44,500 acres, and the average production amounts to 250,000 cwt. per annum, for a fair harvest.

In Bavaria, beer is produced in nearly 5,000 breweries, the annual production amounting to 336,887,000 gallons, the greatest part of which finds home consumption.

The exhibit of bottled beer was second only to that of wine, and this was very systematically arranged, showing both the product and the materials from which it is produced, and statistical charts and other publications connected with the industry. One of the most attractive displays was made by the Berlin Brewing Company, and was situated near the main aisle. Bavarian and Bohemian hops were exhibited loose and in sacks.

Next in importance, or at least in quantity, was the display of cigars and cut tobacco, which were shown by eight exhibitors. The tobaccos from which these exhibits were manufactured were grown in Russia, America, Turkey, Japan, and other countries, the labor of preparing it being the only German element in the product.

In Memorial Hall, Germany exhibited a very large number of

Works of Fine Art,

Many of which were of more than ordinary merit, and attracted considerable notice.

Scenes of domestic interest furnished a large proportion of the subjects, with now and then a devotional picture and a great number of landscapes, the Dusseldorf school evidently holding its influence still, though rivalled by the allied school of Munich.

The most prominent piece of German statuary was a colossal bronze statue of Prince Bismarck, by H. Manger, Berlin, which stood in Gallery B, under the dome. It was lifelike in expression and realistic in pose. Ludwig Brunow, Berlin, exhibited a statue of Count Moltke in bronze, and a marble bust of the same. The earnest, intellectual face of Von Moltke furnished a good subject for the sculptor, and these representations were admirable. R. Schweintz, Berlin, exhibited a marble bust of the Crown Prince of Germany, and C. S. Silbernagle a statuette of Prince Bismarck in bronze.

E. Herter, Berlin, exhibited bronze statuettes of Orestes and Antigone, and F. Rensch, Berlin, an excellent group for a fountain. M. Schulz, Berlin, exhibited a group, with technical merits, entitled "Love Conquers Strength;" and E. Andressen, Dresden, and M. Ezekiel, Rome, plaster bas-reliefs, the former of a fountain group, "Boy and Frogs," and the latter of Christ.

Among the landscapes were some exceedingly pleasing pictures, which attracted considerable attention. One of the best that struck us was the "Morsum Cliff," on the Isle of Sylt, by W. Erdman—a rocky piece of coast with some rugged cliffs just touched by the departing sunlight, and strongly outlined against the dark clouds which fill the sky in the distance. There was some very refined work in this picture, which simply as a piece of painting had few rivals in the landscapes around it.

In the same corridor were three others which represented very fairly German landscape work. These were "The Goslau Lake," and "The Lake of the Four Cantons," by J. C. Jungheim, and "The Glacier of Argentiers," by V. Ruths. In the first and last named the

distant peaks of the mountains illuminated by the setting sun were the objects that engaged the eye. All of these were careful and conscientious renderings of impressive scenes, and were very pleasing pictures.

Another picture in the corridor that invited attention by its blaze of color was "The Mammudi Canal," near Alexandria, by E. Koerner. This is a brilliant oriental sunset, in which the best painting is in the sky.

A very imposing work of a similar character was the "Summer Evening at the Brandenburg Gate," Berlin, by A. Hetzel. In this the artist had suggested a blaze of sunlight, in the golden haze which envelops the tall tower crowned with a statue of Victory and the distant buildings, and which flashes through the openings of the noble trees, under which the beauty and fashion of Berlin are promenading. This was much the most impressive landscape in the section.

Three of the moonlight pictures in the German section were interesting as successful renderings of a class of effects that are peculiarly difficult, and which few artists succeed in rendering with success. These were "The Sternberg Lake," by F. Bellermann, in the corridor, and "Moonlight in the Harbor of Elsinore," by W. Moras, and "The Mouth of the Thames," by W. Xylander, in the main gallery. Of the three, the last-named was the finest picture, and in it the reflections of the moon in the rippling water were painted with more than ordinary skill.

Probably the strongest and best picture in the collection was "Broken Flowers," by A. Schwarz. It is a sad poem on canvas, in which every detail of the scene is harmoniously utilized to tell the story of a broken heart. A woman stands in the marshes, looking out upon a stream, where she hopes to end her troubles.

Her pathway to the spot is marked by broken flowers, her attitude suggests despair or great sorrow. The cold atmosphere, the sombre aspect of all nature, and the keen wind which blows her drapery in disorder, all combine to tell the thoughts that are passing in her mind. The execution was equal to the conception of this picture, and although it was hung far above the sight line, it attracted much attention.

Among the historical paintings, which were all painted with considerable technical skill, one of the most remarkable was the "Capitulation at Sedan," by Professor Louis Braun. The "Prison Scene from Faust," by A. Dietrich, Dresden, was powerfully painted, and was a much better representation of the story than it is possible to put on the stage.

Many beautiful marine views were exhibited, as also cattle pieces, the best of the latter class being one entitled "Young Ones," by E. Meissner, in which a sheep and lambs, and a hen and chickens, were the principal objects of interest. This was a very charming picture. Among the genre paintings, of which there were a good many excellent in subject and treatment, were two very attractive ones: "Herring Fishers starting for the Dogger Banks," by F. W. Fabarinus, Dusseldorf, and "The Last Rehearsal before starting for the Sangerfeste," by Friedrick Ortlieb, Munich.

CHAPTER XV.

FRANCE.

CONSIDERABLE fears were entertained, owing to the delay which occurred in getting ready the French section, that the display from France would not be so creditable as was desired; but long before the opening day, so rapidly had lost time been made up, and also judging from the extremely valuable and interesting nature of the exhibit, it was universally conceded that it would be one of the most interesting displays of the Exhibition, and in some points unsurpassed. Now that the Exhibition has come and gone, these conclusions have been amply verified. The French have a very happy faculty, peculiarly their own, of arranging everything so as to produce the most attractive effect.

Thus the predominance of articles of real beauty, such as bronzes, porcelains, faience, laces, jewelry, and the innumerable host of *articles de fantaisie*, and the systematic and tasteful arrangement of the plainer wares and fabrics, combined to make the French section of the Main Building a delight to people of cultivated taste. It was also especially the domain of the ladies, and its portals might have been appropriately inscribed, "*Place aux Dames*," for nowhere else were there so many elegant things, such as women most covet—lace shawls of the finest workmanship, silks in a profuse variety of color and pattern, rich brocades and velvets,

lovely embroideries, costly Paris dresses, heavy with flowers and real point lace; silk stockings with lace inserted at the instep; the daintiest of shoes and slippers, jewelry, fans, ribbons, artificial flowers, and a thousand quaint and pretty articles for the writing-desk, the mantel, and the boudoir-table, all admirable in their way. If one went with a lady to the Exhibition and got involved in this region of dress and decoration, he became lost for the day. It was useless to suggest the American silverware, the English pictures, or the Italian carvings as counter attractions—their charm did not work within the limits of the French section. This marvellous shawl in black lace, or that dress of white satin with its long trail embroidered with silk and gold thread, exercised a more potent spell.

The bronzes had the place of honor at the crossing of the nave and transept of the building, where they faced the English and American silverware and the German porcelain. Barbedienne, the most celebrated of the Paris *bronzeurs*, was not represented, and two or three other famous houses were also absent. One of the best statues was Bourgeoise's "Negro Snake-Charmer," which bears date 1862, and gained for the artist that year the *Prix de Rome* (two years for study in Rome at the expense of the French government). Very imposing from its great size, and admirable for the pure classic taste it displayed, was Marchand's great mantel of black marble and bronze. It was sixteen feet high by eleven wide. The principal decorations were in verd antique and gilt bronze. Under the cornice and in front of a dead black tablet with Pompeian border of gilt and colors was a gilt statue of Minerva, and at the sides of the fireplace were figures representing the wise

men of Greece. The price of the mantel was $10,000. The same figure was named for a large circular sofa called a *pouff*, in the centre of which was a fountain in red antique marble surmounted by a bronze candelabrum. The upholstery was green satin, and the frame and legs were in richly chased silver bronze. Some beautiful bronzes were exhibited by Susse Frères. Their chief piece was a colossal bust of Washington, two meters high, by H. Cros, cast in a single solid piece. The expression was noble and heroic, and the artist had evidently allowed his own conception of the character to influence his work. For fineness of workmanship there was nothing outside of the Japanese bronzes that equalled Gregoire's group of the "Rape of Herselia" in the Susse collection. Although the group was only about two feet high, the texture of the skin of the two figures was worked out with chasing instruments with almost microscopic minuteness.

The clocks and salvers in hammered brass shown were very fine, and they had also some handsome work in Algerian and Mexican onyx. Under the title of *Bronzes du Fantaisie* the Paris house of Kaffel showed a great variety of very attractive work in vases, tables, candelabra, flower stands, caskets, etc., of gilt and silver bronze in combination with porcelain and glass. In its line, this work was not equalled in the Exhibition.

The porcelain exhibit adjoined that of the bronzes. It occupied a square of six stalls, directly opposite the English display, facing the east side of the north transept.

Noticeable in the collection were two porcelain vases of a rich turquoise blue color with medallions painted by A. de Loney, a Sèvres artist. These vases were

three feet in height, and the mouldings, fillets, and handles were in highly ornamented gilt bronze. The medallions represented peasant groups, one a lad taking a music lesson and the other a drawing lesson. There were also several stands of three trays each, in light and graceful bronze frames, the trays themselves being decorated china. Among the many appliances and toilet articles was a glove box in porcelain, with a charming little picture of humming birds and flowers painted on the white ground. The birds had dropped down on to the twigs of a rosebush, and were quarrelling over the possession of a butterfly. The drawing was spirited and nervous, and the color rich and delicate.

Close by was one of the unique displays which helped to make the French exhibit creditable. It consisted almost entirely of reproductions and designs after the manner of the artists who made the Nevers faience famous during the seventeenth century. Here were circular plateaus ornamented with medallion heads on a border of arabesques or grotesques in fine yellow lines on a blue ground, with central drawings of Scriptural subjects—such, for example, as Moses striking the rock in the wilderness. These pieces were mainly after the manner of the Conrades. There were also numerous vases, flasks, ewers, and tazzi in the more common style of the Saxons, and of Moustiers and Rouen. The prevailing colors in this ware, as in Italian majolica, were blue and yellow; but the two fabriques differ in this—that the figures in the former are always yellow on a blue ground, while with the latter the process is reversed.

Terra-Cotta Ware.

A large exhibit of terra-cotta ware from Navarre was fine. They call all pottery—porcelain, transparent or faience, the coarser ware. Some of the assortment was so exquisitely done, the little cups and saucers being put up in velvet and morocco cases, like a lady's jewelry case. Open the case, and there was a little cup and saucer, and the paintings were so fine as to make quite an art gallery for our tables. Another display in faience, or coarser pottery, gave two immense vases, between three and four yards high, the design commemorative of the Act of Independence, 1776, made by Haviland & Co., of Limoges. The eagle, with

"E Pluribus Unum,"

And names of the signers of Independence were all on the vase. On the wall was a large picture, put up in small squares or tiles, the whole representing the rise and progress of the ceramic art (the art of making porcelain or pottery), where a rough-looking figure is in the act of rising from the flames with vases and images in her hands.

The finest display of decorated porcelain in the French exhibit was, in some respects, that of Ad. Hache & Pepin, Leballeur Frères, of Limoges. Here was seen more notably the influence of the revival or modification of orientalism in ceramic decoration now obtaining in Europe. This firm makes a specialty of it, and some of the designs had all the boldness and originality of the manner characterizing the artists of the Orient. There were several superb sets of full dinner service, with pink and turquoise blue borders, with medallion centres, containing portraits of the celebrated beauties

of the gorgeous Courts of the Louises, painted in the highest style of modern art—more suitable for framing as *plateaus* than for use for the purpose for which they were designed. The central object of this exhibit was a group—a centre and side pieces—for fruit, flowers and bon-bons, which was a splendid piece of decorated porcelain.

The French ought to have given us a good exhibit of furniture, but they sent us next to nothing—in fact, nothing to represent the styles of the present day. A gigantic bookcase of heavily carved walnut in the Louis XV. style, costing $5,000, and a cabinet of ebony and lapis-lazuli in the Henri II. style, marked $6,250, were of course very beautiful, but we would gladly have seen, besides such extravagant curiosities, something to show what kind of chairs and sofas the French sit on, what kind of beds they sleep upon, and the tables, washstands, and bureaus they use—things handsome enough to be worth bringing across the ocean, but at the same time cheap enough for people who are not millionnaires to purchase. Except some pretty tables and secretaries inlaid with porcelain tiles shown by an exhibitor of porcelain, a few gilt-framed mirrors, and a wardrobe with mirrors that swing around from the side in front of the mirror-door, so as to show the figure in front from all possible points of view, there was only a single exhibit of furniture—the costly one we have just mentioned.

Only one of the Paris jewellers sent any work worth mentioning in gold and precious stones—Boucheron, of the Palais Royal—but his small collection was rich in articles of high artistic merit. His $40,000 diamond necklace surpassed in beauty of design, but not in the size of the stones, its rivals exhibited by the New York

and Philadelphia jewellers. A coronet of rubies and diamonds ($40,000) was less unique but exceedingly rich. The large cats-eyes, surrounded with diamonds, were remarkably fine specimens of a curious stone more valued for its oddity and rarity than for its beauty. A leaf-like ornament incrusted with diamonds contained three unusually fine pearls, one of a roseate tint, one of a smoky hue, and the other of the usual color. An exhibit of imitations of Egyptian jewelry from the Knede Sebastopol contained an elegant scarabée necklace and several rich enamelled caskets. Of imitation jewelry—brilliant paste diamonds and rubies, that frankly declared their real character by their labels, strings of lustrous false pearls and oroide rings, bracelets, and brooches—there was enough. There were a great many unique things in cheap jewelry, such for instance as brooches made of humming-birds' heads set in gold, with gold beaks and sparkling stones for eyes, and necklaces and earrings of little blue beetles from Brazil. The ornaments of painted porcelain, in close imitation both as to form and color of real flowers, were exceedingly pretty. They were in the form of sets of jewelry, of bouquets, and of baskets of flowers.

The only silverware exhibited was a contribution of the French government, and consisted of a collection of prizes awarded by the Ministry of Agriculture and Commerce at various fairs and cattle shows. Most of the pieces represented groups of animals, and the workmanship was admirable—unequalled in its way, in fact, in the entire exhibition.

An artistic handicraft, in which Paris has a rival in Vienna, is the manufacture of ornaments from tortoise shell. Some admirable work in this line was shown—the best single article being the cover of a large photo-

graph album, decorated with chased silver clasps and medallions in enamel.

The ivory articles were unrivalled in the Exhibition, except, of course, by the wonderful carved ivory work of the Chinese and Japanese. They were for the most part toilet articles and mirror frames. A novel display was a case full of glittering stage jewelry—crowns, coronets, sceptres, girdles, swords, rings, bracelets, and all the tinsel finery required for mimic kings and queens. One quite large exhibit contained only crucifixes, cups, and other altar vessels and furniture for Catholic churches, and a small altar in gilt, enamel, and imitations of precious stones, very brilliant and not wanting in artistic taste. There were many stands of altar pieces in life-size figures: St. Joseph of the Sacred Heart, etc., and next a representation of a barn, the Christ Child in the manger, just near Him the cattle feeding in their stalls, above in the mow stacks of hay, and kneeling reverently on the floor, Mary and Joseph and the magi, their crowns taken off and thrown down, presenting their gifts and looking with believing wonder at the miracle of the ages. There were always crowds around this last, looking at its beauty and naturalness. The multitude of these pious figures and groups, and the much greater multitude of crosses, rosaries, medals, and other aids to devotion, gave us a glimpse of a side of French character little understood in this country.

In the French section, a case of delicate watches attracted a great deal of attention. In all sizes and forms were these

Liliputian Watches

To be seen. Inside a tiny enamelled locket, by touching an invisible (seemingly) spring, was seen a watch

with a face the size of a three-cent piece, ticking too, so as to be heard, though, to be sure, it was the smallest tick one ever listened to. Another was under the wing of a small pheasant, who had his literally golden feathers thickly covered with diamonds.

The display of textile fabrics was, we may safely say, the best in the Exhibition. Of course no country competes with France in the matter of silks. Apart from the variety and excellence of the fabrics shown in the Lyons court, the tasteful manner of their arrangement, and the harmonious combinations and contrasts of colors were particularly noticeable. The Gobelins tapestries were properly exhibited in the Art Gallery, but there was an excellent representation in the Main Building of what may be called the tapestries of commerce. The products of the Gobelins looms all belong to the French government, and are very seldom to be had at any price, but the Aubusson tapestry goes into the market like other fabrics. Three thousand shades of silk are used in the manufacture of the finest pieces.

Five or six large pieces were exhibited, the best of which was a garden scene, with a group of young merry-makers of both sexes, gathered around an old fortune-teller, who was reading the future of a pretty girl from the lines of her palm. There were also admirable copies of Vanloo's "Turkish Harem" and "Favorite Sultana."

They resemble so closely the oil-paintings from which they are copied that visitors not familiar with art tapestry find it difficult to believe that they are really woven fabrics, until they have examined them carefully.

The display of French carriages at the exhibition

was large, but there was nothing remarkable unless it be a greater degree of plainness than one would expect, considering the fondness of the French for ornament. The forms were not as light and elegant as those of our American carriages, but the workmanship was very thorough.

A curiosity in the way of locomotive apparatus was a dog velocipede called the "Cynophore Carriage." Circular cages were attached to the two large wheels of the vehicle, in which the animals were placed. The rider sits on a high seat between the wheels and guides the machine by a lever that works a third wheel in front. It is claimed that great speed can be attained. This method of riding is no doubt very pleasant to the man, but must be rather tiresome to the dogs thus forced to work their passage in a manner not at all agreeable to canine habits.

The fine court of the Paris book publishers was among the very best features of the French exhibit. Adjoining was a court devoted to steel engravings, lithographs, and specimens of the photolithographic processes of Woodbury and Rousselon. Their peculiar softness, combined with great distinctness in the minor details, rendered these pictures very attractive.

France can scarcely be said to have been represented at all in the department of machinery. One manufacturer of railway material, car wheels, buffers, etc., had a good exhibit; there was a silk loom, some electrical machines and a few confectionery establishments. There was, however, in another edifice a fine display of French achievements in engineering science; and as models of the same nature were shown as machinery here, these may, perhaps, be classed as part of the French exhibit under this head. They were exhib-

ited by the French Ministry of Public Works in an edifice by themselves, and were one of the finest features of the Exhibition, as indications of the grandest achievements of human labor. They were mostly models of great bridges built in France by the government engineers in places where success was especially difficult. There were bridges over chasms in the Pyrenees —the bridge over the swift-flowing Rhone at Iarascon, some of the bridges at Paris, a model of the whole splendid structure at the Pont-du-Jour, a model of the port of Marseilles, working duplicates of some of the most splendid lighthouses and models of others. In short, this show was almost an epitome of the engineering history of this ingenious and exact nation.

We must not omit to mention the exhibits of specimens of enamelling.

The four or five different processes of enamelling on a metal base are usually classified as cloisonee, champievee, Italian or jewelers, and late Limoges. Cloisonee, meaning "partition work," is produced by bending and soldering together, and fast to the object to be decorated, narrow, thin strips of gold, silver or brass, set edgewise so as to form the design, leaving the little cavities which these partitions separate to be filled with the enamel paste.

In the case of M. Boucheron, in the French department, were two or three exquisite examples of translucent cloisonee objects made entirely of gold outlining and the translucent paste, in rich variety of tints, fused each in place without backing, rendering somewhat the effect of a diminutive window, one of these, a Bonbonier of about two inches in diameter, being mounted between two small mirrors, so as to produce a beautiful play of reflected light.

On the southwest border of the horticultural grounds, between the Moorish Pavilion and the building of the German government, stood a miniature fairy palace of iron and glass richly stained with artistic figures. It was the French Art Pavilion, and was designed by the French engineer, R. de Bergue, who had charge of it. Its object was to make a comparison between the best stained glass of French and American make, one side of the building containing the former, and the other the latter. The French glass was clearer than the American, and the designs upon it were more fanciful and elaborate, and better executed. In addition to the stained glass, specimens of the finer industrial arts in their greatest development in France were exhibited. There were, for instance, two vases manufactured by Deck, the leading ceramist of Paris, who never turns out two pairs of such vases having the same pattern and coloring; the olive porcelain tiles which answer equally well for the outside or the inside of a building, and a tempting cabinet of the Sohier Brothers' perfumery. The little palace was further beautified by elegantly carved jardinieres, with aquaria. In the curiosities there were two short columns of onyx. These belonged to a collection of six such columns exhumed from a temple in the ruins of ancient Carthage. Of the four remaining columns, the Rothschilds have two and a French nobleman of the old régime the other two. This onyx is as dense as marble, and it resembles alabaster beautifully mottled.

Among the most noticeable and attractive features was the magnificent show-case, constructed in Paris, sixty feet by thirty, devoted to the exhibits of the manufactures of the

City of Lyons.

The products of that great silk and velvet manufacturing centre of the old world were richly represented. The case itself was a curiosity, presenting, as it did, a quadrangular wall of plate glass covering 360 lineal feet. In the centre of the enclosure, which was accessible from all four sides, was arranged an elegant oval divan, from which in luxurious ease the whole display was inspected at leisure. The velvets here seen were of the most costly description, such as potentates alone could purchase, and Parisian dresses costing over $5,000 each. The velvets, silks and satins, "rich enough to stand alone," were indeed the acme of perfection.

Lace Shawls.

There were some of the handsomest lace shawls ever seen in this country. One of chantilly had a centre cluster of fern leaves and roses, with buds and foliage, that seemed almost to be from fairy looms; so fine, so light, and yet each curve and line so clear, each shade so marked.

Chemicals.

In chemicals the display was also rich—especially in the samples of aniline for dyeing. This mineral was exhibited in its crude state, and in the same case were silks and ribbons showing the different colors it produces.

Artificial Flowers

Also attracted much attention; there were some specimens so exquisitely made that it was difficult to believe that they were not natural flowers.

The French exhibit of pictures comprised about 200 oil paintings, and among them was particularly noticeable the absence of many distinguished names. It could not be regarded as a thoroughly representative collection of French art of to-day, and a great deal of space was taken up by works which were chiefly remarkable for their size. One of these which arrested the attention of every passer-by was the famous picture, by Becker, of

"Rizpah Guarding the Seven Sons of Saul,"

An example of great technical power, devoted to the representation of a subject so repulsive that few looked upon it with anything approaching pleasure, and which had a sort of unpleasant fascination about it.

The figure of the sorrowing daughter of Aiah is in the foreground, and of heroic size. She is battling furiously with an enormous eagle, which is seeking to tear the flesh of the victims hanging side by side upon a roughly constructed gallows, just behind the agonized and brave woman.

The face of this woeful mother is of a grand, passionate beauty, which not even her anguish could destroy. The great, dark eyes seem to burn with the determination and courage that fill her heroic soul, while the parted and distended nostril speak of the horror and terror that rend her bosom, as the powerful bird again and again swoops upon his prey driven from it each time by the blows of the brand in her right hand. The gloom of the lowering sky, the heaps of barren rocks, against which the purple and yellow of her robes stand out in vivid contrast, are so well delineated as to seem real.

The subject of this saddest of stories is beautifully told in the words of Holy Writ:

"And Rizpah, the daughter of Aiah, took sackcloth and spread it for her upon the rock, from the beginning of harvest until water dropped upon them out of heaven, and suffered neither the birds of the air to rest on them by day nor the beasts of the field by night."

Some other notable pictures were Clement's "Death of Julius Cæsar," which recalled the school of David; "Birth of Venus," by Faivre-Duffer; "School for Young Satyrs," by Prion, and some good genre pictures.

In the Art Annex, France had nine rooms, the northern half of the three central rows. Here, as in Memorial Hall, we looked in vain for any illustrious name. Among the pictures deserving of mention were Castelman's "Apollo Gallery," Cassagne's "Cross Road," Garnier's "Bather," Cherez's "Landscape in Dauphiné," Herpin's "River Marne," Maignan's "God of the Woods," Debat's "First Mourners," and Cassagne's "Sully's Walk."

CHAPTER XVI.

THE EXHIBITS OF THE RUSSIAN EMPIRE.

THE Russian government was rather backward in making up its mind whether or not to participate in our Centennial Exhibition, but when it had once decided to do so, it acted with great energy and liberality. A commission, appointed by the government, made a list of the articles wanted, and of the manufacturers that produced the best of each kind, who were induced to contribute by the government undertaking the payment of freight and insurance to and from Philadelphia, and of all expenses of installation, including the purchase of show-cases.

Next to England, Russia had the largest and most varied exhibition of any foreign nation. Russia hitherto has been, as it were, a sealed book to Americans, and for the first time we have had an opportunity of learning something with regard to her recent achievements in industry and manufactures that supply the multifarious wants of the highest modern civilization.

The most noticeable feature was the decided stamp of originality observable throughout all the exhibits, not only in silverware, jewelry, brocades, and costly silks, but also in cutlery, various kinds of work in metals, in pottery, and glass, and even in the cheapest cotton prints. Everywhere there was manifested a pronounced tendency to independent invention and a conscientious study of the sources of national art.

To the student of industrial art, the Russian section was a fruitful field, presenting in a striking manner the results of the revived taste for national forms and ornamentation as expressed in early Muscovite art and architecture that now prevails to a very marked extent among all classes of Russian society. This taste is a recent growth; but stimulated by an intense patriotism and by the most exalted ideas of the future of the Slavic race, it is almost a mania, and bids fair to greatly modify if not entirely replace the taste for classic, renaissance, and modern European art.

The essential Russian character of the exhibits was particularly noticeable in the really magnificent display of Sazikoff, the Court jeweller of St. Petersburg and Moscow. The jewelry and silverware exhibited in the Russian section was uncommonly elegant, and formed the most attractive portion of the display.

The collection of Sazikoff was well worthy of his world-wide reputation, and embraced among other articles the following, which are the most worthy of mention: goblet chased with bas-relief, representing John the Terrible, falcon hunting; inkstand surmounted by figure of Themis, and two candelabra from Professor Charlemagne's drawing; Satellite with a horse, a beautiful production, modelled by Baron Clodt; elegant goblet chased with bas-relief, showing a Russian dance; copy of a Benvenuto Cellini vase; two handsome candelabra with figures of dancing Cupids; complete tea service, chased in Russian style of the seventeenth century, with fine repoussé work; pitcher for wine with plateau and nine cups in form of animals' heads; cup chased with figure of a soldier, being a copy of the Theodore Joannowich cup of 1596, still preserved at Moscow; punch bowl, salver, scoop, and twelve cups

with drawings by Jonkowsky, bearing figures of Russian peasants, images of Christ, the Virgin, Michael, and Gabriel; cup with enamel and precious stones, in ancient Russian style, being a copy of the cup of the Patriarch Nikone, preserved at Moscow; a number of elegant Russian cigar boxes and cases, some enamelled, some with engravings from Russian life and scenes; a stand for papers, with handsome chased bas-relief (repoussé) representing the demon, from Lermentow's poem of that name, the design being taken from a sketch by Zichy.

The finest specimen of all, however, was an alto-relievo representation of the "Adoration of the Magi," in dull silver. The piece was almost semicircular in shape, with a chord of about four feet. The figures stood out about three inches from the surface. In the centre was represented the Blessed Virgin with the Infant Jesus in her arms, surrounded by the wise men and St. Joseph doing homage. The work was elegantly executed and beautifully finished, and was valued at $7,000.

The repoussé work in silver, of which there were so many beautiful examples in the Russian section, more or less elaborate, is done in the following manner: The designs are produced on comparatively thin plates of metal by beating up from the back with punches of various sizes and shapes, and finishing the surface with small chasing, scraping and burnishing tools. It is one of the oldest forms of ornamental work in metals, objects in repoussé being found by M. Mariette in the tomb of Queen Aah-hotep (1500 B. C.), at Thebes. Hammered work was also popular in the best periods of Greek art, and armor, shields, helmets, vases, goblets, platters, etc., ornamented in repoussé, have fre-

quently been found. The art died out in the Middle Ages, but was revived by Benvenuto Cellini, the famous shield at Windsor Castle, made by Cellini for Francis I. and by him presented to Henry VIII., being a fine specimen. The art again fell into partial disuse, but was again revived by Antoine Vechte, a Frenchman, who lived in England, and who was born about 1800, and died in 1868. His Milton vase, made for the French government, several shields and vases for Queen Victoria, the Titan and Ellesmere vases, etc., all of oxidized silver, being the best examples of repoussé work since Cellini.

Next to Sazikoff, Avchinikoff, whose specialty is in the great *niello* productions, had a very fine display of silverware. This *niello* work was first brought to perfection in modern times by Maso Finiguerra, about 1440. He was practically the inventor of engraving on copper, and a metal plate worked by him for the altar of St. John's Church at Florence, is familiar to every visitor to that city.

Among the rich collection of Avchinikoff was an exact copy of the tea-service presented by the Emperor of Russia to his daughter, the Princess Marie Alexandrowna, on the occasion of her marriage with the Duke of Edinburgh, in December, 1873. The richly enamelled and decorated tea-pot was adorned with repoussé work, representing the Kremlin at Moscow. A handsome wine-pot, with relief representing the return of Peter the Great to Moscow, after defeating Charles XII. at Poltava; a finely executed work, surmounted by the arms of Moscow—St. George and the dragon. The Slavonic inscriptions around this and other productions were noticeable on account of the beauty of these ancient characters.

There was a magnificent punch-bowl in silver-gilt and enamelled, with cups to match; the beautiful filigree work greatly enhanced its value. The baskets with silver napkins looked so like the more ordinary household article that numbers of visitors asked what those common napkins had to do in a collection of silver. There was a tea-pot in silver enamelled with Chinese figures as finely as though the surface had been an even one. "The Liberated Serf" represented the husbandman who thanks God for the imperial proclamation of 19th of February, 1861, freeing every Russian from serfdom. There were two elegant companion vases for flowers representing a Russian peasant and girl dressed in the costume of the province of Rizan.

From Moscow was shown a large case filled with the most elaborate and elegant articles of jewelry, among them a large diadem representing a bunch of flowers and wheat. The leaves of the flowers were of rubies and diamonds, and the wheat of spun gold, with diamonds representing dew-drops sprinkled over it. There were ten uncommonly large pearls and seventeen large diamonds, besides innumerable small diamonds and other precious stones in this beautiful jewel. Another piece represented a butterfly, with wings of large opals, the body consisting of a large ruby and the back of a solitaire diamond. Bracelets, necklaces, lockets, etc., crusted with jewels or elaborately enamelled, were also exhibited. Another case had lockets, pins, etc., of gold of various colors, produced by different alloys. These articles mostly represented leaves, fruits, flowers, etc.

Malachite, Lapis-Lazuli.

The display of malachite, lapis-lazuli, and other precious stones was dazzling. The manufacture of these

into articles of ordinary use is a peculiar industry in Russia, and they are reproduced in tables, urns, vases, clocks, mantels, etc., cut out of single blocks of these beautiful stones, or matched from pieces of unusually fine color. Such a display of a valuable substance used so freely is not often seen outside of the empire of Russia.

Hoessrich & Woerffel, of St. Petersburg, made a magnificent display of objects in malachite, lapis-lazuli, labrador, rhodonite, jasper, nephrite, and other Siberian stones. Among the articles exhibited was a mantelpiece of solid malachite, the front of which was ornamented with a mosaic of ornamental stones and with bunches of fruit in relief, made from amethysts, agates, cornelians, crystals, etc. The value of the piece was $6,500. A large table, with a gilt bronze frame and malachite top, was valued at $2,400, and there were several other malachite tables of various sizes and values. A small circular table, about eighteen inches across, the top of which was of lapis-lazuli, was valued at $750. This stone is of a dark blue mottled color, and costs from thirty to fifty dollars a pound. There were two card receivers of rhodonite, a very hard red stone, which has to be cut by diamond dust. These two small articles were valued at $2,000 a piece. Jewelry, clock cases, vases, etc., in great variety, were contained in this display; also a block of malachite in the rough, weighing 1,080 pounds, and worth $4,860.

Quite an attractive display of bronze statues, statuettes, clocks, and other articles was made. The most remarkable was Chopin's fine collection of bronzes. Chopin has been awarded medals at every great exhibition, including Paris in 1867, Vienna in 1873, London in 1862 and 1874, and Moscow in 1872. His chief

work in our exhibition was a magnificent candelabra, some eighteen feet high, admirably adapted for a vast saloon. The imitation Japanese decorations in porcelain were considered excellent even by the Japanese. The pedestal (which can be at once detached) formed a handsome flower-stand. Next must be noticed a finely-executed clock in Byzantine style, surmounted by the figure of a falconer engaged in that sport. The pendants to this piece, forming elegant candle-holders, were the representation of a Strelitzer and of a member of the Civic Guard of Moscow, under John the Terrible. Near this was a fine piece of workmanship, a Boyard of the time of John the Terrible. Next came the Cossacks, father and son, in the steppe, carefully executed. "After the Combat" represented a Cossack, who, having slain his foe, is leading off the dead man's horse with its accoutrements; the animal is uneasy at the loss of his master, and the Cossack's own horse is impatient at the delay and anxious to return home. There was a handsome clock in Russian style, with fine enamelled work, *en relief;* in true Slavonic style was a *suspensoire* for a bed-room, with the soft, subdued light from the shaded lamp.

Furs and Fur Goods.

As might naturally be expected, the display of furs and fur goods was the finest to be found in the Exhibition. The articles were shown in every stage, from the single skin of the animal to the manufactured garment. Black fox skins worth $300 for the single pelt, silver and blue fox, sable skins about as large as a good-sized rat skin, and worth from $15 to $125 each. Royal ermine skins, squirrel, mink, fitch, and every other kind of skin used for dress, were shown. A beautiful cape

of fine black fox fur was marked $1,400, another of sable, the real Russian of course, was ticketed $2,700. There were unfamiliar articles of head-gear, leggings, and mufflers of the finest and softest skins. One small bunch of sable skins among the collection was marked $2,400. The animals, stuffed, with glossy skins graced the cases. Among the latter, four little cubs about six months old attracted much attention. They were stuffed and mounted, and represented as playing with a ball. The positions were extremely natural and amusing, and the group was an excellent specimen of taxidermy.

In St. Petersburg, Moscow, and other cities of Russia the winters are very long and severe, and the ground and floors of buildings become very cold. In consequence of this, fur rugs and carpets are very extensively used among people of means. Specimens of these articles were shown in great variety. One carpet valued at $250 was made of 2,400 small pieces of furs, the scraps from a dress fur manufactory. Rugs and carpets of lion, tiger, bear, jaguar and other skins were also exhibited.

Weapons and Uniforms.

A case which was very attractive to visitors contained various military uniforms and accoutrements. Dressed figures were here shown, together with separate articles of military apparel, and small portmanteaus for officers' baggage. Adjoining were cases containing a great variety of weapons, fire-arms, swords, etc. The Crown Armor Factory, Government of Orenburg, sent a very fine display of Damascus swords, blades, and daggers. These goods were most elegantly finished and were of the best material.

The collection of dress silks, woollen goods, cotton and linen fabrics, rivalled those of any other nation for beauty of fabric, richness of color, and tastefulness of pattern. In silk goods, especially, the display was particularly rich and elegant. A case of dress silks of all colors, from rich, heavy black gros grain to light and delicate full-dress shades, was extremely attractive to the ladies. The silks were literally heavy enough to stand alone, and of an exquisitely soft and rich texture. Brocade silks, very heavy and rich, were also shown in great variety.

But most magnificent of all in the Russian display were goods of cloth of gold and silver, intended mainly for ecclesiastical vestments, altar clothing, etc., red velvet and flowers in gold, black satin embroidered with flowers, the gold figures woven of gold thread, silver cloth in plain and moire antique pattern, the

Heaviest and Richest Fabrics

We have ever seen, some in gold thread with velvet appliqué figures. Judging from the richness of the priests' robes the Greek Church must be gorgeous in its ritual.

In a large case was shown a magnificent assortment of

Embroidered Articles,

Among them elegant table cloths covered with gold embroidery, dresses, cushions, sashes, etc. Many of these articles were of extreme richness and beauty of workmanship.

Towels and handkerchiefs exquisitely embroidered and trimmed with lace were exhibited in great numbers and variety. Shirt fronts elaborately worked in em-

broidery and fancy plaits, and ladies' undergarments magnificently worked, were also shown.

In one of the cases in the Main Building we noticed a miniature painting of the face of Saint Alexander Newsky. Around the head was a "glory," embroidered in gold and jewels; in the corners of the frame were twenty-four miniature paintings of saints celebrated by the Orthodox Greek Church on the name-days of the sovereigns of Russia, beginning with Peter the Great and ending with Alexander II. This beautiful specimen of painting and embroidery was valued at 5,000 roubles, or $3,860.

A similar though less elaborate painting represented the face of Christ, surrounded with gold and jewels. This was valued at 1,000 roubles, or $772.

In Machinery Hall the Russian government had a very fine display which we must briefly describe. The first in order was

Heavy Ordnance,

Consisting of a rifled field piece, breech-loading. The system of loading was by a breech block, pushed in from the side; the rifling attracted attention from the number and depth of the grooves, which make less than a quarter of a turn.

The next gun was an eight-inch rifled fortress gun mounted on a barbette carriage. The largest piece was a twelve-inch rifle, which seemed short in comparison with the ordnance of other countries. Projectile was put in from the breech, which was then closed by a sliding breech-block. Other large guns, both of iron and bronze, had a breech which closed with a screw block.

A three-pounder mountain howitzer was exhibited,

loaded on four horses. These guns were made at the St. Petersburg arsenal, which is under the jurisdiction of the Central Artillery Department.

The Imperial Rifle Manufactory at Toola exhibited infantry rifles with bayonets made by machinery, and with interchangeable parts. These rifles were shown whole and in sections, and separated into their component parts. The sectional view showed the mode of operation of the breech-loading apparatus. These rifles are made at a cost of $8.11. The manufactory was established in 1712.

The rifle factory at Sestoretsk, near St. Petersburg, was established by Peter the Great, in 1714. It exhibited cavalry carbines and Cossack muskets.

Models of Vessels.

Among other government exhibits were models of vessels belonging to the Russian navy, the most noticeable of which was the model of a Russian monitor. It was circular, iron-clad with sixteen-inch armor plates, and carried two guns of twelve-inch calibre. These were situated in the centre of the vessel, and were mounted on carriages having air buffers to check the recoil, which were so arranged that the gun has but little backward motion. The vessel was propelled by six screws, three on each side of the rudder.

The most interesting and instructive exhibits in this department were the displays of machine tools made by the pupils of the "Imperial Technical School of Moscow," and the "Practical Technological Institute of St. Petersburg," two of the highest technical schools now existing in Russia, and each divided into two departments of Chemistry and Mechanism.

They are intended for the education of mechanical

constructors and mechanical and technical engineers. They are under the immediate control of the government, and are maintained by funds from a tax on capital, fees of foreign students, and profits received from articles constructed by the pupils. Admission as a boarder or day scholar is obtained by competitive examination. Those pupils who attain a certain grade receive certain rights in the service of the government.

These schools possess large mechanical works and hired workmen, joining shops, pattern shops, fitters' and moulding shops, all under the management of skilled specialists.

The exhibits which were shown at this Exhibition were the full size tools, implements and parts of machinery constructed at these shops by the pupils. They consisted of samples for imitation in learning wood-turning; collections of tools for turning in wood and turning in iron; tools for joiner work and models for imitation in learning joining; collections of blacksmiths' tools and models for imitation in learning blacksmiths' manipulations. Several cases contained parts of large engines and machines. Some of the tools which we specially noticed deserve some extended description.

The first we shall mention were iron planers, one of which worked so easily by hand that, so far as the operation of the lever was concerned, the strength of a mere child was all sufficient. These planers were of a simple construction, the feed being regulated by a kicker, governed by an automatic lever, which could be set to give any desired thickness of cut. The larger one was constructed to be worked by belt power. Near the planers stood a small foot lathe, with compound slide-rest and dog-chuck; and then a power surface and screw-cutting lathe and dividing machine. The latter

lathe had also a compound slide-rest, and was provided with an independent feed attachment. A very fine vise was one of the features of this exhibit. It had universal jaws, working so that it could grip any shaped piece of metal at any angle or degree. Then there was a very excellently constructed key-seat drilling tool, for cutting key-ways in shafts. It had a lateral and down feed, and would cut in any direction, either spirals or parallels, and circles. A section of a horizontal steam cylinder also formed part of the exhibit. The section showed, at one end only, the exhaust and steam feed, expensively arranged, somewhat similar in construction to the cut-off of the Corliss engines. The Corliss valves were parts of circles, while the valves of this cylinder were conical—just the same as a common boiler safety valve. The pupils of these institutes also showed a great variety of models in metal, of parts of safety valves, piston-rods, and cross-heads, eccentric rods, equilibrium valves, sluice valves, butt-ends of connecting rods, etc., all of which went to show the thoroughness of the course of instruction through which they pass. In every case the workmanship on these tools was fine and accurate. There was no attempt at "Exhibition" finish about any of them. Russian engineers stand among the highest in their profession, and no wonder, considering that they have such schools as these institutes.

A Russian inventor, Mr. Alissoff, of St. Petersburg, exhibited a type-writer, which for excellence of mechanical structure, cleanness of impression, and ability to do printing in different characters, was fully equal to our American type-writer. It could not be made to work nearly as fast, however, as its American rival, and, as speed is what most people seek in such a

machine, it is doubtful if it will ever come into extensive use. Mr. Alissoff says that he first turned his attention to making a machine for speed, but finding by observation that few men can think faster than they can write with pen or pencil, he concluded that such an invention was not what was needed, but something that would make as accurate and legible "copy" as a printed page. In this undertaking he has fully succeeded. His machine writes in the Russian and English characters, makes capitals, small capitals, figures, signs, punctuation points, and all the French accents. As the types are movable, it can be arranged to print Greek, Hebrew, or any other written language.

The manner of working it was to move a lever on a dial to the letter desired, and make the impression with the foot upon a pedal. The speed is about that of ordinary writing. Mr. Alissoff also exhibited an invention for photo-lithographing music. The staves, notes and signs, printed on thin paper, were kept in small boxes, from which they were taken and pasted upon a large plate of glass, regularity being secured by lines on card-board at the back of the pane. Thus the composition is built up much more rapidly than could be done with types. A negative is then taken of any size desired—the light passing through the glass—and when transferred to stone the printing is done by the usual process.

The Russian section in Agricultural Hall was situated south of the centre aisle and next to the western wall, near the main western entrance. The exhibits were, for the most part, arranged in glass cases, and the section was not enclosed by railing or cables. The articles on exhibition were principally the immediate

products of agriculture or the forest, or of manufactures directly connected with agricultural pursuits.

Cereals.

A fine exhibition was made of the leading cereals, which were exhibited in grain bags, open-mouthed, with a circular piece of plate glass inserted to keep out the dust. The bags were arranged on a pyramidal set of shelves, and were labelled with the names of the varieties of grain.

The breeding of sheep is very extensively carried on in Russia. The

Wool

Of the common Russian sheep is hard and coarse, but of late years the breeding of fine wool sheep has been steadily on the increase, especially in the Baltic provinces in Poland, and in the southern governments. According to the statistical report of 1874, there were about 14,000,000 of the fine wooled sort, principally found in the governments of Yekaterinoslav, Kherson, and Bessarabia. There were fourteen exhibitors of wool, washed and unwashed. The unwashed samples were arranged in tufts to show the lengths and in single fleeces. The merinos were in the largest proportion.

Several sacks of Astrakhan and Angora wool were shown. Some specimens of the latter were very fine in quality.

Among the miscellaneous exhibits in this department were a small but fine display of native woods, chemicals, specimens of native tobacco, refined and raw sugar manufactured of beet-root, hops, flax, hemp, etc.

Educational Appliances.

The display of educational appliances by the Pedagogic Museum of St. Petersburg evinced the deep interest taken by the Russian government, by whom the museum is supported and conducted, in the necessity and importance of

Object Teaching,

Which is the back-bone, as it were, of the educational system of the empire.

Among the articles exhibited by the museum were the following: a fine set of charts, published by the Imperial Economical Society; school atlases, charts and anatomical tables; treatises on comparative anatomy and the anatomy of man; skeletons of some of the smaller animals, nicely prepared and mounted; stuffed animals, skulls of horses, dogs and hares; preparations of a horse's leg and hoof, and a school collection of furs. Of papier-maché models there was a full collection, including a collective model of a man, the trunk of a man, vertical sections of the head and brain; the spinal cord and cerebellum; the lungs, heart, and larynx; the heart; the mask or face, with the mouth open; the larynx, with soft, movable epiglottis, and elastic connection of the hyoides with the cartilago thyreoiden; the lower jaw in section, showing the organization and progressive development of the teeth; an enlarged collective model of a human tooth, made to take to pieces and show the structure; models of joints; sections of the skin, enlarged models of the eye and the ear; models of the horse, lion, bear, dog, beaver, cat, goat, cow, and other mammalia. There were also skeletons of birds and fowls, and preparations of birds' feet, wings and skulls, and a number of stuffed birds.

CHAPTER XVII.

THE EXHIBITS OF SOUTH AMERICAN REPUBLICS.

Mexico.

THE display made by Mexico of her products and resources was found in the Main Building and in the Art Gallery. In the former, the most prominent feature was the large number of exhibits of ores, minerals, and precious stones—Mexico being richer in mineral products than any other country in the world, not excepting even Peru.

Perhaps the most interesting sight to visitors, and that which attracted the most notice, was a large mass of pure silver weighing 4,000 pounds, which was shown in the exact condition which it assumed when it ran out of the smelting furnace.

There was another specimen weighing 1,300 pounds and valued at $2,000, a bromide of silver, exhibited by the National Museum.

The Mineria, or College of Mines, an institution which has always enjoyed the support and protection of the government, had a very fine case of specimens, conspicuous among which was a block of red porphyry, a mineral in which the Mexican opals are found. It was about five inches square, and protruding from its sides was one most perfect and beautiful opal, while traces of others were seen, a cornelian broken through the middle, and a couple of agates. There are whole mountains of porphyry in which these precious stones

are found. There were also in the case valuable specimens of cinnabar, or quicksilver ore.

Specimens of gold ores were also to be seen, exhibited by the Mexican Society of Natural History.

It is estimated, though, of course, it cannot be accurately stated, that there are in the whole of Mexico not less than 500 tons of silver and one and a half tons of gold mined every year.

There were several valuable and rich collections exhibited by the Natural History Society of Mexico, and also by some private exhibitors of minerals and ores, comprising specimens of tin from the States of Michoacan and Jalisco; copper from the same States and from Guanajuato and Mexico; lead from the mines of Oaxaca; and from this latter State some beautiful amethysts, agates, turquoises, cornelians and opals.

In the collection of iron ore was a very interesting specimen, viz., a large lump of meteoric iron weighing 4,000 pounds, which was found in the State of Chihuahua, and was composed of pure iron. Iron is found in nearly every State in Mexico, and there are now ten companies engaged in mining and manufacturing it.

Mexican Onyx.

Among the most attractive things in the Exhibition were the Mexican "onyxes," so called. These were in large slabs of nearly an inch in thickness, bearing a high polish. The first impression which these slabs gave was that they were an exceedingly transparent, variegated white marble. But marble has not such clear translucency. Some of the specimens were so set in upright frames as to show their capacity for transmitting light. There was none of the milkiness of alabaster about this stone. It had the clearness of

chalcedony, and most people hastily examining it would have said that it belonged to the flint or quartz series. But where shall we find agate or onyx that can be cut or polished in circular slabs of two or three feet diameter? The Emperor of Germany has purchased the finest of these "onyx" exhibits, composing a mantelpiece, the price of which was stated at $3,000. Professor J. S. Newberry, of Columbia College, has expressed his opinion that they are stalagmite; but it is impossible to determine whether they are obtained from caves of modern era or from geologic formations which enclose the stalagmites formed in caverns of a remote epoch.

Coal

Is found in several localities. A specimen of bituminous coal is shown from the State of Vera Cruz. It is found in the banks of the river Panuco, above the water level, and the vein is quite wide and thick. Its extent is unknown, as no regular explorations have been made. It is valuable as a gas coal, for which purpose it is principally used.

Anthracite coal has been found in a very pure state at Tecomatian, State of Puebla. A company is just being formed to make an exploration of the deposit. It is said to be a superficial deposit and easily worked. Its extent is not ascertained, but it is believed that there is a large amount of it. But little attention has been paid to coal as a fuel on account of the abundance of timber.

Mexican Manufactures

Are comparatively unimportant, being insufficient to meet the home demand. Cotton and woollen fabrics are woven in Vera Cruz, Jalisco, Puebla and some other

States, the cotton being raised in the hot and temperate climates. Cotton goods were exhibited of standard quality.

The other Mexican products on display were of a miscellaneous nature, the most notable of which was pottery, on which some fine specimens of decorative painting were shown performed by the pupils in the Orphans' School of the City of Puebla, and a wax model of a

Maguey Plant,

Or the American agave, which grows to the height of six or seven feet.

The varied uses to which the juice and fibre of the maguey plant have been put make it a most valuable and remarkable product. The juice is extracted by means of a suction apparatus introduced at the base of the plant. This is fermented like grape juice, and forms the common drink of the people. It is called "pulque." Twine, cordage, cables, netting and any fabric requiring strength is made of the fibre of this plant, and these articles were also exhibited. Some very finely constructed fish-nets and hammocks made of this fibre were shown.

Another use to which it is adapted is in the manufacture of paper. Some paper made of this material was shown which is as tough, fine and strong as bank note paper.

Mexican Paintings.

The exhibit of the Mexican paintings in the Art Annex was very fine, and evinced a high degree of artistic culture on the part of the painters. The display was that of only one academy of art, St. Carlos Academy, of the City of Mexico, and comprised some old pictures

of the sixteenth and seventeenth centuries, as well as paintings by the students and professors of the academy.

The latter were well drawn, fine examples of perspective, and all evidenced a conscientious desire to do the work thoroughly.

One of the finest pictures in the whole Exhibition was a portrait of Hidalgo, the father of Mexican Independence, by Joaquin Ramirez. He was represented as having risen from his chair, having just finished writing his declaration, and his face expressed the thoughtful resolution which is the sure precursor of success. The accessories were excellently painted, and are said to be literal representations of the room where the declaration was written and its furniture. But the face of Hidalgo was the great study in the picture, and nothing more lifelike was to be found in the Exhibition.

The pictures of the sixteenth and seventeenth centuries were nearly all of saints, the crucifixion, and of the Virgin Mary, and most of them were comparatively well preserved, and the colors remarkably bright and fresh-looking, notwithstanding their age.

On entering the little court or enclosure which contained the

Peruvian Exhibits.

We saw in the centre a rather repulsive collection of half-decayed mummies, skulls, skeletons of the aboriginal races. These mummies, taken out of their tombs where they have lain for the last three thousand years, seemed to leer and grin as if in hideous mockery on the surrounding trophies of modern civilization. These relics of an extinct race may have been perhaps interesting to ethnologists, but to us we must confess

they were not particularly attractive. Turning away from them the next objects which struck our attention was a collection of articles, weapons, and other ancient remains which had been buried with the exhumed bodies, and which showed that the ancient Peruvians had made considerable progress in many useful domestic manufactures.

There were, for instance, work-baskets found with the female figures, containing needles and thread, and little hand looms for weaving strips of a thick cotton fabric with variously colored threads, so as to produce raised figures upon the surface. Rude as the designs were, the process was essentially the same as that of weaving figured fabrics is to-day.

A large collection of old Peruvian pottery was, after the mummies, the most prominent object. It included bowls, plates, and jars, and numerous curious water-vessels in the forms of men and animals, rudely modelled. The pottery was unglazed, and was of a dark red color verging on black.

The most valuable mineral product of the country is

Silver Ore,

Of which two large specimens were on exhibit, containing about twelve per cent. of the metal. The silver ore of Peru is exceedingly rich, yielding from five to fifty per cent. of metal. The yield of the mines Cerro de Pasca, Puno, Huantajaya, Hualgarjoc, etc., in 1873, amounted to $6,000,000 in silver bullion. In the cases were exhibited beautiful specimens of sulphate of iron, salts of copper, sulphate of alum, borate of lime, sulphate of baryta, strontium, sulphate of soda, and some salts that are not often met with. There were also small specimens of the woods of Peru. These and the

minerals were exhibited by the government. Among the minerals was a well-cut representation of the crucifixion, cut in a piece of sulphate of lime, by a half-breed Indian.

The chief wealth of Peru consists in the immense deposits of

Guano

On the islands belonging to the republic, particularly the Chincha and Lobos Islands. It is computed that, including the deposits discovered in 1874, there are 26,000,000 tons of guano in Peru, of which about 18,000,000 tons are accessible. The latter are valued at $675,000,000.

Of manufactured articles, there were samples of native wines; castor oil, prepared for the market; extremely fine wool from Llama goats' wool; inlaid tables of Peruvian woods; a Panama hat, valued at $300; and a jewel-case of fine silver wire, woven into filigree work.

The paintings of Peruvian scenery were interesting, as showing the landscape features of the country, but were crude artistically, and exhibited in a very bad light.

The general impression produced by the exhibit of

The Chili Republic

Was that it represented a country where mining is the all-important industry, agriculture a secondary affair, and manufactures just commencing to be developed. But upon a careful examination of the display made of her products and resources, we found that our first impression, based upon the prominence given to the exhibit of her mineral wealth, was an erroneous one.

The truth is, that agriculture is the leading avocation, and domestic manufactures more extensive than the display made in these two branches of industry would lead us to suppose, the deficiency being occasioned by the great distance between Chili and Philadelphia, and the consequent cost of transportation.

At the entrance to the Chilian section was a large circular pavilion of wood, in the centre of which was a big stuffed condor, perched upon a pile of silver-bearing ores. Around the sides were glass-topped counters, containing a collection of silver ores, valued at $25,000, and belonging to Emilio Escobar, of Santiago. It was chiefly composed of silver ores and native metal, but there were also exhibits of copper ores in great variety, of light blue alabaster, malachite, cobalt, and of rock taken from different levels in the silver mines. There were 445 specimens, of which ninety-one were of strata or layers of the argentiferous ores from the famous mine of Chañarcillo, taken from the surface to a depth of over 600 yards.

In the native silver, of which there were 105 specimens, were many beautiful natural conformations, imitating roots, leaves, flowers, and the beautiful forms assumed by water frozen. There were many specimens of sulphurous silver, among which was one containing stephanite, imbedded in sulphuret of silver, and there were other specimens containing large crystals. Perhaps the handsomest minerals were the specimens of pronstite of silver or ruby silver, which displayed many beautiful forms of crystallization. There was one weighing twenty pounds, which contained hundreds of translucent crystals of pronstite imbedded in equally numerous crystals of carbonate of lime; another was composed entirely of pronstite, in large crystals. The

gem of the collection was valued by Mr. Escobar at $4,000, not that it contained anything like that amount of silver, but on account of its rarity as a curiosity. A line of cases with smaller specimens supplemented the Escobar collection. A pyramid of wines and liquors stood at the opposite end of the section, but of the merits of these drinkables it is impossible to speak as long as the corks remained fast sealed in the bottles. Most varieties of wine grapes cultivated in Europe have been introduced successfully in Chili. The agricultural exhibit, contained in two show-cases, included all kinds of grain grown in this country, and a variety of nuts, herbs, vegetables, fibres, tobacco, wool, and fruits in cans. In the way of manufactures there were silk in skeins, well-made shoes of leather and satin, blankets, knit shawls and scarfs, embroideries, a very handsome table-top of alabaster, another made of a mosaic of many-colored marbles, leather of good quality, some samples of paper, and a few fine specimens of ornamental book-binding. The large drawings of bridges on the railroad between Valparaiso and Santiago were of special interest to engineers, and there were sectional drawings of public buildings in the latter city.

Near the west end of Machinery Hall the Chilian government had put up, at a cost of $3,000, an oblong wooden structure which contained a working model of a set of amalgamating machinery for gold and silver ores, the invention of Mr. Krinke, a German, residing in Chili, which is claimed to be much superior to any machinery for the purpose used in the mining districts of this country. The amount of work on the model will be appreciated when the fact is stated that it cost $13,600 to make. It is one-sixth the dimensions of the full-sized apparatus, which cost $230,000.

The only exhibits of art were a well-carved crucifix of wood, and three bronzes modelled by N. Plaza. The larger of these was a life-size model of a youth playing ball, and was full of animation gracefully expressed. The other bronzes were bas-relief busts, one of them being a portrait of Commander Chacun.

Argentine Confederation.

The space allotted to the Argentine Confederation in the Main Building was located on the southern side, between Chili and Portugal. The exhibits were displayed in a pavilion, octagonal in shape, in which were arranged collections of ores and minerals, consisting of copper, silver, lead, gold, iron and antimony, and several earths used as pigments. The mining industry is as yet in its infancy, but is being rapidly developed, and, rich ores being abundant, it promises to be a very important feature in the business of the country.

Among the miscellaneous exhibits were the following most noteworthy:

A large and varied collection of woods, natural and polished, and of ornamental articles manufactured of, and representing, native woods. There were over 1,268 specimens, besides the dye-woods, representing several hundred species. Many of them were beautiful in grain and were susceptible of a high degree of polish. There were many species of the palm and the pear, peach, willow, walnut, rosewood, poplar, mulberry, acacia, olive, cedar, cinnamon; apple and pine were also exhibited. Among the novelties were great trunks of cactus wood, showing that the plant there grows at least two feet in diameter. There was a large collection of dye-woods exhibited in glass jars, some of which are new to this country, but there were no means of

determining their relative values. Lapacho wood was exhibited with the dyes made from it, and specimens of silk and woollen textures dyed with an extract of it. Cebil bark for tanning was exhibited in a sample one and a half yards wide (half the circumference of the tree from which it was taken) and about half an inch thick. It was of a deep red color like hemlock.

There was a curious travelling-trunk three feet long, two feet wide, and one and a half feet deep, covered and lined with leather. It was for travelling and camp use, and, although appearing nothing more than a handsome trunk, it could, in a minute, be transformed into a complete dining-room outfit. When opened, it formed a fine sofa, sufficiently capacious to accommodate four persons. In one arm a spring was touched, and out popped a writing-desk. The manipulation of another combination in the other arm changed it into a traveller's necessaire, containing all articles indispensable in such a thing. By pressing springs in the back of the sofa, a wardrobe was disclosed which would hold enough clothing to last a person several months, and a table at which four persons might sit and eat with comfort. Finally, writing-desk, table, repertoires, necessaire, clothing, delf and cutlery could be hidden again, and the combination changed into a bed by simply turning down the back. The price was $600, gold, and it was marked "sold."

Two or three specimens of wood carving were shown, the most noticeable of which was a collection of flowers made by Jose Pibernat, a boy seventeen years old. Two guitars were remarkable for the delicate inlaid ornamentation. One of these consisted of 39,721 pieces of wood and the other of 29,500 pieces. An inlaid table made of a great variety of woods was very notice-

able. It was made by M. Lacroix, of Buenos Ayres. The colors were so beautifully blended that it was difficult to believe that the artist's pencil had not assisted in the ornamentation.

Among the curiosities of the exhibits were several walking-sticks, some of which were made of different kinds of wood; racks, one of which was composed of twenty-five different species of wood; cigar-cases of oak and chica wood.

Another curious article was the guano of the mountain bird called the *guancho*. This was a kind of gum or resin, and is used by the natives in cases of broken or fractured bones, being mixed with grease when splints are required.

Two lay figures, dressed in the native costume, the slouch hat, the mass of color, broad belt and short sword, and immense spurs, made up a combination that attracted a great deal of attention.

Quite a number of private exhibitors displayed stuffed specimens of

Wild Animals,

Including lion, hare, fox, wild cat, polecat, armadillo and an alligator.

Hides and Wool.

The two staple products of Argentine are hides and wool. The display of untanned hides, and hides tanned with the fur, was very extensive, and the posts and timbers surrounding the section were covered with them.

Wool was shown in large quantities, and there were some remarkably large fleeces, one of which weighed thirty-one pounds, grown in eleven months and eighteen days, on a pure-bred negrette ram, in the

district of Las Flores, Buenos Ayres. There were two others, weighing respectively twenty-three and twenty-five pounds each.

In cases were samples showing the length of the wool, and in one case containing sixty-six specimens a few of the samples were four inches long.

Republic of Venezuela.

The exhibits made by the Republic of Venezuela were in Agricultural Hall, and were located next to the Japanese section. The space which they occupied was surrounded by a tall frame-work, from which was festooned the national colors, and over the centre was the flag of the republic, composed of three broad longitudinal stripes of red, blue and yellow, while in the middle of the central blue stripe was a constellation of seven white stars.

The exhibits were arranged on two long tables, one on each side of the enclosure, leaving a broad passage-way through the centre.

The chief products of the country, and of which the principal exhibit consisted, is coffee, and a large number of samples were shown in glass jars. The unhulled berry was also exhibited, and a machine by which the hulls are removed.

Cotton, next to coffee, is the most important industry of the country, and is largely raised in the warmer sections, and many samples of good cotton were displayed, ginned and enclosed in glass jars, and other specimens in the boll.

The forests of the country supply a great variety of beautiful woods, which are exported to some extent. They are valuable for cabinet work, and many of them as dye-woods. There was exhibited a large collection

of barks valuable for medicinal purposes and dyes, among which are the well-known cinchona bark, from which quinine is extracted, copaiba, curtidor, sassafras, mangle, ginger, sarrapia, bejuco moreno, quassia, fustic, quaica, grape tree and others.

Very few articles of manufacture were shown; boots and shoes, blank books, preserved fruits, soaps, candles, and vegetable and animal oils about complete the sum total of the exhibits of this republic.

CHAPTER XVIII.

THE EXHIBITS OF BRAZIL.

THE most important and interesting exhibits which come under this head were from Brazil, an empire which occupies three-sevenths of the South American continent, and which covers an extent of territory 3,200,000 square miles—larger than under any other government in the world, with the single exception of Russia.

The products, industries and resources of Brazil were displayed in the Main Building, Agricultural Hall, Machinery Hall, the Art Gallery and in the Women's Pavilion. Besides these, there was a beautiful Brazilian villa at the head of the Lansdowne ravine.

These exhibits, together with the presence of the enlightened, liberal and progressive Dom Pedro, the Emperor of Brazil, at the opening of our exhibition, and the deep and continued interest which he took in its success, caused that country to be a theme of the greatest interest to Americans.

The enclosure of the Brazilian section in the Main Building consisted of a beautiful and brilliant colonnade with ornamented capitals and arches, supporting a superstructure of wood painted in rich and well-contrasted colors. The façade was similar to the sides and color and decorated with painted glass tiles; the whole in Moresque style of architecture. The Brazilian coat of arms was painted on the tiles in front, and

the word "Brazil" at the top of the superstructure, while inside the court were the names of the provinces and the emperor's monogram.

Just within the main entrance of this graceful structure was the specialty of the section, a tall pyramidal case of plate-glass filled with specimens of all the most beautiful birds that flourish under the tropical sun of Brazil, and also of the insects. There were shown the most exquisite garlands and flowers made from the feathers of the birds, so natural that they deceived the eye; and of the bugs and beetles there were exhibited several thousand species. On account of their rich colors most of them resembled so many precious stones, furnished with long legs and antennæ. Brazilian ladies have such an admiration for these bright-colored beetles, grand-daddy-longlegs and kindred crawlers, that they wear them as brooches, sleeve-buttons and other jewelry, and whole cases of such articles were exhibited here.

The display of minerals comprised native gold, taken principally from the Minas Geraes, St. Paul and Alagoas districts; native diamonds, of which Brazil possesses the monopoly of almost the whole world, and also tourmalines and auriferous quartz. Though the mineral wealth of Brazil is too great to be estimated, it has been but slightly developed, and was not, therefore, fairly represented at the Exhibition.

In another portion of the section we saw some very handsome furniture made of Brazilian woods, with cane backs and seats. Two chairs by F. J. Moreira were beautiful in design and finely finished. There was a writing-desk of good design, elaborately inlaid with fifty-two different native woods. In this section was displayed a case containing the jewelled decora-

tions belonging to Dom Pedro I., a case containing surgical instruments and supports for broken limbs, all of home manufacture, and stands containing vases, bowls, baskets, boxes, etc., of fancy woods, and boxes veneered with tortoise-shell.

Educational System.

There was a very instructive exhibition of the educational system of the empire. It included the text-books of the public schools, samples of writing, drawing, and other studies pursued by the pupils, some from the Academy of Fine Arts at Rio, and specimens of the method and result of study at the institutes for the deaf and dumb and blind. This display was well classified and arranged in long show-cases in the body of the court, and was divided, first, according to the grades of schools, and secondly, according to the classes in those schools. For each school there was exhibited a complete series of text-books used in each class, and side by side with these were samples of the ordinary work done by the pupils.

The developed resources of Brazil are mainly agricultural, and it was therefore in Agricultural Hall that she showed

Her Richest Treasures.

Within a space here of about 4,250 square feet, enclosed by a low Moorish railing corresponding with the palace in the Main Building, and overhung with a forest of the national colors, interspersed with festoons formed of the hides of boas and of wild and domestic animals, contrasting agreeably with the whitewashed roof of the gigantic hall, she exhibited pyramids of ornamental and building timber in sections; rolls of

twist tobacco, with rope enough for sea-sounding lines; tall columns of cigarettes in showy wrappers; hundredweights of cigars, and a great amphitheatre of long-necked bottles, bearing such attractive labels as that of Aguardente de Abacaxi and containing whiskies, wines or brandies.

Close by this enclosure was a square Gothic pavilion, constructed almost entirely of cotton, with just enough wood to keep it standing, and that hidden in the white, fibrous walls. In the centre of this was a towering structure, with shelf upon shelf laden with glass jars filled with coffee—the main staple of the country. The scene was completed with bins of sugar and rolls and cases of tobacco surrounding the base of the coffee tower. The exports of Brazil for 1875 amounted to $118,267,641, and of this sum coffee netted $64,047,481, sugar $15,403,151, and cotton $14,902,443.

A very striking feature in this enclosure was perhaps the skins of wild animals—the jaguar, puma, ant-eater, peccary, ocelot, badger, snakes, and alligators, and many small animals not so familiar. The skin of the large ant-eater was the most singularly marked, and as it hung from the cord suggested a funeral hatchment, its bar sinister and bar dexter the most plainly marked, associated with some curious emblazonments which no garter king-at-arms could possibly interpret.

Spinning Silk from Cocoons.

The process of spinning silk from cocoons was thoroughly illustrated in the Brazilian section of the Machinery Hall, beginning with the hatching of the eggs, continuing through the several stages of growth of the grubs from worms one day old to worms three weeks, all of which were shown as they advanced day

by day, and still further continuing through the spinning of the cocoons by the worms, and the after manipulation of the cocoons, and the reeling of the fine and brilliant silk filaments which finally appeared in the form of the raw silk of commerce. This exhibit was exceedingly interesting, the display of eggs, worms, cocoons, silk and reels being ample for the purpose; and it was the only practical illustration of the kind in the Exhibition, although Brazil makes no specialty of the manufacture of silk. A brief description will be, we feel sure, interesting to our readers; both to those who may have witnessed the process at the Exhibition, and especially to those who were not so fortunate.

Silk-worms as soon as they are born are only about one-seventh of an inch long, and their appearance at this stage of their existence was that of meat "skippers" blackened. They are voracious feeders, and in about twenty-five days they reach the length of about two inches, at which time they cease the gormandizing of mulberry leaves and begin to weave the cocoons, the web becoming denser, until the worm occupies a cavity only a little larger than itself in the middle of the mass. It then begins to weave around itself the cocoon proper, which resembles a groundnut shell in both form and size, varying in color according to the species of worm, and being as firm as if composed of half-a-dozen thicknesses of newspaper pasted together. The cocoon is generally white, or of a yellowish shade. It is finished at the end of twelve days after the worm begins to weave.

Unravelling the Cocoons

Was done by putting the cocoons into a basin filled with cold water, which was heated by steam sufficiently

to soften the gummy substance causing the fibres of the cocoon to adhere to one another.

The fibres being thus set free, two sets, each composed of ten fibres, were secured to a reel which revolved by clockwork, and then through two niches in two heart-shaped glass plates fitted into loops at the ends of spiral springs. Passing from these loops the sets again crossed, run through two wire loops several inches apart, crossed a third time and were wound on a reel connected by belting with the shafting of the Corliss engine. The machine being set in operation, the fibres were unwound from the bobbing cocoons, brought together at the discs, intimately twisted by the little clockwork reel, and in two threads wound on the large reel from which the silk was slipped off in hanks. Some very valuable items connected with this branch of Brazilian industry deserve mention just here.

With one ounce of eggs 40,000 silkworms can be raised in forty-five days. Allowing a loss of fifteen per cent. there would remain 34,000 cocoons. These would weigh about eighty-five pounds, which, at fifty cents a pound, would be worth forty-two dollars and fifty cents. As the yield is made six or eight times a year in Brazil, a woman or child in that country may start with an ounce of eggs, and make about $300 by the end of a year.

In China and Europe the silkworm yields only once or twice a year, while in Brazil it yields from six to eight times in the same time.

Brazil made an exceedingly creditable display in

Machinery Hall,

Where her section was enclosed by iron posts, between which was looped a thick cord or rope, the strands of

which were yellow and green, to correspond with the national flag. At the centre aisle the space was divided by a passage-way running through the section, on one side of which was exhibited the army display, and on the other that of the navy.

These sections had a very martial appearance, from the arrangement of the articles on exhibition. Piles of cannon balls, surmounted by flag-staffs and the national ensign, and guns and models of guns mounted and unmounted, were at the corners and marked subdivisions of the space.

Among other articles, the miniature models of stationary and marine steam-engines attracted the visitor's attention. There were also three models of men-of-war now in the Brazilian navy, and one of the naval arsenal at Bahia, in which were represented the engines and boilers and all the different pieces of machinery. There were three boilers and two engines, and a complete line of shafting, with couplings, counter-shafting, and hangers, all complete. Here were displayed, all arranged in methodical order, planes, upright drills, boring machines, and several lathes. Small as these latter were, and all were made to scale, they showed every part as perfect as in the larger machines. Besides the engines and boilers and the shafting, there were twenty-one different machines represented, and also the rail tracks, with the two turn-tables and two trucks. There were also two models of stone dry-docks, being made to scale from those at Santa Cruz and the Imperial Dry-Dock. These were also complete, and gave a very good idea of those important government works.

Two machines used in the Brazilian mint were also shown; one was the stamp for cutting out and making

the coin, and the other a machine for milling the edges.

Among the miscellaneous exhibits which we must not overlook on account of their growing importance were the following:

Caoutchouc or India Rubber.

The provinces of Para and Amazonas, where the *siphonia elastica*, from which this valuable product is extracted, grows profusely from the seaboard to a distance of nearly 2,000 miles inland, furnish the chief supply of caoutchouc. The exports of India rubber in 1873 and 1874 amounted to 14,819,870 pounds, valued at $5,847,387.

Herva Mate.

Another interesting exhibit was herva mate, which is the leaf of the mate tree, and is used as a daily beverage in the southern provinces of Brazil, constituting one of the most important articles of commerce of those provinces. It is said to possess two great advantages over tea and coffee, being less exciting and cheaper. The exports of herva mate amount to about 30,000,000 pounds annually, and the home consumption (exclusive of the large quantities used by the native population) amounts to about 40,000,000 pounds annually. It is estimated that where a supply of herva mate for a daily beverage would cost $4 per annum, an equivalent supply of coffee would cost $18, and an equivalent supply of tea from $80 to $100. A packet of mate, containing a little more than two pounds, costs twenty cents.

Building Timber and Useful Woods.

The exhibit of building timber and useful woods was wonderful for its variety and the beauty of some of the specimens. There were over 1,000 specimens in blocks, boards and logs, cut and planed, and either wholly or partially varnished, to show the grain of the wood and their quality as decorative woods, capable of being polished. Among the woods exhibited there were several under the name of jacaranda, or rosewood, which were very fine in color and texture, and susceptible of a high polish. There were also specimens of stone wood from the Amazon valley; of the copaiba, valuable for the oil which it yields, as well as for its timber; of the Brazil-wood, which is celebrated for the coloring matter it contains; and of bow wood and macaranduba, which are used in cabinet-making. Besides these there were from 300 to 400 species of the palm, many varieties of mahogany, cedar, iron wood, etc. The palms, besides furnishing good building timber, bear valuable fruits, as the cocoanut, and yield wax, oil, starch, materials for cloth and cordage, and the sap, roots and flowers have medicinal properties. Nearly all the woods were of good texture and suitable for building purposes, and some furnish valuable fibres for ropes, cordage and caulking purposes. Of these and the resins, oils, dyes, etc., obtained from native trees, there was a large exhibit.

In a handsome upright case made of native woods, there was a beautiful exhibit of vegetable fibres for use in the manufacture of textile fabrics. These fibres were taken, some from vines and others from the inner bark of palm trees. The fibres are said to be superior to flax in strength and elasticity, and easily prepared

and cultivated. In appearance they are almost equal to silk.

The art exhibit of Brazil was not an extensive one, but it comprised several

Pictures and Statues

Which were of decided merit. Conspicuous among the pictures was one, a very large one, the canvas being about sixteen by twenty feet in size, a view of the

Naval Battle of Riachuelo,

In the Paraguayan war, painted by Victor Meirelles.

The bow of a large side-wheel steamer in action, with naval officers, sailors, etc., on board, occupied the centre foreground; to the right was seen the deck of a sinking ship, with men struggling in the water; thirteen vessels were shown in the painting, many of them engaged in firing, and the atmosphere was heavy with the smoke of gunpowder.

"The First Mass in Brazil" was another very large picture, by the same artist. It represented a sea-shore view, with ships riding at anchor in the distance. In the centre was erected an altar, surmounted by a large cross, in front of which was the priest in the act of elevating the Host. Directly in front of the altar were European soldiers and others kneeling in adoration, while surrounding them were a large number of Indians, in postures of curiosity or wonder.

Another large picture was by Pedro Americano, and represented the Brazilian army crossing the Passo da Patria, led by Marshal Ozorio, during the Paraguayan war. The landscape represented a tropical forest, through which flowed a stream of water, over

which the army was crossing. At the head was Marshal Ozorio on horseback, the face having been evidently painted as a portrait.

The statuary exhibit consisted of four pieces, life-size, in all of which the attitudes of the figures were very natural, the faces remarkably expressive and lifelike, and the anatomy of the muscles admirably shown.

CHAPTER XIX.

MINOR EUROPEAN STATES.

Belgium.

THE exhibits of Belgium were very attractively displayed in the Main Building, occupying a space between those of Switzerland and Brazil.

One of the most beautiful things in the Exhibition was found here. We refer to the splendid

Pulpit of Carved Wood,

Sixteen feet high, and composed of eighty pieces. It represented five fronts. On each front was carved a Scriptural story. On one was the marriage of Mary and Joseph, on another the Annunciation, on another Elizabeth welcoming the Virgin, on another the Flight into Egypt, and on another the Crowning of the Virgin. The pulpit had a canopy very richly carved with flowers, leaves and fruits.

Belgium exceeded any other country in the display of laces and of fine linens.

The lace manufacturers had a large pavilion containing a collective exhibition of their products; and this was, to the ladies, one of the most interesting departments in the Exhibition. The laces were shown in large glass cases, and were admirably arranged for their proper display and easy examination. Among the hundreds of specimens in the shape of curtains, dresses, etc., there were some that could only have

been purchased by an Astor or a Vanderbilt. For the benefit of those of our fair readers who did not visit the Centennial, we will briefly mention a few of these articles which more particularly attracted our notice.

Vandezande-Goemaere, of Courtrai, exhibited, among other articles, a parasol cover valued at $205, a handkerchief valued at $111, a fan valued at $83, and laces from half an inch up to four inches wide, the latter valued at $76 per yard. All these were Valenciennes laces.

Crommelinck-Decoeyere, of Courtrai, exhibited Valenciennes laces; one piece, about six inches wide, was valued at $105 per yard.

Gillou-Steyaert, of Courtrai, exhibited an elegant dress of light purple silk and lace valued at $1,225, and another silk and lace dress valued at $2,175. The front of a baby's dress was valued at $138.

O. De Vergnies & Sisters, of Brussels, exhibited black and white lace goods, among them a black lace shawl valued at $1,095, a black lace flounce about eight inches wide valued at $125 per yard, a black lace overskirt and body valued at $1,095, and a silk dress with a flounce of white lace valued at $187 per yard.

Duhayon-Brunfaut & Co., of Brussels, exhibited lace handkerchiefs from $100 to $168 each, and a white lace shawl valued at $940.

L. Sacré, of Brussels, exhibited lace flounces, valued at from $50 to $175 per yard, and a fan valued at $206.

Rene Bergerem, of Ypres, exhibited a flounce of Valenciennes lace valued at $195 a yard, and a handkerchief of the same valued at $195.

Verdé, Delisle & Co. (*Compagnie des Indies*) had a large case, in which, among other articles, were exhibited four magnificent silk and lace dresses. One of

pink silk had a bridal veil of point, mixed with round point lace, covering the entire garment. Another of yellow silk had an overdress of point de Venise lace. This lace was entirely made with the needle, and was an exquisite specimen of needlework. Another dress was of light blue and pink silks, with an overdress of Valenciennes lace, and another of white silk, with a black lace overdress.

A splendid exhibit of glass was made by the Belgian window glass manufacturers.

These exhibits were arranged in large cases, divided into compartments by partitions radiating from a common centre, and included excellent samples of all kinds of window glass, white, colored, fluted, ground, engraved, enamelled and stained. Immense mirrors were also exhibited, two of which were sixteen by eleven feet each, and were said to be the largest plates ever silvered. Very large and heavy sheets of plain plate glass were also exhibited, and there were a few exhibits of glassware, such as tumblers, goblets, wine-glasses, decanters, glass globes, etc. The glass industry is an important one, and gives support to twelve thousand workmen, the annual value of the products amounting to at least a million dollars.

A large proportion of the space in this section was taken up by a collective exhibit of

Woollen Fabrics

From the district of Verviers. There were nine hundred patterns of plain and fancy cassimeres and other goods, each pattern several yards in length, and the goods of each manufacturer were arranged in separate cases. Twenty-three different manufacturers were represented, and all kinds of fine wool goods for men's

wear were shown. None of the patterns were made expressly for the Exhibition, but the collection had been formed to show the industrial products of Verviers as manufactured for the market, and not merely to please the eye.

An uncommonly large and fine display of

Linen and Cotton Fabrics

Was made. M. Rey, of Brussels, made a particularly large and fine display of linens of every sort and quality, arranged in a handsome case of black and gold. Fine handkerchiefs, shirtings, napkins, etc., were shown in great profusion. Table linen of all qualities and widths up to 123 inches was shown in rolls standing on end, and graduated so as to resemble the ornamental pipes in the front of a church organ.

In the display of sewing machines, there was an embroidering machine, run by electric motor, which was wonderfully ingenious, and did its work admirably. It had a universal feed, which, by means of a crank, could be made to run in any direction, and thus to guide the material to any pattern. The mere turning of a screw changed the embroidery from a tapestry or tufted to a chain stitch, and with an attachment—a reel for braid—it could be made to sew on braid, either flat or turned over at each corner of the pattern. The machine worked with any kind of thread, and any kind of braid, and the samples exhibited showed that it would embroider on fine netting or tulle as well as on the heaviest cloths, leather, etc. A recent improvement enabled the workmen to slip a stocking over the works and plate of the machine so as to embroider on one side of a made stocking.

A model Belgium school-house was exhibited by the

Director General of Public Instruction, as illustrative of the primary school system of Belgium, and well repaid examination. Attached to it was a model gymnasium, containing vertical and horizontal bars, ladders, rope-ladders, dumb-bells, etc.

There were no finer heavy iron forgings to be seen in Machinery Hall than those that were displayed under the auspices of the Belgian Commission.

On entering the Belgian department, no one could fail to be struck by the huge apparatus exhibited by Chaudron, of La Valerie, for sinking mining shafts through water-bearing strata and quicksand. Immediately adjoining this was another striking exhibit—the rock-drill of Dubois & Francois de Leraing. This splendid drill pierced the famous tunnel, known as the

Mont Cenis Tunnel,

which unites France and Italy by an "under-ground" railroad.

We must not omit to mention the Corliss engine, exhibited by Van der Kerkhoeven, of Ghent, constructed after drawings and under a royalty from the eminent American builder.

There was probably no nation, except Great Britain, which sent a more uniformly good collection of pictures to the Exhibition than Belgium; and, although there were greater pictures to be found elsewhere, there were some of the first order of merit in the Belgian exhibit. The landscapes were, in our opinion, the finest portion of the Belgian section in this department, and some of them rivalled the best French landscapes. Among the most noticeable was "Sunset," by J. T. Cooseman, Brussels; others, such as "The Dead Bird—Winter Landscape," "Before the Thunder Storm," "After the

Rain," one of the best, were specially deserving of study.

Among the historical paintings the one which attracted the most attention was "Parisina," by Jean Bernard Wittkamp, of Brussels. The drawing was very fine, and the management of the light so skilful as to add to the story-telling power of the picture.

In the Art Gallery Annex there was a very spirited bronze group of a boy teaching a dog tricks. It was called "The Exercise," and was by Jean Audre Laumans. Of the other works of Belgian sculptors, the most important was "The First Child," by Charles Augustus Fraikin. The subject is one that appealed very strongly to the sympathies, and the group was certainly the work of a skilful artist. Another pleasing work by the same artist was the "Drone Bee," a little girl attempting to catch a bee which has settled on a flower. This was charming.

The space occupied by Austria, or more properly speaking

Austro-Hungary,

Was only partially enclosed, and that with a triple arch filled with Tyrolean stained glass, upon which were the coat-of-arms of the provinces, and the likenesses of Andreas Hofer, the patriot who led his countrymen against the first Napoleon, and of Rudolph IV., of the House of Hapsburg, first Emperor of Austria. The exhibits of the articles for which the country is chiefly celebrated were brought to the front, so that, in passing down the main aisle, the attention of the visitor was at once arrested by the Bohemian glass-ware, antique ceramics, bright bronzes, and curiously-carved meerschaum pipes.

The delicate Bohemian glass was the most attractive feature in this section. The collection included all the finest varieties of this celebrated glass, the finest in the world, as well as the beautifully-engraved crystal glass. The different variety of colors in the articles comprising this exhibit was truly wonderful; among the tints were cerulean, ruby, emerald, olive, opal, silver, alabaster, ivory, violet, turquoise, black, and almost every color known to the artist, the richest of all being dark sea-green. The articles consisted of urns, vases, goblets, decanters, tankards, pitchers, etc.

Meerschaum Pipes.

The magnificent cases of meerschaum pipes, in the Austrian section, appealed strongly to the masculine heart, and there were few, whether smokers or non-smokers, who were not attracted by the novel display. Meerschaum, as the name imports, is so called from its resemblance to sea-foam. It is a hydrous silicate of magnesia, and is found in veins in beds of serpentine. It is believed to be produced by the decomposition of the carbonate of magnesia in the serpentine rock. It is found in Spain, and in most of the country at the head of the Mediterranean. At the quarries it is rudely fashioned into pipes and shipped to the places where the manufacture of fine pipes is carried on.

The articles on exhibition varied in size and finish from the plain pipe-bowl with briar-wood stem, to the immense amber-tipped meerschaum, covered all over with artistically-carved Venuses, Cupids, etc. One exhibitor showed, in addition to pipes, amber cut into a variety of ornaments, among which was an exquisitely designed

Chandelier of Amber,

Which had six branches for the reception of candles, each holding four; a balustrade of amber, with railings of clear amber, surrounding the branches at the lower part. Pendants of transparent amber had figures of swans, etc., carved upon the stem, and were almost as beautiful as cameos.

Among the Austrian jewelry and precious stones there were some beautiful garnets and opals shown, and conspicuous among the latter was a large uncut stone, about three inches long, and two and a half inches wide, and a half inch thick, weighing 202 karats, and valued at $25,000. This was said to be the

Largest Opal in the World.

We may briefly allude to other prominent features in the Austrian exhibit, such as, for instance, rich specimens of the furniture used in the palaces of royalty and nobility, musical instruments, fine linen in every manufactured form, columns of wax in different colors, pyramids of wax candles, drugs and medicines, etc.

Paintings and Statuary.

In the collection of Austrian paintings and statuary in Memorial Hall was the largest and most attractive picture in the Exhibition, and a large number of smaller paintings of great merit, forming an art collection of value which very creditably represented Austrian art. "Venice Doing Duty to Catharine Cornaro," by Hans Makart, of Vienna, was a very imposing picture, and one which attracted the greatest attention.

Catharine Cornaro, the adopted daughter of the re-

public, richly endowed by the authorities of Venice, was married to the young Prince of Cyprus, but her husband dying soon after their marriage, Catharine returned to Venice, after having abdicated in favor of the republic, and, drawing towards her the society of scholars, poets and artists, spent the remainder of her days at a country-seat, Asolo, in the neighborhood of Venice. The picture represented her, after she had resigned the crown and returned to her native city, receiving the homage of the citizens. She was seated on a richly decorated throne, and was surrounded by people of all ranks and conditions of life doing her homage. The composition and coloring were admirable.

Spain.

In referring to the exhibits of Spain, we must not omit to remind our reader that when preparations were being made by foreign nations for our Exhibition, Spain and her people were distracted by civil war, which was followed by a long period of internal dissension, very hurtful to all industrial pursuits. Taking these facts into consideration, the display made of her resources and products was really very remarkable and extremely creditable.

The exhibits were contained in a large and imposing enclosure painted in imitation of colored marble, surmounted by the arms of Spain and trophies of flags. Show-cases, containing exhibits, formed the sides of the enclosure, and occupied the greater part of the enclosed space. The front also contained cases in which armor, photographs of armor, etc., were displayed.

One of the handsomest articles in the whole Spanish section was a magnificently carved sideboard of oak and

other woods, valued at $1,500 in gold, exclusive of the duty. This splendid piece of furniture stood ten feet high and six feet in width, and was entirely covered with the most elaborate carving in arabesque designs and imitations of animals, birds, fruits, etc., in alto relievo. At the extreme top of the screen which formed the back of the sideboard was carved a large basket containing fruits, over the top of which was leaping a cat of life-size, with a fish in its mouth. In the centre of the back panel was a figure of a hunter with a gun over his shoulder. Under the shelf at the back was a large panel, with a carving of several ducks in a pond surrounded by high grass and reeds; a small boy was seen partially hidden by the grass; he was armed with a fishing-rod and line, and had caught one of the ducks on his hook. One of the doors of the lower cupboard had a panel carved with bunches of grapes and foliage, and the other with a basket containing various fruits, a sickle, snakes, birds and other objects. On one of the curved ends was a representation of a bird's nest with the birds hovering over it, and on the other a monkey warming himself in front of a fire.

Minerals and ores, chemicals, ceramics, manufactured cotton goods, woollen and felt goods, laces, gloves, fans, paper in considerable variety, saddlery, sewing machines and pianos, and esparto and gunco grasses completed the display made by Spain in the Main Building.

The Spanish section in Agricultural Hall, surrounded by a wall of yellow wood, and entered under a lofty Gothic portal, was a wonderful museum of wines, oils, spices, fruits, grains, woods, tobacco, skins and nuts, all from Spain and her colonies. On the floor lay huge

logs of mahogany and rosewood. Festoons of tobacco leaves and sheaves of grain surrounded the pillars. On shelves rising one above the other were ranged bottles and jars in orderly array, filled with every conceivable article. Among the wines were many excellent varieties unknown outside of the Peninsula.

Cuba

Sent her cigars and tobacco, and the Havana cigar-makers displayed their exhibits in a row of light mahogany cases mounted upon standards. From the Philippine Islands came specimens of woods, resins and gums, fibres and hemp.

The exhibits of paintings from Spain were made up principally of religious and historical subjects, and formed a very instructive and attractive collection.

The Spanish Government Building.

In the Spanish Government Building, which was situated near the Catholic Fountain, was an extremely interesting and valuable exhibition of arms, models, educational and scientific appliances, hospital equipments, etc., which was specially deserving of study.

Perhaps no department at the Exhibition was more thronged, or was more instructive and interesting than that of

Italy.

The display made of her exhibits was chiefly of art works and manufactures. In wood carving and carved furniture there were some of the most beautiful articles in the entire Exhibition. Among the most remarkable specimens was a mantel-piece and looking-glass frame of walnut, about ten feet high, literally covered with

elaborate carving in bas relief. Another mantel and mirror frame, exhibited by Fruellini, of Florence, was ornamented with dancing Cupids beautifully carved; at either side of the frame were carved busts and at the base were two enormous lizards.

A pillar ornament by the same exhibitor was a wonderfully beautiful specimen of wood carving. It was of willow wood, light in color, and was seven feet two inches high, one foot two inches wide, and five inches thick. It occupied the time of the carver for two hundred days of twelve hours each in the years 1862 and 1865, and was valued at $600. It contained figures of flowers, foliage, fruit, birds, lizards, serpents, etc., all most exquisitely carved, without a break or error and without a piece being "let in" to the wood in any portion.

The most attractive corner of the Main Building, however, was that which contained the exquisite Florentine mosaics and cameos, an exhibition worthy of the wonderful studios of Italy.

Mosaic is simply the producing of artistic designs by means of small stones and bits of glass of various colors to give the effect of painting. There are two distinct mosaics, the Roman and Florentine. The latter is formed of stones of the natural color, that are cut into the required form: for example, the petal of a jessamine will be seen to be complete (not formed of other stones, smaller), and uncolored; the calyx will be formed from a green stone, a daisy of white, with the stamens green, and therefore this style is chiefly confined to floral designs and arabesques. In the Roman mosaic the field is wider. There is a factory in Rome in which are made these minute stones or smalts, the technical name of which is tesseræ, of which the mosaics

are made, and here as many as 25,000 shades of these stones are produced. They are generally opaque. They are put together as tiles with cement, and large or microscopically small copies of pictures can be made with them.

We saw reproduced in mosaic, paintings by the old masters—the "San Sisto," of Raphael, "Ecce Homo," the "Mater Dolora," and "Beatrice di Cenci," by Dolci.

Among the sapphires, diamonds, emeralds and jewels of every hue, we noticed specially an aigrette of diamonds, a tiny bird, and a single wild rose of pink shell, with diamond dew quivering on its petals.

A great deal of coral was shown, the most valuable piece being of a lightish red, showing strata of pale pink, and about two and a half by four inches in height and width and an inch thick, carved into a bas relief of Cupids and flowers. The silver and gold filigree work was very pretty indeed, exhibiting great variety of design, and all done by hand.

Several cases of exquisite cameos were shown, and the process by which they were cut was illustrated. First the shell medallion, then the same with the design sketched upon it, then the design blocked out with the tool; after that, in the phases of development until the last, showing the head of a Bacchus crowned with the vine, all in the very perfection of the art.

Mosaic Tables.

We must not overlook the mosaic tables, which were exceedingly handsome and valuable. Mirror frames, ebony bookcases, and bureaus and cabinets were also displayed, all beautifully carved and ornamented with Florentine mosaics of different designs.

The jewelry, pearls, medallions, turquoise and cameo

sets displayed by the court jeweler, who has establishments at Turin and Rome, were unrivalled. The *chef d'œuvre* of his collection was a necklace of twenty-four rubies, forming twelve pairs of earrings, all of the same color and size, with diadem, bracelets and pins, valued at $20,000. Three diamond ornaments for the head were valued at $10,000.

In the shape of more useful articles than what we have been describing, Italy displayed Leghorn hats, gloves, shoes, coarse woollen blankets, buttons, bed-spreads, hats, brushes, soaps, candles, chemicals, perfumery, paper and books.

The Italian agricultural display was very tastefully arranged, and, as was naturally to be expected from sunny Italy, the most prominent feature was a full exhibit of the products of her vineyards. The space was partly enclosed by glass cases, containing wines and liqueurs, while in the centre a number of stands of a pyramidal shape were filled with hundreds of bottles. On the floor, round the side of the section, were ranged plows, cultivators and other farming implements in use among Italian farmers.

Among the exhibits of dried and preserved meats the preparation of

Pologna Sausages

Attracted considerable attention, some samples being six feet in length. Then came oils of all kinds, arranged in a high glass case; after these drugs, chemicals, pharmaceutical preparations and colognes, the latter in fancy bottles, whose varied colors made a very attractive appearance. Hundreds of jars contained samples of wheat, rice, nuts, barks, etc., while in glass cases were shown specimens of different minerals. The Italian

exhibits gave a very fair idea of the agricultural products of that country.

The most valuable portion of the exhibit of Italian art in Memorial Hall and its Annex was the collection of Greek and Roman antiquities belonging to Alexandro Castellani, of Rome. These were contained in a suite of three rooms opening from the east corridor of Memorial Hall.

The first contained the marbles and bronzes; the second, the majolica; and the third the gold ornaments, the engraved gems, and other articles of personal adornment. The chief value and interest of this collection, with the exception of the engraved gems, consisted in their antiquity. Most of the marbles date from the first or second century, A. D., and were found accidentally in Rome or Naples. The bronzes were, for the most part, found buried with the dead in the Necropolis of Palestrina, and are chiefly articles of toilet used by the Etruscan and early Latin ladies. The value of the Castellani collection is $200,000, and from what we have heard we have every hope that this very remarkable collection will have been purchased to be retained in this country, the rarity and worth of its treasures rendering it invaluable as an art educator, as a nucleus for more extended collection in the same branches, and for purposes of illustration in the lecture-room.

In the Art Gallery, among the many hundreds of pieces of statuary exhibited by Italian artists, all of which displayed remarkable technical skill and artistic power, the most noticeable were the following: "Aruns," or Arontes, in the act of shooting the Virgin Camilla, by Pietro Guarniero, of Milan; "Study and Work," by Cav. Ugo Zannoni, Milan, an excellent figure of a girl reading and knitting at the same time; "The Youth of Michael Angelo," by Egidio Pozzi, Milan.

In the Art Annex there were many fine statuettes in marble, representing children at play, in grief or in sorrow, or aping the vanities and faults of their elders. There was wonderful humor and fine expression in all these figures, and great technical skill displayed in the representation of texture and drapery. These attracted considerable attention, and were by the mass of visitors, we think, preferred and better appreciated even than the generally solemn and mysterious productions of high art, which they had not the time to study or understand.

Oil paintings and other pictures were of secondary importance to statuary in this department, and there were none which struck us as being particularly deserving of note.

Mosaic Pictures.

The mosaic pictures are necessarily inferior to paintings, lacking their freedom and play of hand, but when we take into consideration the amount of labor expended on them, the value of the material, and cost of execution, and their extreme durability, they are extremely valuable. These are made of small pieces of colored glass imbedded in cement, on a plate of metal or stone, the colored tesseræ or pieces of glass being grouped so as to form a picture, usually a copy of some valuable painting. In passing from the high light to the shadow of any object, the artist must use separate pieces of glass of tints varying so little as to show no line between the separate pieces, and sometimes this must be done with exceedingly small pieces of glass or stone. It is said that ten thousand tints are required to form a full palette of colors, and these must be methodically sorted and arranged ready for use.

There were several beautiful specimens of this kind

of work in Memorial Hall, such as fine table-tops, in Florentine mosaic, where simple designs, flowers, geometric patterns, etc., were made of small pieces of natural stones, inlaid in black marble, porphyry, or other stones. A portrait of Lincoln, in mosaic, was a fine specimen of the work in glass.

In Memorial Hall there was shown a collection of works by unknown artists, lent for exhibition by

Pope Pius IX.

These included a bouquet of flowers and two Madonnas in fine mosaic, and an elegant piece of tapestry, representing the martyrdom of St. Agnes. The specimens of the mosaic work were exceedingly fine, and the tapestry was also an unexceptionably fine piece of work.

CHAPTER XX.

SWEDEN AND NORWAY.

THESE two countries, although independent kingdoms, are under a common king, and preserved in our Exhibition a similar relationship. Each was independent of the other in space and enclosures, though their display of resources and exhibits were so much alike that they appeared as the contribution of a single people. We shall, however, take them up separately in briefly describing some of the more prominent features of their exhibits.

In proportion to its size we think that Norway made as fine an exhibit as any country, and from the very little that was known of Norwegian goods in this country, the display was unusually interesting.

The Norwegian section was enclosed by a light framework of pine decorated with colors. The exhibit of manufactures was small, but included several objects of interest.

The articles that attracted the most attention were representations in wax of the people who live in Norway and Sweden. They were correct and lifelike representations of their soldiers, their weddings, their watchmakers, their hunters, and scenes in their home life. The most striking group was in Norway, and represented a child dying, with the mother bending over it, the father at the head of the cradle with the Bible in his hand, but too intently watching the sick

child to look at its pages, and the grandparents at the foot, gazing at the little one whose breath was fast leaving it. In Norway there was a representation of a man, his wife, a reindeer and a sled. The man was about taking a ride, and his wife was coming towards him with the lighted pipe in her hand. The expressions of the faces were lifelike, and the tints reproduced with remarkable fidelity to nature.

There was a very striking display of iron in the form of the forward half of an old Norse galley; the mast was made of long iron bars, the sheets and shrouds were of chains and wire cables; on the sides of the prow hung shields covered with spikes and nails; a pile of bar iron and steel lay upon the deck, and standing at the bow, behind the dragon figure-head, was a painted Viking in armor, leaning upon his battle-ax.

Very striking, too, was the display of furs, including the skins of white and brown bears, lynxes, wolves, and foxes, dressed with the heads on, which are used for rugs and carpets. With their glass eyes and teeth fastened in painted wood to imitate the red mouths of the creatures, these heads looked startlingly lifelike.

The silver filigree ornaments were not equalled in the Exhibition for varied beauty of design and minute grace of execution.

Noticeable among other things were the exhibits of silver ore and ingots, matches, blank books, school furniture from Bergen (plain deal desks and seats with queer narrow paddle-shaped backs), a brilliant show of cod-liver oil, wicker-work furniture, photographs of peasants in costume, and droll two-wheel carriages, called kariols, with their long narrow bodies, in which the driver half sits and half reclines.

The Swedish display was as creditable as that of her

sister kingdom of Norway, and in orderly and effective arrangement was nowhere surpassed. Much the most striking and largest group of exhibits was that of the iron and steel. Nowhere in the whole Exhibition—not even in the United States section—was there such an extensive, well-arranged, and well-classified show of these metals. Twenty-eight exhibitors contributed, and among them were the two largest establishments in the kingdom, those of the Motola and of Sandwik, which were not represented at any of the World's Fairs in Europe. Huge columns and pyramids of iron and steel bars and pipes, great screens towering nearly to the roof of the building, upon which were arranged tires, bars, ingots, etc., collections of iron and pig metal, cases of nails, a reindeer made of spikes, huge railway axles, maps of the mining districts, and drawings of furnaces and machinery, were among the many things seen in this group. The arrangement of the articles was such as to produce the best possible impression of the magnitude and excellence of this leading Swedish industry.

To go from the most solid and substantial to the most delicate and fragile of articles is a sudden transition, but as the porcelain was the second group in importance it next demands our attention.

There were excellent reproductions of the old Palissy ware, not as good, perhaps, as the works of Barbizet in the French section, but nevertheless showing a high degree of artistic excellence. The Parian ware was also very fine, the work in vines and flowers being exquisitely delicate. There was a large vase in black and gold, from the handles of which hung heavy wreaths of flowers of Parian work that was remarkably fine. The tea sets, with black ground and delicate

vines and arabesques in white, were very pretty, as were the large white vases decorated with painted flowers.

Perhaps the most striking object in the whole ceramic collection was a porcelain stove about twelve feet high, of a delicate blue, richly ornamented in white, gold, and a darker blue. Nothing but a colored photograph would give an idea of the elegance of this article. Its price was $1,000. A pair of gigantic candelabra, in the same style, beside it, was valued at $900.

The rich show of furs was an exceedingly attractive object. They were valued at $24,000, and were in every variety of the choicest kinds, and made up in every conceivable style.

In a little area detached from the main body of the Swedish section, and between Japan and Denmark, across the main aisle, was the military display of the country, where were costumed figures showing the uniform and equipment of the Swedish army, a steel field-piece with its caisson, and complete collection of arms and accoutrements, which were worthy of the careful study of military men.

Adjoining the military exhibit was that of the technical art schools of Sweden; and that reminds us that we have said nothing of the

Swedish School-House,

Situated north of the Main Building, which attracted so much deserved attention from its tasteful design. The materials used in its construction were imported from Sweden. It represented a typical primary country school-house, and was forty by fifty feet in size. The main entrance opened into a large vestibule, on the

right end of which was a large private apartment for the teacher, and at the other was the school-room. Three rows of school-desks of peculiar pattern were here arranged. The desks were all of the same size, but were adapted to children of different ages by means of a folding foot-board, which could be raised or lowered. The desks were provided with an ink-well, book-rest, a place for the slate, and the books were protected from the dust by a lid.

The teacher had a commodious desk, behind which was a high chair. Each school-room was provided with a cabinet organ, cheaply constructed, which is usually played by the teacher. Music is taught in all the schools, and a large musical staff, with places for movable notes, was fastened to the organ.

The system of instruction in an elementary school seems to consist in a large degree of object teaching, judging from the articles on exhibition in this building. There were glass cases of mosses, plants and woods labelled, and cards with pictures of birds and beasts, each with its appropriate label.

The art display of Norway and Sweden was somewhat scattered; the paintings were of a very good class, as a rule boldly painted in broad masses of color, some of the landscapes of the first class, and a noticeable feature of the exhibit was the number and excellence of the paintings by women.

The exhibit made by the

Netherlands

Was not merely a collection of merchantable wares, sent to the Exhibition for the profit of manufacturers, but the result of an intelligent effort on the part of the Dutch government to give our people the opportunity

of studying the public works, educational systems, manufacturing industries, agricultural products, and colonial resources of the sturdy people that inhabit the "hollow-land" lying upon the North Sea. Formed on this idea, the exhibit of the Netherlands was a valuable museum of information about the country rather than a bazaar of attractive and salable goods. Entering the enclosure under rich maroon hangings, pendant from graceful arches of light woodwork, we came first to a great seven-winged screen hung with maps, diagrams, and pictures, illustrating the wonderful system of public works by which the ocean is kept from inundating a large portion of the country, and a circulation is maintained in the waters of the canals and streams below the sea level. The engineering works employed in draining Haarlem Lake, and by which it is proposed to convert into fertile farms the far greater expanse of the Zuyder Zee, were shown, and there was an admirable series of *papier maché* casts, representing the surface of a portion of Holland with its dikes, rivers, canals, and bridges.

An interesting exhibit was made by the artisans' school at Rotterdam of the work of its pupils in stone-cutting, modelling in plaster, wood-carving, and so forth, and the public school system of the Netherlands was set forth in a very thorough and creditable manner. Instructive models of houses, grounds, views of interiors, and plans of public buildings gave a more correct idea of the domestic life of the Dutch than could be obtained from reading volumes of description; and the model dwellings for workingmen could be studied with profit by architects, builders, and philanthropists interested in ameliorating the condition of the laboring classes of our great cities.

A part of the Exhibition that attracted all passers-by was the collection of carpets from Delft. These were made in one piece, and in imitation of Smyrna carpets, and were, if anything, softer, thicker and richer in color than the originals.

Among the few Dutch manufactures that can properly be ranked as art industries is that of lacquered work on wood, which has evidently been borrowed from the Japanese, with whom for a long time the Netherlands was the only nation that had any commercial intercourse. The cabinets and caskets in this style by no means equalled those exhibited by the Japanese themselves. There was, however, a large screen of surpassing beauty, that was at the Vienna Exhibition, inlaid with mother-of-pearl, ornamented with four scenes from Goethe's Faust, and four from different poems by Schiller. This was the one unapproachable and perfect gem of the Holland exhibit.

The representation made by the Dutch Colonies was one of the most interesting departments in the building. Here were grains, spices, woods, arms, weapons, embroideries, filigree work, and gorgeous woven stuffs of the East Indies. In the centre of the court stood a brilliant Indian pagoda, filled with the choicest specimens of the products and native industries of the Dutch possessions in the East, and an exceedingly fine collection of East Indian weapons exhibited by the King of the Netherlands, and selected by his order from the palace of Het Lov and from the Royal Cabinet of Curiosities at the Hague.

In Agricultural Hall the Dutch made a compact and well-ordered display, containing two very interesting collective exhibits made by agricultural societies, the finest samples of fruits and vegetables put up in glass

jars to be found in the Exhibition, fishing nets and models of fishing craft, a marvellous variety of the cordials and fancy liquors for which Amsterdam is famous, and numerous piles of the hard, round, little red or tinfoil covered cheeses of Edam.

A very comprehensive and interesting exhibit was made by

Portugal

Of its resources and products, taking into consideration its size and the limited trade relations with this country.

The variety of manufactures was very large and full. It included a wide range of textile fabrics—silks and brocades, coarse white cottons and prints, good cassimeres, broadcloths, and woollen shawls, boots, shoes, and other leather goods, felt and silk hats, glassware, pottery, and porcelain, cutlery, tools, nails, wire, tinware, and much other work in metals; buttons, paper, books, silverware, jewelry, baskets, etc.

The most unique class of exhibits was the pottery. There was some peculiar ware of red terra-cotta, marked with outlines of ferns and other leaves and studded with round knobs in which were stuck little bits of white marble. Majolica and even imitations of Palissy ware were shown, but the color and workmanship were inferior. There was some good porcelain ornamented with floral devices, and an abundance of white pottery covered with pictures in blue and green, exactly like the English ware in common use in this country twenty or thirty years ago. There were some excellent figures in porcelain, colored in imitation of nature and representing peasants, etc. Smaller figures also of porcelain had their woollen clothes represented by flock or fine wool clippings dusted upon the wet paint, which, on drying, fastened it there.

The fine arts exhibits of Portugal were all in the Main Building, and included some remarkably beautiful specimens of

Wood Carving

For interior architectural decoration, exhibited by the Commercial Association of Oporto.

The finest carvings were intended for the decoration of tables in the parlor and the directors' room of the Commercial Association, and were made of rosewood, jaccaranda, boxwood, etc. One little piece, representing an anchor with rope attached, was carved of a single piece of wood, and was simply a marvel of delicate workmanship. There was probably no finer work in wood to be found in the whole Exhibition.

The greater number of these carvings were for the embellishment of columns, capitals and for the coves of window mouldings and door frames. The scroll work for the latter purpose was in high relief and of involved pattern. It was made in sections to fit over coves in mouldings, and was exhibited in sections and put in position. Nearly all the carvings were made in chestnut wood, some were varnished and others were painted in polychrome and gilded. A painted and gilded column and capital, handsome in design, was exhibited, also a column enclosed in an elaborate piece of carving, through the interstices of which the column was shown. Among the art exhibits were a finely carved crucifix in marble, good plaster images of a boy on a turtle's back and a boy on a dolphin, and plaster ornaments for building purposes.

An immense display was made in Agricultural Hall, in the Portuguese section, of

Port and Madeira Wines,

Case after case, with long rows of bottles arranged on shelves, each bottle (except those from Madeira) with a white and blue label with the name of the producer, his residence, the annual product of his vineyards, and the price of the wine at home.

Some of these bottles were marked as low as nine and even six cents a *liter* (a little more than a quart), and twenty-five and thirty cents was an exceptionably high rate!

There were few sections of the Main Building in which so much that was really interesting was crowded into a small space and so compactly and systematically as in the

Swiss Section,

Which was arranged in a series of courts enclosed by show-cases of the severest plainness, the iron frames being painted a Quaker drab color, unrelieved by any ornament. Taking them in their order in which they came, we will call these enclosures, from the exhibits which constituted their principal feature respectively, the court of watches, of education, of embroideries, of textile fabrics, and of wood carvings.

The display of watches was very fine indeed. There were forty-five exhibitors of watches, chronometers, and parts of watches, and their products embraced the whole range of pocket time-pieces, from the cheapest silver cylinder escapement up to wonderfully elaborate pieces of mechanism that struck the hour and the minute and told the day of the month and the phase of the moon. There were watches, too, so small that they were inserted in finger-rings and in charms for

ladies' chains, and one miracle of minuteness was contained in a gold penholder. It had three dials of three-sixteenths of an inch diameter each, indicating the time, the day of the week, and the date of the month. The price was $800. The watches set in gold rings were a little larger, and cost in the neighborhood of $300.

In the same case there was a handsome gold snuff-box. A spring opened a part of the lid in which was a bird, not more than half an inch in extreme length, and of brilliant plumage. The little fellow sang loudly and clearly, opening and closing his mouth, moving his wings, and turning about in the box in the most natural manner. His song concluded he disappeared, and the lid closed over him so suddenly that the visitor could scarcely realize that he had gone. This was a beautiful and very remarkable toy.

Among the musical boxes exhibited in the vicinity of the watches and clocks was a handsome

Swiss Chalet,

Containing a musical box. When the air had been played a bird of brilliant plumage appeared in a little observatory on the roof, and sang with great sweetness and surprising power, moving his throat and body in an exceedingly natural manner. There was a clock in the cottage, and the hours were announced by the music and the singing of the bird, or both were made to perform at will. Another musical box, by the same exhibitor, attracted considerable attention. On its top were three figures which joined in the performance of the music.

The educational system was represented by every canton in the confederation, by a very interesting dis-

play of the apparatus, books, etc., used in the schools, both public and private. The Kindergarten, which is very popular in Switzerland, was represented by excellent specimens of the work of the pupils, and a full array of articles used in the Froebel system of object-teaching. In the third court were laces and embroideries from the cantons of Appenzell and St. Gallen, exquisite work, especially the fern-pattern curtains. Some of the work was done by hand, and some by machinery, and so perfect are the machines in use that it was almost impossible to distinguish one kind of work from the other.

In the fourth court there was quite a large display of cotton and silk goods, the latter of handsome colors and good fabrics, but not of as fine a finish as those of Lyons; also straw goods, braids, horse-hair goods, etc.

The wood-carvings constituted the principal art exhibit of Switzerland. The carved wood-work from the Bernese Oberland is well known to all American tourists, and the specimens exhibited were very beautiful specimens of art taste, and of skill in the handling of tools. All the pretty articles shown—chalets, clocks, chess-men, boxes, and mantel ornaments—were cut out by hand in the cottages of the peasants, high up in the Alps, in the winter season, when they can do no outdoor work. The woods used are chiefly pear, cherry, oak, and walnut. The most beautiful specimen which we saw was a book-holder in white maple, with Alpine roses and edelweiss, carved in the most perfect imitation of nature.

In the Machinery Hall, among the two or three machines which made up Switzerland's display, there was a small

Water Motor or Engine,

Which from its simplicity of design, excellent workmanship, and general efficiency, deserves a special notice. The principle of this machine was substantially the same as the ordinary oscillating steam-engine; differing from it, however, to this extent, that it had no eccentrics and no valves, or any of the general contrivances for admitting or cutting off steam. The great difficulty with American inventions of this class has been to get a machine to run with considerable velocity, and yet without creating a great deal of noise and jar. This difficulty is owing to the non-elastic quality of water. Under these circumstances the jar or concussion at the end of the stroke soon wore or otherwise affected the connections and other working parts in such a way and to such an extent that after a little while the engines had to be set aside. This difficulty has been to a great extent, if not wholly, overcome by the system patented by Messrs. Wyss & Studer, and exhibited here. It consisted in cushioning at the end of the stroke on compressed air, two air-chambers being attached to the supply-pipe and one open chamber to the exhaust. The water was admitted into a chamber on the side of the cylinder, and, after doing its work, was discharged from the opposite side. The cylinder worked in trunnions, and the water was admitted into it through ports from a chamber representing the segment of a circle whose radius was about one-half the stroke, the admission, form, and area of the ports being duly proportioned to the size and form of the engine. This little water-engine, which had a maximum piston speed of 250 per minute, was chiefly designed as a substitute for manual and animal labor on a small scale.

Denmark.

The display made by Denmark was not a large one, but comprised a very interesting collection of articles from Greenland, and of pottery, porcelain-ware, etc., of her own manufacture.

The exhibits were almost entirely those of private individuals, the only representation of any branch of the government being the topographical maps, exhibited by the Royal Staff.

The enclosure set apart for Denmark, in the Main Building, was a plain neat structure, with a large arched doorway, surmounted by the coat-of-arms of the kingdom, and the sides decorated with trophies and shields.

The most important feature was the pottery and porcelain-ware, conspicuous among which was the exhibit made by P. Ipsen's Widow, Copenhagen, the largest and the oldest manufactory in Denmark, which is famous for the rich and delicate salmon color of the clay. The vases, jugs, bowls, etc., were extremely handsome, the work done with the greatest delicacy. The Royal Porcelain manufactory also exhibited some very beautiful biscuit bas-relief, after Thorwaldsen.

The collection from Greenland contained many objects of extreme interest, prominent among them being a model of an Esquimaux house, and a "Kyak," a native boat, resembling somewhat the "shell" in which our boat races are rowed. It was made of skins which extended over the opening in the centre, where the oarsman sat, and covered him as with a water-proof coat. We were not a little amused at seeing among the inventions in machinery, etc., exhibited in this section,

a simple register of fares, intended to be used by car conductors in place of the bell-punch, and which was claimed to be thoroughly effective, except in cases of collusion between the passenger and conductor.

In Agricultural Hall the exhibits consisted chiefly of liquors, grain, preserved fruits, and vegetables, which were arranged on tables covered with cloth, and also in upright cases.

Considering the internal dissensions in the Ottoman Empire, we had not expected much of a display of the resources and products of

Turkey,

And were therefore most agreeably surprised when we examined the exhibits, which comprised many very interesting articles.

The section was not surrounded by any enclosure, and was not decorated to any extent, except with hangings of Turkish carpets, which formed its most prominent feature. These are the best known fabrics of the country, and a sight of them was, of course, the first thought of visitors to the Turkish section. Their great merit consisted in durability of color and fabric. Two rugs were shown, one of which was said to have been in constant use for seventy years, and the other nearly as long. Both looked just as bright as the new rugs which hung beside them. The places of manufacture are Smyrna and Siras. The largest carpet on exhibit was about twenty feet by fourteen feet square.

In front of the section was a case containing two preserved specimens of the celebrated Angora goat, with long, soft fleece, which resembled silk.

One of the best exhibits of the manufactures of Tur-

key was of woollen cloths, and similar manufactures made by machinery, an industry recently introduced. The cloth was coarse and not finely finished, but some of it looked very much like the dress goods fashionable here last winter. Camels'-hair cloth, which is said to be water-proof, was exhibited. It looked like gros-grained silk, but was without any lustre. Cloth made from the hair of Angora goats and heavy felted goods were also exhibited.

Among the chemical manufactures, the celebrated attar of rose was exhibited, it being a branch of industry very largely carried on in Turkey. It is a very fragrant perfume, made from the petals of the rose. The method of manufacture is to distil the leaves and place the rose water in flat open pans over night, in the morning skimming off the oil which rises. It takes about 200,000 well-grown roses to make an ounce of the oil, which has a market value of from $40 to $100 per ounce. Much that comes to market is adulterated with sandal wood and other perfumes. The bottles of the oil exhibited were made in Kezanlik. It is marketed in flasks covered with felt, which must be kept closely sealed, as the oil is very volatile.

The soaps of Turkey have a world-wide reputation for toilet uses. Quite a large variety of these were on exhibition. The ingredients are pure olive oil and soda or pearl-ash. About a million pounds of pure olive oil soap are made annually.

Prominent among the agricultural products was Turkish tobacco, which has long held its place as the most fragrant of any variety used by the smoker. Its quality is not so much the result of careful curing and preparation as of the character and soil of the climate where it is grown. The samples on

exhibition were quite light in color. It was sold at the section with long stemmed pipes and chibouks. Some of the tobacco brought six dollars per pound.

The other articles exhibited were sponges from the coast of Syria and the Grecian Archipelago, of which there were no less than 250 different varieties, some of them valued at ten dollars each; minerals and metal-work; pottery from the Dardanelles; and musical instruments.

A stand for the sale of trinkets and mementos was situated near the section, presided over by a Turkish lady. Here were sold necklaces and bracelets, made of what was called rosewood, which was very fragrant; handsome ornaments carved out of olive wood from Jerusalem; crosses, ear-rings, and many other articles of amber; and pipes of all shapes and varieties.

Turkish Bazaar and Cafe.

We must not omit mention of the Turkish bazaar and café, which was a large octagonal structure situated behind the Pennsylvania State Building, having three entrances opening upon verandahs. The interior of the building had a domed ceiling painted in the Turkish colors, and ornamented with Turkish designs. All along the sides of the room were divans, covered with blue and straw-colored plush, and in front of them circular tables. On the east side was a dark walnut carved counter on which were ranged glass dishes filled with all kinds of oriental delicacies. The establishment was presided over by native Turks, dressed in their picturesque costume, red fez cap, red tunic, yellow sash, and blue and brown silk trousers; and

these furnished visitors with coffee and pipes, the former served in tiny cups, about the size of an egg-cup, enclosed in silver holders, while the latter, supplied with Turkish tobacco, could be obtained by those desiring them. Dispersed through the room, at the sides, were small bazaars where were sold rich costumes, carpets, pipes, swords, daggers, hilts, and many other novel ornaments.

CHAPTER XXI.

EXHIBITS FROM AFRICA.

THE greeting sent by the oldest nation of the world,

Egypt,

To the youngest, consisted of a very interesting and instructive display of the products and resources of that fertile country, and of mementos of her ancient splendor.

The section was arranged with lateral and transverse aisles; from the entrance a bird's-eye view of the whole of the interior was obtained. At the left of the main entrance was a plaster cast of Rameses II., modelled after a statue representing him as a young man.

One of the most prominent and attractive exhibits stood directly in front of the entrance, a large closet or armoire, constructed out of several highly ornamental woods, and richly decorated with carving and inlaid with pearl and ivory. It stood about fifteen feet high, and was shown by a Cairo dealer. Several chairs, stands, and music racks were also exhibited, elaborately ornamented in a similar style. A sideboard valued at $4,000 was also there, all evidencing the most industrious and laborious painstaking on the part of the Egyptian mechanics to elaboration of details and the minutiæ of workmanship. As an instance of this we particularly noticed a door covered with the most

intricate carving, which had taken the united labor of several men for two years to complete.

The same attention to details was seen in the goldsmiths' work. A coffee set was exhibited, made in filigree work, of twenty-two carat gold, by negro workmen at Soudan. It was all made by hand, and the tray and cover were particularly rich and beautiful. The cups, as they stood, resembled egg cups, and were intended to receive small detached porcelain bowls out of which the coffee is drunk. This set was valued at $4,400.

The assortment of horse and camel trappings was large and interesting, as was also that of armor and implements of war. The latter included sabres, long and heavily curved, shields of elephant skin, spears, bow and barbed arrows, a shirt of mail, and many other weapons and defences.

Among the former was a case of richly embroidered horse trappings from the stables of the

Khedive of Egypt.

They consisted of saddles for horses, dromedaries, etc., richly embroidered with gold and silver thread upon the richest green silk velvet, which was nearly covered with ornaments.

The textile fabrics and specimens of embroidery included several very curious exhibits. There was, for instance, a door curtain, used alternatively as a praying mat, made of red velvet and embroidered by hand with gold and silver, and valued at $3,000. A tray cover of green velvet and gold was almost equally rich. Quaintly shaped but comfortable-looking cloaks for men's winter wear, a roll of cloth made from the wool of the Angora goat, a door mat, evidently serviceable,

and slightly removed from the prevailing Turkish design, were among the other exhibits of this class. To go further into detail would be merely to catalogue a wonderfully miscellaneous collection of samples of native wood and grain, tobacco, wines, opium, nargilehs and chibouks, ostrich eggs and feathers, articles of rhinoceros horn, wax and cloth imitations of the mulberry tree with cocoons, and a thousand others.

Among the antiquities and curiosities of this wonderful country, the origin of whose people is wrapped in mystery, was a set of very remarkable furniture for the writing-table, in solid silver, admirably executed. It consisted of two candelabra, formed of female figures; an inkstand, representing a Nile boat with female figures at the bow and stern, paper weight, sand-box, etc., and two papyrus cases, also of silver, designed for holding manuscript.

Near this was an alabaster water-cooler, made out of a single block, 4,000 years old. The vestment of an Abyssinian priest took us back well-nigh a thousand years; at least the gold and silver ornaments with which it was richly covered were of that age, but the vestment itself was of a dark blue silken fabric of an evidently more modern date. There were several other articles of a religious character, or connected with funereal rites, deserving of attention. Among them was the door of a mosque in Cairo carved and inlaid with ebony and ivory, and dating from the fourteenth century. The scarabæus, the symbol of creation, appeared in different forms—among the fittings of a writing-desk copied in silver from an antique original, and in the shape of perforated beads, with hieroglyphic engravings taken from mummies.

Samples of Cotton.

The growing of cotton has lately become one of Egypt's greatest specialties. One of the most valuable portions of the present Exhibition was a full showing of the trade of the country in this direction. Along the centre of the room was a large stand on which was displayed a collection of over 2,000 samples of cotton, representing the crops of eight years, with classification and prices in Egypt and England. The staple was long in this cotton, and the article was of excellent quality. Other textile fabrics, raw and manufactured, are also shown, such as cords and ropes of flax.

Finally, after passing through the Egyptian court, right in the centre, was a mammoth crocodile, appropriately placed as a guard over all these Nile valley treasures, himself the representative of the strange country, and seeming to assert that the mystic river, for which he stood in visible form, was the true animating force of Egypt.

Republic of Liberia.

The resources and products of the Republic of Liberia were well represented in the exhibition in Agricultural Hall, near the central part of the eastern front.

The collection consisted of specimens of coffee in the hull, as it was found growing wild, and as cultivated; also the machinery in use for separating one size of coffee from the other, and for hulling it. These machines were exhibited in full operation. The unhulled berries were first passed into a revolving cylinder, which was nothing more than a wire sieve of various sized meshes. The berries, passing from the smaller meshes to the larger, dropped through into

drawers under the cylinder, when they reached large enough meshes to admit their passage. They were then carried into a machine for hulling the berries, and thence to a fan for cleaning the grains of the hull. The former hulled at the rate of a bushel a minute, the latter cleaned the berries at the rate of a bushel every two minutes. The grains of coffee were then passed to another sizing machine, and having been again graded, the coffee was ready for export.

Palm oil forms one of the principal articles of export from Liberia, and was exhibited both in its native state and in specimens of soap into which it is there manufactured. A species of oil was shown which is extracted from the kernels of the stones after the palm oil has been obtained from the fruit. This nut oil is at first rancid, but is used in England for making shaving soap, and in France for table oil after it has been perfumed.

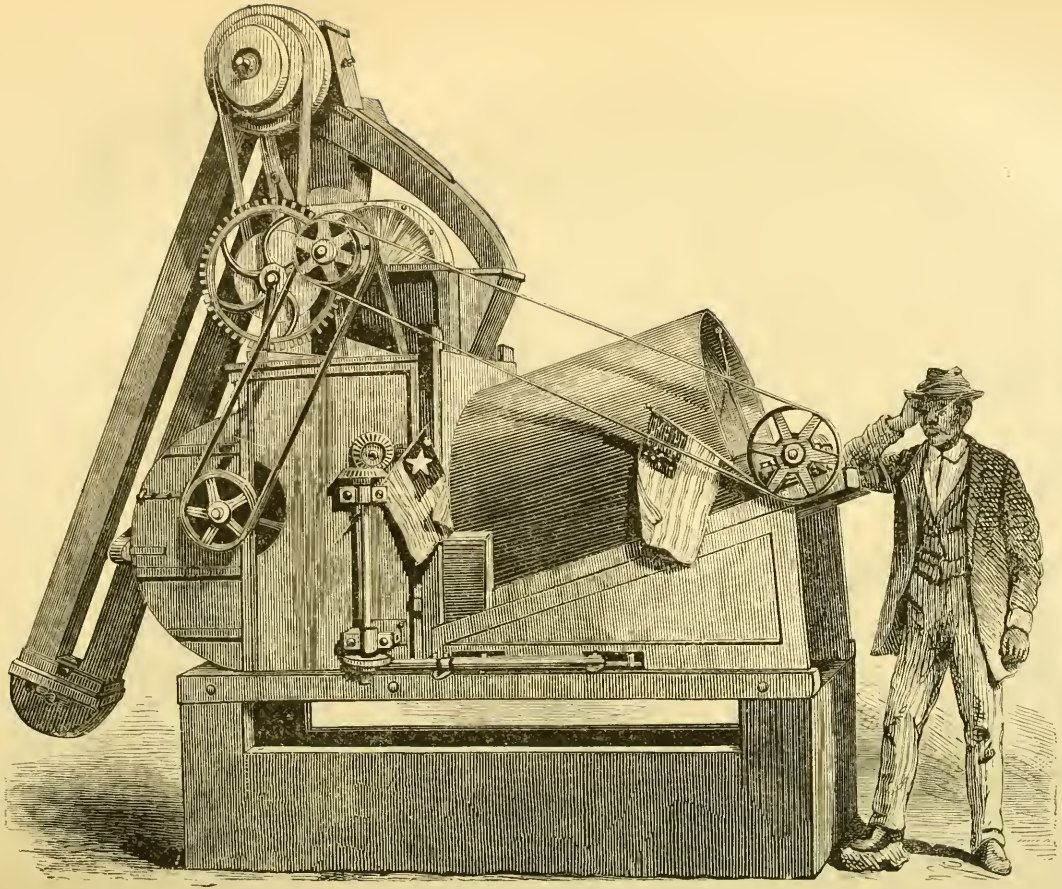
The other products of Liberia which were on exhibit were specimens of cam wood, a valuable dye; ivory tusks, from those of a baby elephant to a pair six feet in length; samples of sugar, ground arrow root, cocoa, African ginger, native woods, and some interesting articles of native ingenuity.

The Orange Free State,

Another republic of South Africa, was the youngest country represented at our Exhibition, and so little indeed was known regarding it that when visitors came across the enclosure containing its exhibits in the Main Building, with the name inscribed above the portal, not one in ten appeared to know where it was situated. For the benefit of any of our readers who may be in ignorance on this point, we will here state that the

LIBERIAN IVORY DISPLAY.

LIBERIAN COFFEE DISPLAY.



LIBERIAN COFFEE HULLER.

LIBERIAN PRODUCTS.

Orange Free State is situated in South Africa, to the eastward and northward of the British Cape of Good Hope settlements, and to the westward of the British Colony of Natal, and is embraced between the parallels of twenty-six and thirty-one degrees south latitude, and between the meridian of twenty-four and thirty degrees east longitude. These are not exact figures, but sufficiently near as indications, as the territory of the republic is irregular in form, covering an area of about 40,000 square miles—rather less than the area of Pennsylvania. There are about 45,000 white inhabitants, and about 200,000 native Africans within the boundaries of the republic. There is an elective President and Legislature, or Assembly, of one House. The country is largely pastoral, well adapted to sheep grazing, to which industry the civilized inhabitants turn their attention chiefly, for the sake of the wool crop; but there are diamonds there also. The imports in 1875 amounted to about $3,500,000, and their exports to about $7,000,000, of which nearly $4,000,000 were of wool.

The display made was small, but very interesting and instructive. There was white wheat with remarkably large berries; excellent corn; a singular grain called Kaffir corn; wool in huge glass-topped boxes; the hides of the springbok, jackals' skins, dried fruits, and bituminous coal. Then, in the way of manufactured articles, there were rhinoceros-hide whips, harness of first-rate workmanship, and a model of a wagon for wool transport. Among the natural curiosities was the fruit of the cream of tartar plant—a small gourd containing a handful of brown seeds about as large as Lima beans, each covered with a white powder, which it is said possesses all the properties of cream of tartar.

The cases of stuffed birds of brilliant plumage gave an idea of the ornithological richness of the country, and a diamond in the rough, worth about $7,000, stood for the recently discovered wealth of the diamond fields. A pair of elephant tusks were the largest in the Exhibition except those in the Egyptian section.

The country evidently abounds in natural resources, and the rapid influx of immigrants drawn there by the diamond diggings will probably open up a career of prosperity equalled only by that of California after the discovery of gold.

Cape Colony and the Gold Coast Colony,

Belonging to Great Britain, were very creditably represented, indeed, by a very fair collection of the natural productions, art manufactures, etc.

The special pride of the Cape Colony seems to be their new poultry—the ostrich—which has been tamed and made a most valuable addition to the list of domestic fowls. On a stand was shown a stuffed ostrich, two days old, about the size of a common hen; another one fourteen days old, and the model of a leviathan ostrich incubator that will hatch twenty-four ostriches out of twenty-five eggs when seven days old. The ostrich is worth fifty dollars in gold there. Not a farmer so poor but has one on his farm, and it seems to be the most profitable live-stock they can raise. Each farmer will have from two to two hundred, all as tame as chickens; and as the feathers command a large price, the business of rearing ostriches is becoming an important industry in this colony.

The Ostrich Incubator

We were particularly struck with, and think it de-

serves a few words of explanation. It was invented several years ago by Mr. Arthur Douglass, an ostrich farmer, of Cape Colony. Through the wholesale destruction of the wild ostrich by hunters, these birds were threatened with extinction—a danger averted by the invention of this machine. It is a large box, divided into compartments, and kept at a certain even temperature by means of a hot-water tank, heated by lamps underneath. The eggs are first placed in drawers, covered with bran, and placed in close contact with the heating apparatus. After a certain period they are removed to small compartments at the top of the machine, where they are left till the birds are hatched out. They are then placed in heated compartments till old enough to take care of themselves.

In a case were displayed diamonds in the rough, just as found in the mines. Where one would think the sparkle too faint to be of any worth, he is mistaken, for diamond dust is precious, and they have found them that would sell for $150,000. In the diamond case were pictures of the machinery used to get the diamond in the stone and break them up; and huge washing-machines to separate the precious jewel from the valueless setting nature put about them.

Around the room were horns of various shapes, the greatest display of horns ever seen. Two elephants' tusks, each seven feet long; rhinoceros' horns, bucks', bisons', and goats' horns; and many skins of animals, as bears', leopards', buffaloes', and lions'.

The exhibits of the Gold Coast Colony were varied, comprising many specimens of country cloths, native looms with cotton spinner; sandals, ornamented with gold, worn by the chief of the gold coast; specimens of native woods, especially the odorm wood, the build-

ing-wood of the country; samples of carving by native artificers; a variety of domestic articles in earthenware of colonial manufacture; specimens of different oils made at Cape Coast, from African nuts and seeds; cassada starch and arrow-root, and a very curious and interesting collection of gold dust and gold ornaments manufactured in the colony.

Tunis,

One of the Barbary States, on the north coast of Africa, made a very creditable display in the Main Building, in which were exhibited among other things two sets of the armor which is peculiar to the region of the Caucasus, and which is in use in portions of the Russian and Persian armies at the present day. It consisted of the helmet, a hemispherical cap, having a long, sharp spike in the top, a pendant curtain or cape of fine chain for the protection of the neck, and in front a bar, capable of being raised or lowered at the will of the wearer, for the protection of his nose, and the chest and back-plates, each rectangular in form, nearly flat, appearing singularly small compared with some of the enormous tub-like cuirasses of the more western nations. The small, circular shield, and the plate-guard for the right forearm, with its chain glove and sleeve attached, completed the defensive part of the suit. These plate-pieces were of steel, all elaborately wrought with arabesques in low relief, not of the repoussé character, but entirely sunk from the surface and with gold and silver inlays, known as damascene.

The display was a collective one, being about equally divided between two exhibitors, the Bey of Tunis, Mohammed Sadek, and M. Valensi, a Tunisian merchant.

The gem of the Bey's exhibit was the mosaic representing a lion and his prey. This was found by Davis' party during his explorations of the site of ancient Carthage. It was found within the precincts of the Byrsa of Carthage, and in close proximity to the site of the Temple of Astarte, the Juno of the Phœnicians. In this vicinity there appears to have been a temple dedicated to Diana, and this lion formed a part of the pavement of that temple. Every other representation on this vast pavement had relation either to the chase or to wild beasts. Through the ignorance of native workmen of how to handle such easily broken objects, every one was hopelessly destroyed in the attempt at removal, but the lion, which remains in the possession of the Bey. The boldness of the design and exquisite execution of the work assign it to the most flourishing period of Carthage, say 2,500 years ago. The mosaic was about eight by ten feet square, and represented a lion who has seized his prey, a horse or other animal with hoofs, from whose wounds the blood is trickling. The stones of which it is composed are about half an inch square, and are set in cement.

The other articles shown by the Bey were representative of the agricultural and manufacturing interests of the country, consisting of specimens of woollen and silk fabrics, pottery, and red caps.

M. Valensi's exhibit consisted of goods which were on sale throughout the exhibition, and consisted of silk goods, Turkish pipes, with pottery heads and very long cane stems, also fine Turkish tobacco. He had also a large collection of antique pottery and brass, and suits of ancient armor. The brazen urns were of unknown age. They were very large, and were said to have been unearthed at Carthage and found full of gold

coin. They were completely covered with ornamental raised work, representing birds, beasts, and human figures.

Near the Pennsylvania State Building stood the

Tunisian Bazaar and Cafe,

Which was run under the auspices of M. Valensi. The building itself was decahedral in shape, with four of the sides almost twice as wide as any one of the other six. The windows were trefoil in configuration, the square panes of glass being tinted with all the colors of the rainbow. These airy openings swung on pivots, and as the four entrances were high and wide, the novel little structure had an inviting air of coolness and comfort. The walls inside were covered with blue and white paper, the ceilings were creamy white and ornamented with scarlet shields, on which were depicted the Turkish star and crescent. Here natives dressed in the quaint costume of their country sang their native melodies, on a kind of raised platform, accompanying themselves and each other on different curious instruments. Coffee was also sold here, and visitors were afforded the novelty of smoking Turkish tobacco through pipes two yards long. The coffee was made by placing a spoonful of finely-ground Mocha and a like quantity of sugar in a sort of dipper, the capacity of which was but little greater than that of the cup. This was thoroughly mixed with boiling water, held over a charcoal fire on top of the oven until the fluid reached the boiling point, when it was immediately removed. A second too long would spoil it for Tunisian palates, and to determine with nicety the exact time at which the dipper should be snatched from the flames required long experience and careful calculation.

CHAPTER XXII.

THE JAPANESE EXHIBITS.

PERHAPS the greater part of the pleasure we receive in making the acquaintance of another nation is in the surprise it gives us, in the fillip our minds receive at being suddenly confronted with some utterly new and different way of dealing with a familiar topic—some revelation on a threadbare theme. All this charm was in a kind of detail that travellers, for the most part, do not write about, and that we only see when we get the daily life of the people put before our eyes as we had it during our Exhibition.

It is not strange that the Japanese department was one of the main centres of attraction, and the delight of lovers of the curious and the bizarre, and at the same time of the delicate and intricate workmanship. Of all that was wonderful and beautiful in the Exhibition, the Japanese exhibit was certainly not the least bewildering and beautiful. Even in the arrangement of her display, Japan showed her characteristic art.

With a frontage of about one hundred feet on the south side of the central avenue, occupying the third place from the western entrance of the Main Building, Japan presented two large rectangular platforms, handsomely panelled in buff and black woods and placed diagonally to the main avenue, leaving an intersecting triangle of considerable depth, in the centre of which was the large bronze basin of a fountain, itself a rare

specimen of silver inlaying and of embossing in bird and other shapes. This was all hand-work, of course. In front of this prospective fountain the line between the corners of the platforms was made complete by cases containing rich vases of bronze, gold and silver, embossed and inlaid, of values rising into the thousands. These bronzes were especially wonderful, and represented an almost incredible amount of labor and skill. On one of the largest vases exhibited the work was estimated by the Japanese in charge to have been equivalent to 2,250 days steady labor for one man. When this fact was taken into consideration, the price which was asked, and we believe obtained for it, viz., $2,000, did not seem extravagant.

The ground color of the finer vases was a dark steel, and a marked peculiarity was the use of gilt and silver bronze for inlaying, sometimes on flat surfaces for delicate tracery and sometimes in high relief for figures of birds and animals, or for the costumes of men and women, whose heads and arms were worked out in the steel bronze. There was no end to the variety of decorative work put upon the vases. The grotesque, for which the Japanese have such a remarkable fancy, predominated, and showed itself not only in the dragons and other uncouth creatures unknown to natural history, but in the funniest imaginable caricatures of official and domestic life. On one of the largest pieces there was a platform just above the base surrounded by a rail fence, and upon it danced a procession of women, each carrying a gold or silver rose about twice as large as her head. Above, on the body of the vase, were a number of scenes in which foxes in men's clothes figured in comic attitudes, and above these, on panels, were low reliefs that appeared to represent the

reception of petitions by dignitaries. Dragons formed the handles. The handles of another large vase were formed by flocks of birds, instinct with motion, that appeared to be swooping down to alight on the mass of rocks at the base, heedless of the ugly dragon just emerging from them.

Of these bronzes the display was said by those who were there to be without comparison finer than the one made by Japan at Vienna. Indeed, one of the largest and costliest pieces which was exhibited had been intended for the Vienna Exhibition, but could not be finished in time, it having occupied two men several years in its production. There Japan was represented by few bronzes, the wonderful creations we saw here having been nearly all produced expressly for our Centennial Exhibition.

Only less beautiful than these exquisite bronzes was the display of

Porcelain,

Another ancient Japanese art that was brought to high perfection long before it was known in Europe. The entire exhibit of both porcelain and pottery made by all the other countries of the world did not furnish so great a variety in forms and styles of ornamentation as Japan alone showed. Among the multitude of curious and beautiful articles in this group were a pair of vases about ten feet high, valued at $2,500, with golden dragons in relief on a blue and white ground and landscapes of extreme delicacy of drawing; the Kaga ware in scarlet or green and gold, that had a brilliancy of color equal to that of Bohemian glass; the Banko ware, with colors worked through; the Yokohama ware, with a white ground and graceful ornamentation in gold and colors; and the great vases of pottery, with a creamy

white ground thickly overlaid with figures in green and gold.

In this display of porcelain ware there was a case of small figures of every variety of pantomimic and dramatic action, and variety of color, so thoroughly Japanese in their character that we must not omit to mention them. A good example of the absurdity and fun that filled the case was the drawing of an arrow on a bow by a man who had two or three to help him from behind, each man in turn pulling the one in front of him.

Another Japanese specialty, and one which was by all odds the finest feature in the exhibit, was its

Lacquered Ware,

Of which there was a great variety on exhibition, running from pretty little cake trays, costing fifty cents, to elaborate cabinets valued at $1,000 each.

The art of lacquering has declined somewhat during the last 300 years, and the most ancient masterpieces cannot be reproduced in these days, even in Japan, and the modern work does not show to advantage beside the old.

There was a piece in this department which was catalogued as the finest piece of lacquer ever done in Japan, and it was indeed a gem. It was a nest of jewel cabinets set in a frame of beautifully carved tortoise shell. The four cabinets that filled this frame were made in the four main styles of lacquer work, and of all beautiful boxes made as receptacles of jewels or other articles of beauty or value they were, perhaps, the finest ever seen. This was said to be 350 years old, and surpassed all the new in fine workmanship. The price of this gem of art was $5,000.

In the cases of lacquer-ware were also articles of fairylike daintiness in ivory and silver, made in the same shape, not inferior in delicacy of effect or fineness of finish to the former.

The handsomest articles of Japanese jewelry and ornamentation were made of rock crystal, for which Japan is famous. A rock crystal seven inches in diameter—the largest in Japan—was sent to the Vienna Exhibition, but was lost with the steamer "Nile," which was wrecked off the Japan coast. The next largest rock crystal, which is more than six inches in diameter, and cut as a globe for ornamental purposes, was exhibited here, and is valued at $1,500. In the same case there was a smaller rock crystal, and several cut in fantastic forms were exhibited in other cases. There were many necklaces and other articles of jewelry made of the same material. They were well cut, but were marred by having bands of metal run around them to hold them in position.

Silk Fabrics and Embroideries.

The exhibit of silk fabrics comprised silks of all kinds, including crapes such as are made by the Chinese, brocades, damasks, gros-grained silks and plain-figured and checkered dress silks. Crape is made by using for woofing alternate threads twisted in opposite directions and of a much closer twist than ordinary threads. The silk thus made is dipped into cold water, then into hot, and again into cold water, and the unequal contraction and expansion of the different threads produces the craping. There were some heavy gros-grained silks exhibited, which were upwards of a yard and a half wide and very beautiful in color.

The embroidery work was not equal to that on Canton crape, but the colored work was all superior to similar work by the Chinese, the Japanese having more taste in the distribution of colors and having much higher ideas of art. The embroidery work on the screens was excellent, and very beautiful work was produced by a combination of painting and embroidery on silk.

The wooden and basket ware was really wonderful. Several cases were filled with cabinets and useful and ornamental boxes, dressing stands, etc., made of inlaid wood. The work was so fine that at a little distance it looked as though the pattern had been stamped or painted on a smooth surface. Handsome cottages, reminding one of a Swiss chalet, were made of fine bamboo strips, and every detail of the work was reproduced in the delicate plaiting. Bird cages, similar in shape to those in use here, were made of bamboo, tortoise shell and ivory. Some had the wires made of bamboo as fine as our metal wires, and one very handsome cage was made of a tortoise shell frame, with fine ivory wires.

There was an exhibit of furniture in European form that showed the wonderful capacity of the Japanese to excel the artisans of other countries in their own special lines of work. The upholstered chairs were admirable; and there was a wardrobe in carved walnut that was fully equal to, if it did not surpass, anything of the kind in the Italian court.

The Japanese screens were of themselves a remarkable display. The best pictorial art in the country appeared to have been devoted to their decoration, and the wealthy and cultured Japanese, it is said, takes the same pride in his collection of these articles that a mer-

chant prince in our country does in his gallery of paintings. In these articles the most remarkable effects are produced by combining embroidery with painting, the faces of the figures and the outlines of landscapes being painted on the silk background, and the costumes, animals, houses, etc., brought out in relief by the embroidery.

Some of the smaller screens, designed apparently to be hung like pictures on walls, showed delightfully quaint conceptions. For instance, there was one that represented a long line of green grasshoppers marching in single file on their hind legs, each carrying a different species of flower. In the centre of the line a dignitary was borne in a palanquin. A big black beetle led the van, and a company of astonished frogs were sitting like peasants by the roadside watching the strange procession as it passed. A remarkable feature of this droll picture was that it had a tolerably good perspective—a quality in which Japanese art is notably defective.

There was plenty of material for hours of study of Japanese life and manners in these screens. The prices of the larger sizes ranged from $100 to $400, and for the latter sum one could have got a whole Japanese picture-gallery.

The Japanese government had a very complete and well-arranged exhibit of building stones, metallic ores, coals, medicinal plants, grains, stuffed animals, wax-prints, ambulances, and a multitude of other objects.

Quite an interesting display, under the head of

Education and Science,

Showed the wonderful advance made in modern education in Japan. There were photographs of school-houses, both old and new, with views of the interior

of some of them. In the old schools the pupils were seen seated on the floor, while the teacher, on his feet, walked among them. The new schools showed the pupils seated at desks, many of them dressed in European costume, while the artist seemed to have been at great pains to give the school teacher the most comical and grotesque countenance he could imagine. The school furniture exhibited was poor and reminded one of the backless benches and wearisome desks at which the children of our own public schools did penance twenty-five years ago.

The excellent maps, school-books, charts, compositions in English, French, German, and Japanese, written by pupils in the public schools, philosophical instruments, all evidence the wonderful strides which this remarkable country has taken within the last few years, and also prove the success of the new educational system in the empire.

Among the structures on the Centennial Grounds, none excited more interest than the

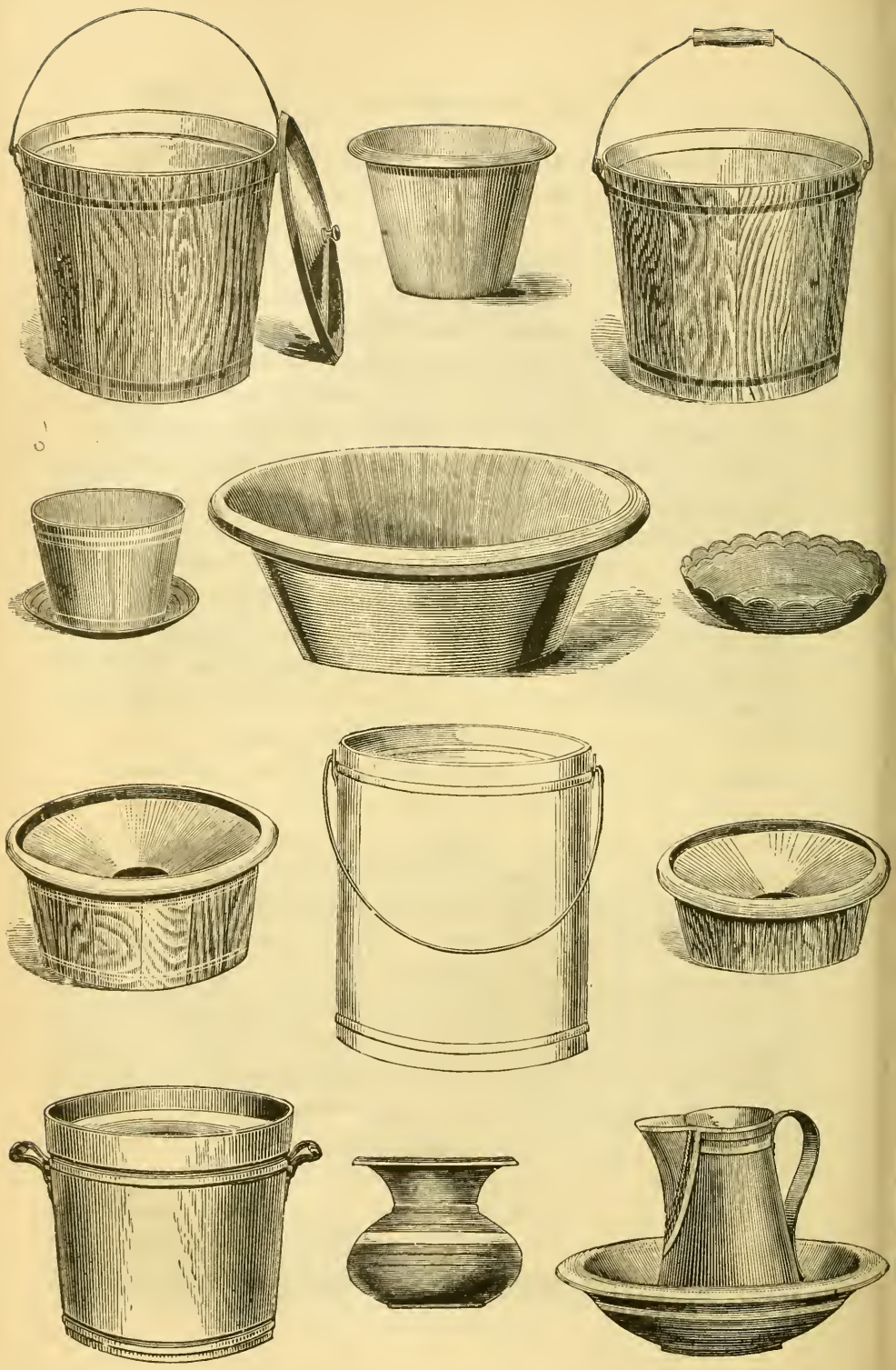
Japanese House and Japanese Bazaar,

Both distinctively Japanese buildings, having been built by Japanese mechanics brought over for the purpose, and from Japanese materials entirely.

The first-mentioned building was built for the residence of several of the exhibitors, who had it made in Japan and brought here and put up by their own carpenters. It was a very neat structure of wood, two stories in height and covered with a roof of black and white tiles. It was extremely light and graceful in appearance, being almost an open lattice work all around. The exterior walls were composed of wooden bars about an inch square, set about six inches apart;

SPANISH BUILDING.

JAPANESE BUILDING.



JAPANESE PAPER-WARE.

behind these were blinds of a sort of matting, and behind these again sliding sashes filled with varnished paper, and intended to be closed in cold weather. The framing was beautifully fitted, and the timbers all planed smooth. The popular idea that no nails were used in the construction of these buildings was a fallacy. They were used in large quantities, but they were so covered and hidden as not to be seen without careful examination. There was much exquisitely carved wood-work about the building, and the entire structure bore strong resemblance to those which have become familiar from pictures.

The bazaar was similar in the details of its construction to the residence. It was quite a tasteful and attractive structure, and was situated on a natural terrace gently sloped, covered with green grass and adorned with artistic groups of rough rocks, and the whole place was shaded by oaks and chestnut trees, among which rose a tall pole, floating the Japanese flag—a white sheet with a red moon in the centre. Under the trees were bronze cranes six feet high, and objects of the same metal, intended to represent Japanese wild boars. The winged side of the structure looked northward. It was entirely open, and approached by a tier of asphaltum walks.

The value of the stock in the bazaar, when business opened there, was about $50,000. The articles were chiefly ornamental, a large portion of them being of porcelain, bronze or tortoise shell. The Japanese toys were chiefly made from a tough, fine-grained wood resembling the American white cedar.

In one corner of the back yard adjoining the bazaar was the Japanese horticultural display. Young bamboo, flowers and stunted trees and shrubbery were ex-

hibited. In a box of blue porcelain, with white raised imitations of beets, carrots, etc., on the outer surface, and having porcelain supports of the size, shape and color of turnips, was a stunted cedar tree sixty years old and not more than thirty-two inches in height. The spread of its branches was four and a half feet in the widest part. The trunk was eight inches in diameter.

The principal blooming plant shown was the tiger lily (lilium auratum).

One of the most attractive and remarkable departments of the Main Building was beyond all question that containing the exhibits of

China.

It was situated south of the main avenue, near the west end of the building. In the front there was a Chinese gateway of heavy timbers, representing the gate of a city. The inscription on it meant "Government House." On the sides of the gateway were Chinese characters, referring to the several ports from which the collections had been made. On the east and west fronts of the section, about midway between the main avenue and the south wall, were east and west gateways similar to the north gate, but smaller. The office of the commission was next to the south wall of the building, and was built of carved and gilded wood enclosing panels of painted silk. The office (which was not open to the public) was furnished with such furniture as would be found in a mandarin's house in China—tables, tea-poys, chairs and an opium lounge of carved ebony, inlaid with pearl, and with marble seats and marble table tops. The couch was about six feet long and nearly square. It had a marble top, on

which the opium smokers reclined. The walls of the office were hung with painted screens.

The show-cases were themselves an attractive exhibit. They represented joss houses (churches) and pagodas (towers), generally nine stories high. The miniature joss houses and pagodas made admirable show-cases, and in the pockets at the base of the joss houses the smaller articles were exhibited for close inspection.

The most striking feature in the Chinese department was the display made by Hu Quang Yung, otherwise known as Hu Tuen Tzen (Great Man). He is a most eminent man in China, a pink button mandarin, and the greatest and beyond all question wealthiest banker in the empire, having branches established in every principal city and town. He is worth $30,000,000, and his wealth increased $3,000,000 in one single year. "All China small boy know he name." The custom-house duties are all paid in to him.

This rich millionnaire lives in Hong Chow, in a house that cost $2,000,000. As a collector of ancient and valuable specimens of Chinese art he has a deservedly great European and Asiatic reputation. He was represented at our Exhibition by his worthy nephew, Wu Ying Ding, who, though still young, has already attained great distinction. He is a mandarin of the blue button, or fourth class, is intelligent and well educated, and speaks Anglo-Saxon with remarkable fluency. Hu Tuen Tzen, desiring the American people to become familiar with ancient Chinese art, forwarded to the Exposition, in care of Wu Ying Ding, a selection from his wonderful museum. The exhibit included rare specimens of enamelled and "Cloisonne" ware, which is copper enamelled with gold, silver and porce-

lain, each from two hundred to five hundred years old, of which there can be none now manufactured, the art having been lost nearly two hundred years ago. Quite a number of the specimens of Cloisonne were made from jade, a very rare and valuable stone, the manner of using which in this class of ware has, strange to say, also been lost many years ago. This is really the finest and rarest collection of Cloisonne ware in existence. In the display were also some beautiful bronzes, manufactured nearly 1,500 years ago, a few of which can be seen only in the art cabinets of the Emperor of Austria, the Czar of Russia, Queen Victoria of England, and that of Pope Pius IX. Antique china ware, made during the dynasty of the celebrated Emperor Ming, was also shown. Rare bedsteads, tables, and work-boxes, all beautifully wrought, and covered with carvings, gildings, and filigree work, executed with exquisite skill and art, and each, in its own way, a perfect masterpiece, arrested the attention of the visitor as he passed through this wonderful department. Here, also, were to be seen vases of strange and wondrous form, and fine aquariums adorned with wreaths of flowers, serpents, birds, or animals. Taken as a whole, the display was one of the most choice and elegant collections ever seen, whether at any of the great world's fairs or in the art cabinets of the crowned heads of Europe. The department was filled to repletion with the most elaborately carved, inlaid, and embossed articles of ornament and actual utility, and every inch, every line of this work was the product not of mechanical contrivances, but of human labor directed by an unerring though somewhat incongruous sense of the beautiful, and aided by endless patience and perseverance. The entire exhibit of China was composed not

of mighty engines for economizing labor, nor the apparently delicate yet actually coarse fabrics manufactured in astonishing quantities by complicated machines, but of artistically beautiful though æsthetically grotesque ornamentation, which has been cultivated until even the most ordinary articles of household use have been transformed into visions of unique beauty.

The wood and ivory carvings in this section won the admiration of all who saw them. In the amount of patient labor required for their execution there were no carvings at the Exhibition that approached them, and some of them could scarcely be excelled in beauty by any in the world. The ivory carvings merited special attention, and they received it, for their location was more visited than any other spot in the section. They formed part of a collection of carvings and jewelry exhibited by Lee Ching, Wao Ching and Yut Ching, of Canton. In a glass show-case was an elephant's tusk two and a half feet in length, standing with the convex side of the tapering end embedded in a solid mass of ebony carved into a representation of a rocky eminence rising out of a bamboo plantation, through which Chinese laborers were making their way, pushing aside, as well as they could, the tall and elastic canes. Beginning at the apex of the tusk and extending up the concave side to the thicker end was an ivory city on a mountain side, wonderfully well executed. There were the joss houses and the palaces, shaded by tall mulberry trees, military marching in the streets, pumpkin-head Celestials, with half their bodies out through the windows to see what was going on, and, towering above all, the characteristic landmarks of a Chinese city—pagodas. In the joss houses were seen,

on their knees or prostrated on their faces, jossmen and hundreds of women. It required the labor of one man for over three years to execute this carving, and yet its price in China was only $320, and for that sum it was purchased by the Pennsylvania Museum of Art. Ivory carving is a prominent industry in China, but it is confined chiefly to Canton. The workmen are paid fifteen cents a day and their food. This explains why an article which, if made in America by Americans, could not be sold without sacrifice at less than $3,000, was offered by Chinamen for about one-tenth of that sum. All these carvings—in fact all the articles in the Chinese section—were executed by hand, there being little machinery in China, except that used by Europeans.

The second great feature of the exhibit was a perfect pagoda, or Chinese tower, in miniature, four and a half feet high. It had ten stories, each story being capped by one of those peculiar projecting roofs so well known from tea-caddie art. The pagoda stood on the centre of an ivory base representing a plot of ground, enclosed by a fence of ivory posts, supporting carved ivory panels that required to be scrutinized closely to be distinguished from the finest flowered lace. Within the area was a portal which would have passed as a miniature of the one at the western entrance to the Chinese section. In the plot about the tower were four trees heavily laden with fruit, and in their shade Celestials, young and old, male and female, were scampering about and having a jolly time. The tower was hexagonal and slightly pyramidal. At each edge was a round support running from top to bottom. These six supports braced the main portion of the structure, which consisted of sheets of carving, having the same similarity

to elegant Belgian lace as the panels of the fence. Each story was encircled, just above the capping of the next lower story, by a railing similar in construction to the fence, and from the four corners of each of the ten cappings were suspended as many bells. This pagoda did not, like the city on the hillside, consist merely of one solid mass of ivory, but of many pieces cunningly joined together by the overlapping and dovetailing process, without nail, pin or cord. If Americans had the patience, and, it may be added, the skill to execute a work like this, they could not have sold it profitably for less than $6,500. The Chinese, however, marked it $600.

But the most curious and to most people puzzling carvings of the lot were the ornamental ivory balls. In front of the enclosure, on the left of the principal gateway, there was a wonderful piece of this kind of work, which could be more closely inspected than those in the case. It was a hollow sphere of ivory, about three inches in diameter, having holes of about an inch in diameter in its surface. Inside of this sphere were twelve others, one within another, each having holes in its surface like the first, and the shell beautifully decorated in tracery work. From the outer sphere was suspended a group of figures, and under them was a carved tassel. The ball was suspended by a chain and canopy, and the whole ornament, twenty inches in height, including the thirteen hollow, carved and decorated spheres, one within the other, was cut from one piece of ivory. To cut any one of the balls, even the outer one, would tax the patience of an American, but to cut a baker's dozen of them, one within the other, almost as thin as paper, would be beyond both his patience and ability. Similar balls were exhibited in

the case containing ivory work. The operation is very simple, but it requires immense patience. The solid sphere of ivory is taken and the required number of holes bored until they have reached points, say half an inch from the centre. A small sharp carving instrument, the cutter of which must be at a sharp angle with the handle, is introduced into each hole, and by careful cutting a small ball may be freed in the centre of the mass. It will hardly, however, be perfectly spherical. This process is repeated as often as is represented by the number of spheres to be freed. But the more delicate part of the work is to follow, for the outside sphere of the ball had been transformed into forests, cities and groups of people, and each of the inside ones into ivory lace of the most flowery and delicate pattern. It required the labor of one man for over a year and a half to carve this ball, and yet it was marked for sale at $200. There were dragon-boats, flower-boats, and numerous other articles of the same material and wonderful execution possessed by those described, and those who examined these and the unexcelled wood carving of the show-cases and furniture will never, we feel sure, turn up their noses at John Chinamen again.

Many costly and valuable articles were found to be broken when taken from the original packages. Before being placed in position the Chinamen in charge employed several women to cleanse some of the dusty articles. While doing this a vase worth about $1,500 slipped from the hands of one of them and was shattered to atoms on the floor. When the Chinamen heard the crash, they jumped as if struck by a cannon ball, making an exclamation something like "By gala," a form of oath common perhaps to the Celestials, but quite obscure to "outside barbarians."

The Wood Carvings

Were exhibited by Sung Sinkung, and comprised handsome picture frames, cabinets, boxes, etc., and a few carvings representing Chinese life. One represented the procession of a magistrate as he walks through the streets of a Chinese city, and another a court of justice, in which the criminal, with a board around his neck, was on his knees before the magistrate. Near him was the officer of the court with a bamboo in his hand, prepared to inflict the sentence of the court if the prisoner confesses, or to flagellate him into confessing if he should be either innocent or obdurate. Opium smoking was also represented. A man and a woman were lying upon a broad couch, inhaling the delicious but dangerous perfumes. The figures in these pieces were only about two inches in height, but they were admirably expressive of life, and all the carvings were excellent.

Furniture.

Among the exhibits of furniture, which comprised blackwood tables with porcelain tops, decorated with figures of Chinamen, flowers, etc., sofas, chairs, etc., there was a carved bedstead, on which a man could, perhaps, sleep comfortably with the thermometer at 210 degrees. There were other bedsteads also, with rattan bottoms, valued up to far higher points, but only on account of the carvings in the frame and canopy. One was priced at $4,000. It was a masterpiece of intricate and delicate tracery with the chisel. Another was covered with a canopy which presented panels of embroidered silk of great fineness and beauty. In the night the light in the room would show through the transparent background and relieve the queer repre-

sentations of Chinese story pictures on the silk. This is quite different from having merely embroidered or painted figures on a bed curtain. It makes the canopy, with the assistance of the light, a real picture gallery. It is true that one wants a bed to sleep in, and while asleep is indifferent to pictures, but for nights when restive sloth finds the down pillow hard and lies awake, or for an invalid, it must have its charms.

Lacquer Ware.

The collection of lacquer work was very fine, and was scattered throughout the enclosure. It was mostly from Canton, and comprised chess tables and chess boards, work boxes, nests of tea trays, tables with porcelain tops, work boxes, tea caddies, trays, cigar cases, cabinets, and an almost endless variety of similar articles. Some of the work was ornamented with mother-of-pearl, laid in fresh lacquer. After it has dried, a coat of black lacquer is given over the whole surface; and when that has dried, it is rubbed down smooth, revealing the pearl, and the surface is again varnished with transparent lacquer. The screens of lacquer work were very beautiful, and one of six leaves was valued at $600. Hok Lee & Co. exhibited in one of the cases some fine specimens of Foochow lacquer work, which differs from that of Canton in color and design. It was of a dull red color, and the designs were simple branches of flowers drawn irregularly over the surface.

Fronting the principal gateway was a Foochow joss house, filled with a splendid collection of silk embroideries from Canton, among which were some exquisite crape shawls, one of them valued at $284. There were also bed covers and curtains in blue and red silk, some

few with designs embroidered in colored silks, but the greater number with the figures in white. The designs were excellent and the workmanship marvellously fine. This was one of the handsomest cases of embroideries in the Exhibition. The cases of embroidered silk screens, and Chinese crape, and dress silks and satins were very attractive, the silks, gauzes, and sarcenets being beautiful in color and texture, and tastefully draped. In a separate show-case there was a fine collection of plain and gold and silver embroidered silks. In the pockets of the case were fans of all kinds, some of common paper, others of silks or of feathers, and the framework either of common wood, sandal wood or ivory. The heads of the figures on some of the painted fans were made of ivory, glued on to the silk. In others the body of the fan, as well as the framework, was made of beautifully carved ivory.

It was perfectly wonderful to note the numberless articles that are made by the Chinese of

Bamboo,

And which were to be seen in their display. The pith of the bamboo, from which paper is made, as also imitations of wax flowers that could not be distinguished from the best wax flowers, is white, elastic, and very tenacious.

Among the objects of interest which we examined were pillows made of bamboo, and of course very hard, just what the Chinese like; ropes made of split bamboo; drums and tambourines, covered with snake skin instead of parchment; mouth organs made of as many tubes of bamboo as there are notes in the gamut, no two being of the same length, and the principle of playing the instrument being the same as that of the

flute; very pliable leather, finished like American oil-cloth, and used for the same purposes as the latter; fans made of plant leaves or of silk-worm cocoons; embroidered silk shoes with cloth soles, only three inches long, having rectangular heels of delicate leather, two inches high, and being the same as those worn by the ladies of China, whose feet are so small that the Celestial beauties must waddle like a man on stilts, while some of them cannot walk at all, but have to be carried about on men's backs; varieties of the compass—an article invented, according to Chinese annals, several thousand years before Adam's time; camel's hair cemented together to form a stiff pencil, and inserted in bamboo holders; blocks of India ink, which, with these pencils, answer for both writing and painting, and many skins of tigers, leopards, wolverines, sea-leopards and other wild animals.

In the mineral annex to the Main Building, where want of space had forced the Chinese Commission to exhibit their display of the agricultural products, exports, and miscellaneous oddities, the most important article was of course

The Tea Exhibit,

Which comprised over fifty varieties, which, however, probably have originated from only a few varieties of the plant, owing to the difference caused by climate, place of growth and various modes of preparation.

The specimens were from the ports of Shanghai, Foochow, Amoy, Swatow and Canton, and included, of black teas, orange pekoe, flowery pekoe, scented orange pekoe, souchong, oolong, scented caper, pouchong and koo-loo-pekoe. Of the green teas there were hyson, young hyson, gunpowder, imperial No. 1 and

imperial No. 2. Of the black teas the highest quality was pekoe, which consists of the youngest leaves of the first picking. When these are so young as to be still clothed with down they are called flowery pekoe. These teas are sometimes scented with flowers and are then known as scented tea. The gunpowder in green tea corresponds with the pekoe in black, and like it, it is from the first gatherings; imperial, hyson and young hyson are grades of the second and third pickings.

Naturally, all green tea should be of a very dark color, but a vitiated taste in Europe and America demands young hyson, imperial, and other green brands, which are colored by a poisonous substance. A Chinaman would rather swallow a decoction of opium and tobacco than one of the green tea prepared by himself. He thinks that the mere change in color of oolong, congou, souchong, or flowery pekoe suggests no improvements in quality, and that a coating of poison is rather a deterioration. Reasoning, however, that what is poison to the Mongolian may be medicine to the Caucasian, he willingly yields to the taste of the latter, especially as a margin of profit is offered in his favor. A novel exhibit was that of tea pressed into slabs six or eight inches in length and an inch thick. It is so prepared for exportation to Asiatic countries, chiefly to Siberia, and is known in this form as "brick tea." The leaves are made to adhere by a gummy substance, and their compactness insures longer preservation than can be effected by the usual method of packing.

One of the most remarkable products of China is the well-known

Rice Paper,

And we cannot pass it by without briefly describing its mode of manufacture. It is in reality shavings from

the pith of the fatsia papyrifera, an ornamental plant which is a native of Formosa. The stems have a pith about an inch and a half in diameter, some of which were exhibited. The Chinese, using a sharp knife, cut the pith into sheets by paring it from the circumference to the centre, unrolling it as it were, and then flatten it out and press it until it is dry, when it remains as a flat sheet. Its uses are manifold. It is a pearly white, and receives the most delicate tints. Several books of paintings were on exhibit, the pictures in which were painted upon this rice paper, backed on a paper of much greater thickness. The smoothness and delicate shading of these pictures could not be excelled. The books contained the birds, beasts, fruits and people of China, and illustrated modes of life, games, etc. The most beautiful use to which this paper is put is in the manufacture of artificial flowers. A large number of bouquets, baskets, and other floral designs were shown, covered with glass. The imitation of real flowers was so very perfect that it required a close inspection to break the illusion.

Chinese Medicines.

The exhibit of Chinese medicines was very curious, and gave us a better knowledge than we ever had of some of the horrible preparations that are swallowed in the Flowery Kingdom. Of over one thousand medicinal specimens the majority consisted of such strange objects as Spanish flies, red arsenic, dried centipedes, roaches and sea-horses, powdered pinch-bugs, betel nuts, which are chewed like tobacco, dried snakes and snake skins, desiccated lizards and opium, each of which has its Æsculapian virtue for the Celestials. Some pills which were exhibited were covered with

white wax, and over one inch in diameter! The most popular medicine in China is ginseng, a root resembling young parsnips. It is of three kinds—native, wild and Corean. Of these the wild is the most valuable, and specimens of it were exhibited, marked $200 a pound. For the bliss of opium, or extract of poppy plant, China is indebted to the European, who, in spite of Celestial opposition, introduced it within her territory from India. She has since become resigned to the cultivation of the poppy in considerable quantities. The commercial article which was on exhibit looked like lumps of shoemaker's wax.

Rice, the chief food of the Chinese, was represented by some scraggy specimens, which, on a South Carolina plantation, would have been regarded as "third common." Fifty samples and over thirty-five varieties of native cereals were exhibited, about which there was nothing remarkable. Among the other articles of food were dried shark-fins, of which soup is made, and which in China form a delicacy corresponding to mock turtle in occidental lands.

China exports little or no tobacco, but produces enough for the vast consumption of that commodity within her territory. A Celestial who does not smoke is regarded as unpatriotic. Opium, his delight, is not so extensively used as tobacco. Every opium smoker is a smoker of tobacco also. The use of opium creates a longing which, if always gratified with opium, would soon kill the smoker, who therefore takes tobacco for a change. The display of tobacco was large, many of the leaves being over two feet in length. It is very rich in what the Celestials do not like—nicotine.

This they get rid of by using an anti-nicotine pipe made of metal, and having the tobacco bowl so inserted

in a chamber containing water that every whiff of smoke is drawn through the latter and deprived of the nicotine.

The representation of the different classes of Chinamen by a number of clay figures, dressed in a variety of costumes, about a foot high, was a very amusing and at the same time very instructive feature in the Chinese exhibit. The chief interest lay in the expression of the countenances of the figures, which were remarkably well represented.

In the matter of clothing China is just as antipodal to America as in geographical position. All the women wear pantaloons, and all the men, except the soldiers, frocks and petticoats. There was the civil mandarin, with his fur-trimmed, silk robes, and on top of his cap the red button, signifying that he was proficient in all the "ics" and "ologies;" the bride with her black-painted teeth and microscopical feet (things indispensable to female loveliness); the military mandarin, with his bamboo, wash-basin hat, surmounted by the blue button, denoting his perfection in military tactics ,the schoolmaster, armed with a pipe and a pouch full of tobacco in one hand, and a hieroglyphical primer in the other; the soldier in his blue drill pantaloons and red-edged tunic; the coolie with his bamboo lever across his shoulder, and the self-denying, hairless, celibate jossman, or priest, with his eyes closed and his hands clasped in prayer. Around the jossman's neck was a string of black beads, which he uses to count his prayers.

Among the miscellaneous articles were cases of antiquities, in which were some carved

Jade Stones,

A stone resembling alabaster in appearance, but generally of a green or flesh color. It is of fine texture and

will take a high degree of polish. The light green jade stone is very valuable. A small charm made of it, intended to be worn on a watch-chain, was valued at $150, and a jade stone tablet was priced at $500.

Tortoise shells beautifully carved, and a stone of two colors, cut as cameos, were also exhibited. Around the office of the commission a number of miscellaneous articles were exhibited, such as soap-stone pagodas, china screens, lacquer-ware ornaments, carvings, or rather adaptations of roots of trees, old bronzes and other relics.

CHAPTER XXIII.

ASIATIC EXHIBITS—CONTINUED.

UNDER the auspices of Great Britain there was a very large and rich exhibit of the products and manufactures of

The East Indies,

Consisting chiefly of collections selected from the India Museum, of London. This portion of the display made by the British Colonies was of much interest to Americans, and elicited much attention and admiration.

The exhibit was very judiciously and carefully classified into separate departments, which we shall proceed to notice, *seriatim*.

Mining and Metallurgy.

First was the department of mining and metallurgy. Under this heading was shown specimens of the minerals, ores, building stone and mining products of the country.

Of iron there were quite a number of exhibits. Iron ores exist in great abundance throughout the Indian Peninsula, and are widely distributed; with the exception of the trap area and the alluvial plains, there are few districts where deposits have not been found. The quality is in most cases excellent.

Among the most remarkable specimens were those of magnetic iron ore existing in the neighborhood of

Salem in the Madras Presidency: here beds of ore from fifty to one hundred feet in thickness can be traced for miles. On a hill in this district there are five bands of magnetic ore, from twenty to fifty feet in thickness, running completely round the hill, which is four miles in length. At Lohara, in the Chanda district, Central Provinces, there is a hill nearly two miles long and half a mile broad, apparently formed entirely of an extremely pure ore, a mixture of magnetic and specular ore, a sample of which was shown. This would probably yield 300,000 to 500,000 tons of iron, without going below the surface.

There were shown specimens of a very remarkable rock called

Laterite,

Which is widely spread through the Peninsula, and occurs also in Ceylon, Burmah, Malacca, and Siam. It caps the summits of the Eastern and Western Ghâts. Under the surface it is soft, and when first exposed can be cut with a spade, but it hardens on exposure to the air; the iron, which in the interior is usually in the form of magnetic oxide, becoming converted into brown hæmatite. The oxide of iron is often accompanied by manganese as pyrolusite. The percentage of iron sometimes reaches thirty or more, when the rock may be used as a source of iron; it is, however, commonly employed for road-metalling and as a building material, for which latter purpose, when carefully selected, it is admirably suited. Many opinions have been held as to its origin and age. The true laterite seems to have been formed by the subaërial decomposition of trap or gneiss rock, but no one theory accounts for laterite in all its positions, or satisfactorily for the sources whence the large amount of iron is derived.

Copper, lead, antimony, tin, and other ores are found and worked by the natives in many parts of India.

Gold Ore.

Gold occurs in many parts of India in the stream gravels, but always in very small quantities; only the poorest of the natives are occupied in washing for it. It is extracted in some parts of the Punjab, in Chota Nagpur, Manbhum, Singbhum, the Godaveri Valley, and a few places in Southern India, and in Assam and Burmah.

The Malabar district has been noted for gold from time immemorial. Two tribes of people obtained it, one from the alluvium, etc., and the other from quartz "leaders" in the hill country. It is also found on the sea-shore about Beypoor. Several auriferous quartz reefs occur in the Wynad. Preliminary trials on different reefs gave an average proportion of seven pennyweights of gold to the ton of ore, this matrix gold containing 86.86 per cent. of pure gold. The alluvial gold of the same district contains 91.95 per cent. of pure gold.

Specimens of gold sand from different parts of Mysore, Chota Nagpur, and Burmah were exhibited.

Of minerals used for ornaments there were quite a large display, consisting of agates, cornelians from Cambay, which have been known since the time of the Romans, tourmalines, sapphires, rubies, garnets, and other stones.

The coal fields of India lie in a region bounded on the north by the Ganges, and, extending beyond the Godaveri on the south, from east to west, they stretch from the neighborhood of Calcutta to some distance down the Nerbudda. Outside these limits there are

coal fields in Upper Assam, the Khasia Hills, and Burmah. The total area over which coal rocks may be presumed to extend is 35,000 square miles, making India fifth in the coal-bearing areas of the world; the United States, China, Australia, and Russia only being before it. Nearly all the coal comes from one geological formation called "Damuda," from the river in whose valley some of the principal coal seams occur. Some of the seams, including partings, are of gigantic size in the Hengir and Damuda fields, reaching 100, 120, and even 160 feet in thickness. The coal that has hitherto been worked, and specimens of which were displayed, is characterized by its excessive lamination and great quantity of ash, this being rarely under ten, and reaching to thirty per cent.; the percentage of fixed carbon is rarely sixty per cent., and averages about fifty-two per cent.

The manufactures of India are very important and varied, and the display made was very fine. No less than twenty-one specimens of rock salt, common salt, and black salt from different sections of the country were on exhibition.

The salt deposits of the Salt Range, hills running through the Jhilam and Shahpur districts, and on to Kalabagh, in the Punjab, are equalled by none in the world for extent and purity. Salt is excavated at four places—at the Mayo mines, Kheora, and Sardi mines in the Jhilam district, at Warcha mine in Shahpur, and at Kalabagh, where the salt is quarried from the surface. In the Trans-Indus district of Kohat, salt is obtained from a chain of hills running from the Indus towards Bohadur Kheyl; that found near the surface is of a black or dark green color, but the greater portion is remarkably pure.

The consumption of salt in Bengal amounts to nearly ten pounds per head per annum, in the Madras Presidency to about twelve pounds, and in the Bombay Presidency to nine and three-quarters pounds per head per annum. Until 1863 the districts on the sea-board of the Bay of Bengal were divided into salt agencies, and two kinds of salt were produced—Pungah salt, obtained by boiling highly-concentrated brine to dryness, and Kurkutch salt, produced from sea water by solar evaporation alone. In 1863 the government manufacture was abolished, and a system of excise, with duty on imported salt, was instituted. In the Bombay Presidency there are salt works on the shores of Gujerat and at Kheraghora, and large quantities are made by solar evaporation in the Runn of Kutch.

Salt is one of the principal sources of the Indian revenue, and brings in from $30,000,000 to $40,000,000 annually.

In pottery there were many very curious examples of vases, water-jugs, and other utensils made and in use in India. The principal manufacture of these articles is carried on in Sind, where the process of making and glazing of earthenware is as follows: The clay required for this purpose is obtained ten feet under ground, in situations which have been inundated. It is reduced to a fine powder and soaked in water for twenty-four hours, after which it is kneaded with the hands and feet until it becomes dough-like. Lumps proportionate to the articles to be made are then mounted on a wheel and formed into the required shape. After the vessels have dried, they are again put on the wheel, and finished by means of an iron tool. Tiles are prepared in moulds, and when dried are rubbed over with a piece of wet cloth and beaten with an earthen

"maul" for the purpose of smoothing the surface; they are then kept for two or three days or more till they become sufficiently firm, and after having been cut to the proper size, are piled on layers in the sun to dry.

The vessels, tiles, etc., having been sun-dried, are then sent to the kiln, after which the required pattern is traced on them in the following manner. A perforated paper pattern is placed upon the article, and powdered charcoal sprinkled over it. On removing the paper, the pattern remains on the earthenware, and is then brushed over with a solution called "Sahree."

When this is dry, glaze of the required color is prepared and poured over it; the article is then allowed to dry again, after which it is placed in the glazing kiln, and subjected to the required amount of heat. The articles are only removed after the kiln has become cold.

There is a very large business carried on in some parts of India, in the rearing of the silk worms, of which there are two kinds, the mulberry worm and the Tusseh silk worm.

At the present time the production of mulberry-worm silk is principally confined to the Lower Provinces of Bengal, and to the districts of Rajshahye, Maldah, Moorshedabad, Midnapore, Beerbhoom, Hooghly, Burdwan, Bogra, Howrah, Nuddea, Jessore, and the twenty-four Pergunnahs. The yield of raw silk is estimated to be 400,000 pounds, and it is believed that no less an area than 150 square miles is under mulberry cultivation, while a quarter of a million of people derive their support from the trade in one or other of its branches in the district of Rajshahye alone.

The Tusseh silk worm is the most important and widely distributed of the wild silk-producers of India,

being found in the Sub-Himalayan tracts almost throughout the extent of the range, through the hills from Assam to Chittagong, in the Soonderbuns, everywhere in the great belt of hill and forest inhabited by the Sonthal, the Kol, the Khond, and the Gond, in the Western Ghâts, and in portions of the Madras and Bombay Presidencies. The worm is multivoltine, but it is not clear how many times in the year it goes through its transformations, or whether its periods of existence may not vary according to conditions of climate. It feeds variously on the Ber (*Zizyphus jujuba*), country almond (*Terminalia catappa*), Asun (*Term. alata*), Saj (*Term. tomentosa*), Seemul (*Bombax heptaphyllum*), Sal (*Shorea robusta*), and other trees. In some parts no attention whatever is paid to the rearing of the worms, the cocoons being simply collected by certain classes of the people from the trees in the forests on which they occur. They are afterwards sorted according to size, thickness, color, etc., and carted off to the dealers. In other parts a batch of the wild cocoons are selected, the moths allowed to emerge, and the sexes paired; the eggs thus procured are hatched, and the young worms then placed upon the trees; in this partial state of domestication, the rearers tend the insects through all their stages, but depend entirely on the wild cocoons for each year's stock.

The method of reeling is primitive in the extreme, and to its imperfections is attributed the scant attention this valuable and very beautiful silk has hitherto received.

Samples of raw silk fabrics, plain and figured, and the celebrated Tusseh silk goods, were shown, and attracted considerable attention. In the exhibit of Indian jewelry, shown by Messrs. Watson & Co., Bombay,

the chasing in gold and silver was remarkably fine, and was not surpassed by any in the Exhibition.

There was in the case an exhibit of the

War Weapons

Of the natives, not exactly such as were known in the siege of Lucknow, but similar in character to those which the soldiers of Lord Clyde met in the provinces during the Sepoy rebellion. There were specimens of match-locks, a long-barrelled weapon, like the Kentucky rifle in the days of Daniel Boone, but with a lighter stock, spears with barbed ends, coats of mail, and a peculiar pair of gauntlets which nobody seems at present to know the use of. The link and chain coat of mail is said to be similar to those which years ago British commanders in India considered necessary to guard them against the daggers of the natives, and was very fine in its texture.

In the collection of wooden and basket ware and papier-maché articles were some very beautiful lacquered wood tables, cabinet and boxes, which particularly struck our fancy. These boxes and other articles were made of turned wood and lacquered in various colors. The process is as follows:

The object to be lacquered is turned from hard wood, usually shisham (dalbergia). After being smoothed and cleaned it is again fixed in the turner's frame (a kind of lathe worked by hand), and made to rotate. The sticks of lacquer color, consisting of a mixture of lac, resin, coloring matter, and, it is said, a certain proportion of sulphur and beeswax, are then applied to the rotating object; the heat produced by friction is sufficient to soften the lacquer composition, which attaches itself to the wood, producing, however, a dull

and streaky appearance. When sufficient color has been applied, the surface of the article is skilfully rubbed with a piece of bamboo having a fine edge, by which the color is evenly distributed, and a polish produced, which is finally completed with oiled rags. To produce the mottled appearance which was so much admired, a color stick of rather harder composition than that used for producing a uniform color is lightly pressed against the rotating object, so as to detach a point here and there. This is repeated with sticks of different colors, and when sufficient color has been laid on, the object is polished with bamboo edges and oiled rags.

Twelve Delhi Miniatures,

Framed together in a beautiful setting of carved sandal wood, were really gems in their way. The views were of mosques, a government building, temples, etc., and the carving was wonderful. The sky and water were particularly fine, contrasting admirably with the rich tinting of the buildings.

There was an ivory elephant from Berhampton with a howdah upon its back, mahout or driver, and persons sitting within. The howdah was so finely carved that it really seemed as though a microscope would be needed to reveal the full beauty of some of the lines.

Education and Science.

Under the department of Education and Science, there was a series of maps illustrative of Indian surveys, ten frames containing photographs of views in India, fifteen frames with photographs illustrative of Indian architecture, and twelve frames of photographs of the different races and tribes of Hindostan.

Indian Art Department.

In the Indian Art Department, there were some very fine specimens of stone sculpture taken from the temples of the Brahmas, the banks of the Ganges, the temples of the Sun, and the slopes of the Himalayas. The majority of them, said to have been in existence thousands of years before the birth of the Christian era, were in alto relievo, and certainly bore the appearance of great age and yet extreme youth in the art of sculpture. They, however, formed an interesting study of a land comparatively unknown, and about which every one is anxious to find out something.

The inlaid work in wood and metal, in the shape of glove and work boxes, was exquisite.

This work is composed of the following materials:

Ivory, which is always white; Samber Horn, which is always green; the color is produced by steeping it in verdigris dissolved in lemon juice, toddy or vinegar.

Sandal-wood, used in its natural color.

Ebony, on account of its color.

Pattung—Sappan-wood. This wood is of a rich burnt sienna color.

Mineral—Tin in imitation of silver.

All these materials partake of the shape of the square, the rhombus, the isosceles, equilateral, and right-angle triangles. Segmental forms are sometimes given to the ivory, sandal-wood, and ebony filling in ground, so as to admit of circular designs. The materials are glued together into various geometrical forms, consisting of circles, hexagons, the square, the rhombus, and the triangle. The length of the pieces glued together is generally two feet, and these are sawn

off in sections with delicate saws in widths varying between the fifteenth and twentieth part of an inch. These are glued on to sandal-wood about a quarter of an inch thick, the latter is fastened on to black-wood, teak-wood, or deal. Not unfrequently the whole box is made of sandal-wood, but this adds materially to the expense.

In the department of agriculture there were shown specimens of 136 different kinds of native woods, used for building, ornamental and other purposes, all classified and tastefully arranged.

Dye Woods.

India produces a large variety of dye woods, and amongst them the most valuable of organic materials for the use of the dyer. Those which are not indigenous have been introduced with success, and when we name indigo, cutch, madder, sappan wood, safflower, mangrove bark, nut galls, myrabolams, and many others which were exhibited, it will be judged that she has great resources in dye-stuffs. The collection sent to the present Exhibition was neither large nor numerous, but it was useful as an indication of the resources at command.

There were cases upon cases of specimens of the food grains, cereals and pulse, showing everything that the natives of India eat, which of itself was a very instructive exhibit, all labelled with the Indian and technical names.

Tea.

An exhibition of tea from any other locality than the well-known one of China possessed more than ordinary interest. There can be no doubt that tea will be very extensively cultivated in India, land spread

over a district exceeding 1,000 miles in length being more or less adapted to its growth.

The production of tea in Assam has taken very firm root, and is spreading with almost unexampled rapidity. But the cultivation of tea is not confined to Assam; the government of India having succeeded, through the able agency of Dr. Jameson, in introducing its cultivation into Dhera-Dhoon, Kumaon, Gurhwal, and Kangra. As the result of this, private enterprise —as represented by a number of individuals and several companies—is now engaged in extending its cultivation in the districts in question, the government still, however, continuing to foster its growth, not with the view to immediate pecuniary profit, but simply to encourage so important an article of commerce. In the Neilgherries also, the introduction of tea culture has proved a success.

There were on exhibit samples of different kinds of tea, among which we observed orange pekoe, flowery pekoe, souchong, pekoe souchong, scented souchong, hyson, young hyson, rose-scented orange pekoe, gunpowder, congou, pouchong and imperial, all evidencing the success which has attended this attempt on the part of the Indian government to render the hitherto valueless mountains a rich and productive field for European enterprise, a profitable source of pleasant labor to the Hill tribes, and through these channels a source of strength and stability to the Indian empire.

Of cotton there was a large display, there having been no less than forty-seven different series of cottons, each kind represented by samples in the seed, roller-ginned, saw-ginned, and seed obtained by each method of ginning.

The fibres indigenous to the East Indies exhibited were

many. Flax has been cultivated from early historic times. Several varieties of hemp were shown. The brown hemp and Sunn hemp are most important. The export of this fibre will increase when the railway line from Bombay to Jubulpore is opened. There were also fibres of the Indian mallow, screw pine, pine apple, jute, plantain, great aloe, mat grass, and Neilgherry nettle.

Ceylon.

The exhibit from Ceylon consisted principally of coffee, cocoa-nut oil, sugar and raw cotton—these being the only exports of note from the island.

Samples of coffee were exhibited, put up in small barrels of satin-wood, a miniature representation of the barrels in which it usually finds its way to market; the kernels were very small and cylindrical and the aroma was fine. Some very good samples of raw sugars were shown, and some crystallized by the centrifugal process. Plumbago from the Ceylon mines, which furnish the most of the plumbago of commerce, were shown; it is remarkably pure. An elephant about a foot long was carved out of a very pure specimen of this mineral. The carving was done by a Singhalese. Some good cordage was shown. One of the most interesting exhibits were some huge cocoa-nuts which grow in pairs and are called sea-cocoa-nuts.

The Straits Settlements.

From the Straits Settlements, consisting of Singapore, Penang and Malacca, were exhibited samples of their raw products, comprising specimens of stick lac, barrels of tapioca, mace, black pepper, nutmegs, vegetable tallow, and the stump of a sandal-wood tree and its roots, which are highly valued for making elegant furniture. All the foregoing were from Singapore.

From Penang and Malacca were seen the well-known canes and rattans, once so fashionable as walking sticks in this country. These canes were very tastefully arranged and exhibited on a series of shelves at one end of the section, which were made in rustic-work patterns from the canes themselves.

Siam

Sent a large and valuable collection of Siamese goods, which was originally intended as an exhibit, but on account of the long delay in their shipment, finally forwarded as a present by the King of Siam to the United States government, and only arrived in Philadelphia on the 9th of October. They were unpacked, and exhibited in the Navy Department in the United States Government Building. The work of collecting these goods was begun several years ago by Mr. J. H. Chandler, an American, who, having lived for twenty-seven years in Siam, was appointed private secretary to the second King, and then selected as the Commissioner.

The entire display numbered two hundred and eighteen cases, and consisted of curiously carved models of dwelling-houses, palaces, and temples, farming utensils of all kinds, including the native plows made of forked limbs, heavy carts, fan-mills, etc., strange-looking masks used in theatrical entertainments, barbarous musical instruments, matting, and native woods of all kinds, tiger skins, nuts, rice, and other products of the soil, besides many models of canoes and ships, costumed lay-figures, and numberless other classes of interesting goods, intended for use or ornament.

CHAPTER XXIV.

STATE BUILDINGS AND STATE DAYS — PARADES AND ANNIVERSARIES.

New Hampshire.

THE building erected by New Hampshire was a square structure, with hip roof, and painted light yellow, relieved with stripes of green and red. In front and on the sides were verandahs. The visitor first entered a hall used as a general reception-room, and from the centre of which rose a stairway of varnished woods to the second story. In this hall the register was kept, and the walls were hung with views of New Hampshire scenery.

New Hampshire day was held on October 12th, on which occasion the citizens of the Old Granite State were out in full force, and the celebration was in every respect a brilliant one.

The State building was appropriately decorated, the white streamer bearing the inscription "New Hampshire" being surmounted by the American colors, and the cornice studded with flags of all nations. The rooms inside were festooned with red, white and blue bunting, relieved here and there with State coats-of-arms. The lawn in front was filled with chairs, settees, etc., furnished for the occasion by sister States, and by ten o'clock in the forenoon all were occupied, with at least 3,000 persons standing in the paths or grouped about the portico.

The crowd rapidly increased from this hour until eleven o'clock, when the procession entered the grounds and proceeded to the State building in the following order:

Cadets of Virginia Military Institute, with band; Amoskeag Veterans, with Brown's band; Governor Cheney, accompanied by Presidents Hawley and Welsh; Director-General Goshorn and the members of the Centennial Board of Finance; Governor's staff in full uniform. The Machinery Hall chimes saluted the parade with national airs. Proceeding to the New Hampshire building, the cadets halted in front thereof and presented arms, while the Governor and staff, under escort of the veterans, marched up and took positions on the porch.

After a few moments delay President Hawley stepped forward and in a few remarks welcomed to the Exhibition the citizens of New Hampshire, and then presented Governor Person C. Cheney, who, after thanking the Commission for their uniform courtesy and attention, said that for the present all formality should be laid aside, in order to better enjoy the pleasure of social intercourse. He desired, however, that the audience would first give their attention while Divine supplication was made by Rev. Henry Powers, pastor of the First Unitarian Society of Massachusetts. At the conclusion of the prayer which followed, Governor Cheney said: We are favored here to-day with a family of singers, honored citizens of New Hampshire, who have acquired not only a State but a national reputation—the "Hutchinson Family." This announcement was received with prolonged applause, and when the Hutchinsons, accompanied by a cabinet organ, united in singing "The Old Granite State," the applause increased to cheers.

As the echoes of the familiar strains died away, the Governor stepped forward and addressed his fellow-citizens.

After referring at some length to subsequent events in the early history of the State, the speaker said, in alluding to the magnificent commemoration of the centenary of American Independence in which all were participating, that every State seemed to be vying with every other in efforts to do honor to the National Government.

The Governor then presented Professor E. D. Sanborn, of Dartmouth College, who delivered the oration of the day, at the conclusion of which the Hutchinson Family sang "A Hundred Years Hence," and the reception proper was commenced. All visitors were admitted at the main entrance, and, after a hand-shaking with the Governor, passed through an ante-room and out a side door in the rear.

Vermont.

The Vermont building was located in the rear of the Turkish Bazaar. It was very small and unpretentious, being a square-looking structure without any pretence to effect and having a French roof. The exterior coloring was of pearl gray, with the coat-of-arms of Vermont and the name "Vermont" in gold letters on black above the doorway. A small hallway, with register for visitors, was flanked on each side by a neatly furnished ladies' parlor, with an organ, and a pleasant sitting-room for gentlemen. In the rear of the hall was a reading-room, with files of newspapers, etc. The modest appearance of the building was owing to the fact that the Legislature did not make an appropriation, and the structure had to be erected by private enterprise.

The Vermonters had their patriotic jubilee on October 27th. While less in magnitude than other similar celebrations, it was as full of warm feeling for the State, Nation, and Centennial as any of them.

Governor Fairbanks having been prevented by sickness from being present, the chief actor in the informal celebration was ex-Governor John B. Page, who gave a reception in the Vermont State Building, which was just west of the Pennsylvania House, near Machinery Hall. Among the prominent Vermonters in the reception-room with ex-Governor Page were the Hon. N. B. Safford, Judge Asa French, Mr. Henry Clark, the Hon. Pitt W. Hyde, the Hon. Samuel Norton, Colonel Albert Clark, Colonel A. W. Veazy, the Hon. Homer A. Roice, Judge of the Supreme Court of Vermont; the Hon. T. H. Canfield, Colonel S. S. Heaton and the Hon. Henry Chase. There were at least 2,000 Vermonters at the Exhibition on that day, and scarce one of these did not shake hands with the ex-Governor, to whom they were introduced by the Hon. Pitt W. Hyde.

This portion of the ceremony concluded, the Vermonters formed in line at their building and proceeded to the Judges' Hall, where they heard the oration on their State by Mr. Henry Clark. The orator, in a thorough and interesting paper, said that more than two centuries have passed since the new Territory of Vermont was known to civilized man, and a century and a half has elapsed since the first settler erected his log hut in the then wilderness fastness. Vermont seemed to be during the colonial and Indian wars a debatable ground, on which a guerrilla warfare was fought, and it was not until the year 1760 that civilized establishments were formed upon the banks of the Connecticut river. In 1761, however, no less than sixty

townships were granted on the west side of the Connecticut river, and within a year from then there were 138. The government of New Hampshire reserved 500 acres of land out of each of these townships. At the close of the Revolution Vermont stood financially better than any of the other States. January 17, 1777, Vermont declared her independence, and on the 4th of March, 1791, she was admitted into the Union. Since then her course of prosperity has been wonderful. She now has 2,519 common schools, 71,325 children attending them, 92,577 children of school age, 6,175 pupils in private schools, and a number of well-supported colleges. In the State are fourteen counties and 241 towns. In 1760 Vermont had only 300 people; in 1775, 20,000; in 1790, 85,425; in 1870, 330,551, and now she has nearly 400,000. In the value of her live stock she is the first State in New England. She has built nearly 1,700 miles of railroad during the last twenty years. She is sound financially, good commercially, and has a great mine of wealth in her quarries of marble and granite. Mr. Clark was much applauded at the close of his address, and the audience then dispersed to look at the show.

Massachusetts.

Massachusetts brought before the world, as her State Building, a specimen of Colonial architecture, quaint-looking, derived partly from the English and partly from the French, and it attracted considerable attention. This was one of the few of the State buildings which adopted as their model the style of houses common to Colonial times. It is one of the largest and best appointed State buildings on the grounds, and consisted of one square section with annexes at the ends and a tower with peaked roof rising from the

centre. It was colored in brown with stripes of chrome green. The grounds were very prettily laid out, with different colored flowers tastefully arranged in beds and patterns. In front of the building stood a little fountain fed by a hose. In front of the entrance was a pretty porch flanked by long piazzas, which were provided with cane-seated benches, and had baskets of flowers hanging from the roof. The main entrance hall was cool and spacious, with rows of comfortable seats, and a large old-fashioned fire-place with mantel of wood. The hall also contained an organ, and a bookcase filled with standard works. At the north end of the hall was an office with a register and post-office, and on the right of the entrance was the Governor's reception-room, very richly furnished, with paintings on the walls, a handsome Japanese screen and a number of other ornamental objects. On the left was the ladies' parlor, somewhat similarly furnished, and provided with a grand piano. Massachusetts had her State day on September 11th, on which occasion the attendance of visitors amounted to 97,868.

Rhode Island.

The building of this State was a small structure, twenty-one feet by forty-two, with an addition to the rear of six and a half feet by nineteen, one story in height, and colored with drab tints picked out with red, with pretty cornice in elaborate turned work. The interior was furnished plainly, and contained reception-rooms for ladies and gentlemen, a register, etc. It was built of solid timber, the frame work showing on the outside, and the roof was covered with Pennsylvania black slate.

This was the smallest but the prettiest State build-

ing in the grounds; and on October 5th it was enveloped with United States flags, the anchor-bearing standard being prominent. This was in honor of the Centennial reunion of the citizens of Rhode Island, which came off on that day.

The day opened most inauspiciously, the sky being filled with threatening clouds, and the temperature that of November chilliness; but, notwithstanding, the Centennial Grounds were early thronged with visitors, and the admissions rapidly increased until noon, when the report of the turnstile-keepers placed the total at 83,540. Badges were obtained during the morning at the State cottage on the slope of George's Hill by citizens and former residents of the State, and thousands of these, some of blue with the words "Rhode Island," and others of white silk with "Hurrah for Little Rhody" inscribed in black letters, could be seen among the multitudes of strangers.

Flags of various designs were arranged with good effect over and around the entrance to the cosy State head-quarters, and a white banner with the coat-of-arms on a blue ground floated from the staff in front, the façade being adorned with gracefully-looped ensigns set off with bannerets. At half-past eleven o'clock General Hawley, with Generals Bradly and Lewis Merrill, and Commodore Calhoun of his staff, accompanied by President John Welsh, of the Board of Finance, waited upon Governor Lippett at the United States Hotel and escorted the Governor and his staff to Gate A, where many members of the Centennial Commission and the Board of Finance were assembled to receive them. At twelve o'clock the gate was opened and Governor Lippett and his staff entered. A procession was then formed, and headed by a detachment of the Centennial Guard and the first brigade band of

the first division, the visitors proceeded along Belmont avenue and through the winding avenues to the State building. Governor Lippett, with Presidents Welsh and Hawley on either side, was followed by the members of the staff of General Hawley and of that of the Governor in full uniform, with some five hundred Rhode Islanders, the number of the latter being augmented along the line of march. Arrived at the building, the Governor's party, on reaching the porch, was cordially welcomed by General Hawley in behalf of the Centennial management. Alluding to the frequent humorous comments upon the relative size of the State, he said that since Corliss had joined us, and made his magnificent contribution to the Exhibition, Rhode Island had come to be appreciated upon her merits. In her manufacturing pursuits she had taken a high and honorable rank, and though small in territory, her population, in proportion to area, is larger than that of any other State in the Union. He alluded to her eminence in the persons of her representatives in the councils of the nation, and extended a thousand welcomes to her people.

After a short but appropriate address from Governor Lippett, which was received with many demonstrations of enthusiasm, the Governor's reception commenced, on the step of the landing, the people coming up in line, and after hand-shaking with his Excellency, passing to the west side of the structure. The members of the Board of Finance and, later, many of the Centennial Commission, paid their respects. For nearly three-quarters of an hour did Rhode Island's chief Executive submit to the hand-shaking martyrdom characterizing these gubernatorial receptions. At three o'clock the reception ended and the Governor and

party, attended by their escort, marched to the Corliss engine, in Machinery Hall, where they were met by Mr. George H. Corliss, Centennial Commissioner from Rhode Island, whose great exhibit they had come to inspect.

After an examination, in which they were assisted by Mr. Corliss, the observance of Rhode Island day terminated, the visitors spending the remainder of the day in the different buildings.

Connecticut.

Connecticut State building was situated on State avenue, and at no great distance from the British buildings. It was built after the design made by "Ike Marvel," the noted author, and was about forty feet square. A strong wooden porch, built in the old fashion of a hundred years ago, over a very odd door, which was divided horizontally in the centre, instead of longitudinally. Over this porch were the State arms, and the motto: *Qui Transtulit, Sustinet.* The wood used within and without was Connecticut pine, which was stained to give the dark look of age. There were three rooms — reception-room, Commissioners' room, and ladies' parlor. These two latter were small, but very complete and attractive. The ladies' parlor had couches and easy-chairs for the weary guest, and was a model of New England neatness. In the Commissioners' room was a large, odd pine mantel-piece of carved wood, over which hung a fine portrait of Israel Putnam, painted by Thompson, of Hartford, Connecticut. Just below this portrait hung the stout old hero's musket—the "Queen's arm," with which he was wont to speak forcibly to his enemies. The fire-place, with its great brass andirons and fender, its tiles of painted

NEW JERSEY BUILDING.

NEW YORK BUILDING.

MASSACHUSETTS BUILDING.

CONNECTICUT BUILDING.

China representing Connecticut wild-flowers and scenes in Putnam's life, presented a very attractive picture. On the right of it stood a small flax-wheel, dark and glossy with time. Farther on, was an antiquated side-board of veneered wood, with spindle legs, claw feet, and rings of brass, instead of knobs, to open the doors and drawers. A set of old silver, made after the Elder Brewster pattern, was upon the top of it. On the left of the mantel-piece hung a *wooden hand*, from Charter Oak; and the most curious fact of this latter was, that the part of the tree from which it was taken grew naturally into this shape—but very little cutting and trimming having been needed to make it complete. The skin, the fat, the lean, and even the bone, were so well delineated as to make one wonder if there was not a species of prophetic foreshadowing in this as to one branch of the noted industries of this thrifty State. There was also a frame made by sawing off a section of a limb from Charter Oak, and an engraving of the oak itself framed therein. This hung over the mantel-piece. A chess table was made from the same historical tree, and an engraved outline of the tree adorned the top, which lifted up, revealing the chess-board beneath. On the left stood a tall clock, made of apple-wood and having all its works of wood. Over the door leading into the ladies' parlor hung, in its original frame, the royal arms of Great Britain, sent over by His Majesty when Connecticut was a colony, and which used to hang over the Speaker's chair at Hartford. It was painted in 1724.

The great Centennial jubilee of Connecticut took place on September 7th and 8th. It had been intended that there should be a grand review of the Connecticut brigade at their encampment, "Camp Israel Putnam,"

on the Pennsylvania railroad, on September 6th; but this was unavoidably prevented by the rain. The reception, however, took place on September 7th, and a very brilliant affair it was.

The number of citizens of Connecticut, exclusive of soldiery who straggled in from Camp Putnam disgusted with the heavy drizzle and deep mud that prevented them from making a grand pageant before the folks from home in particular, and from all over the world in general, was estimated at 8,000. In the afternoon Governor Charles R. Ingersoll gave a reception in the Connecticut cottage, Adjutant-General William P. Trowbridge introducing the hundreds of guests to the Governor, the latter shaking each by the hand and having a pleasant word for every one.

Accompanying the Governor was the Adjutant-General of the State; Governor Hartranft, Adjutant-General Latta, of Pennsylvania; Postmaster-General Jewell, General Hawley, and others.

The dress parade of the brigade took place the same afternoon, and greatly added to the success of the Connecticut day.

At four o'clock in the evening the entire brigade, under the command of Brigadier-General William Randall Smith, entered the grounds at the southern Belmont gates, where they were met by a detachment from Company B, of the Centennial Guard, under Major E. H. Butler, Jr., who acted as pioneers. The brigade, marching in fours, stretched from end to end of that portion of Belmont avenue within the grounds. The avenue was densely lined with humanity on both sides, and here the sight of the half-mile of glittering bayonets, showy and tasteful uniforms and the soldierly bearing of the troops was nothing short of magnificent. The

marching of the Second was almost faultless and won particular applause. The line turned from Belmont on State avenue, along which it moved, past the Connecticut cottage, to the plateau at the foot of George's Hill. Here the brigade was drawn up in four battalions, each composed of a regiment, for dress parade, a pageant witnessed by not less than 15,000 spectators, including ex-Postmaster-General Jewell, Governor Hartranft, General Hawley and other prominent gentlemen.

Camp Israel Putnam was broken up at three o'clock the following morning, and at seven the entire State Guard of Connecticut bade adieu to Philadelphia and the Centennial, where they won for themselves universal admiration.

New York.

The New York building was more elaborate in appearance than most of the other State buildings. It had a verandah extending all the way around it, and a small observatory on top. The exterior was colored in pale yellow and greenish drab, with striping of red. On the left of the entrance was the public office, where conveniences for writing were offered and newspapers kept on file. A register was also kept here. On the right was a ladies' reception-room, prettily furnished; up-stairs a ladies' parlor, exquisitely furnished, and a room for the use of the Governor of this State, furnished in a very expensive manner, and having on the walls several handsome paintings, together with a large portrait of Governor Tilden.

The State day of New York was held on September 21st, and the unusually large attendance on that occasion showed the appreciation of the great Centennial celebration.

The arrival that attracted most attention was that

of a delegation of Metropolitan Police from the city of New York, numbering 593 men, under command of Superintendent Walling. They were evidently picked, and a finer body of police was never before seen in Philadelphia. Escorted by the Philadelphia police the men marched in the following order:

Second Regiment Band.
Chief of Police, Kennard H. Jones.
Captains Wood and Curry.
Platoon of Reserves, Lieutenant Crout.
Twentieth District Police, Lieutenant Creighton.
Eighteenth District Police, Lieutenant Ferguson.
Tenth District Police, Lieutenant Beale.
Sixth District Police, Lieutenant Wilkins.
Fifth District Police, Lieutenant Weir.
Sixteenth District Police, Lieutenant Brown.
Centennial Police, Lieutenant Miller.
Grafulla's Band, New York.
Platoon of New York Policemen.
Captains Delevan, McDonald, Bennett, Burns, Haddan and Ward.
Second platoon of Policemen.
Superintendent Walling.
Captains Clinchy and Washburne.
Double platoons, twenty-five abreast.
State and National Flags.

After these came double platoons of men, headed by Captains Clair, McCullough, Murphy, Robbins, Sanders, Garland, Stearns and Mount, and Inspectors Spates and Dilks, with Drill Captain Copeland.

The entire body then marched in procession down Belmont avenue to Girard avenue, across Girard avenue bridge, around the Lincoln Monument, and back again to George's Hill, from which the body surveyed the city, and then entered the Exhibition grounds.

At one o'clock Governor Tilden arrived on the

grounds in a carriage. He was accompanied by ex-Governor Bigler, of the Centennial Finance Board, and was closely followed by some forty members of the United States Centennial Commission, headed by General Hawley, and Commissioner Beckwith of New York. Meanwhile the New York building had been completely filled, and the space surrounding it occupied by a dense crowd of people anxious to see and be introduced to the Governor. Upon being recognized, the Governor was enthusiastically greeted by the multitude, and responded by bowing to the people to the right and left.

On entering the building the reception began, and for an hour a stream of people flowed in at the front door and out at the eastern gable, every one of whom shook hands with Mr. Tilden. At last, seeing that it was impossible to admit the crowd who still waited outside, Governor Tilden descended to the lower portico for the purpose of speaking to the assembled multitude, introduced by General Hawley thus:

FELLOW-CITIZENS:—I have the great honor of introducing to you his Excellency, Governor Tilden, of New York.

After an outburst of cheers and applause which hailed his appearance, Mr. Tilden made the following brief address:

LADIES AND GENTLEMEN:—My right arm is not wearied with the hearty and friendly grasp of the thousands whom I have had the pleasure to meet and shake by the hand this day. [Great cheering.] But the committee of arrangements having informed me of the vastness of the multitude awaiting outside the building, and warned me that it would be an utter impossibility for me to meet and salute, separately, all who have honored me with their presence here, suggested that I greet you en masse. [Loud applause.] Ladies and gentlemen, I tender you my cordial salutation, one and

all. I have come here to do an important duty—to assist in asserting the moral power of the great State of New York, side by side with those who are asserting the moral power of the great State of Pennsylvania. I do my part on behalf of five millions of people, and on that behalf do I tender you my cordial and complete salutation, one and all. And now I bid you adieu.

This concluded the formal ceremonies, and as soon as the crowd had somewhat dispersed, Governor Tilden, accompanied by some of the State Board of Centennial Managers, proceeded to the Main Building, thence to the Government Building, and back to the New York State building. Here the New York Police delegation was reviewed on State avenue by the Governor, and gave an exhibition of their proficiency in battalion drill. After a few brief congratulatory remarks to Superintendent Walling on the efficiency of the police department of New York city, the Governor left the buildings and grounds, and New York State day was over.

New Jersey.

This State, which acted with so much liberality in its subscription to the Centennial stock, erected one of the most attractive edifices on the grounds.

It was in the old style of half timber and red tile architecture, and was surmounted by a wedge-shaped tower. It was a two-story frame cottage structure of the Gothic order, eighty-two feet in length and forty-two feet in width; the roofs were peaked and bisected, and covered with tiles, which added uniqueness to its appearance. It was nearly surrounded by a tasteful piazza, which was decorated with flowers, and formed a cool and pleasant retreat. The hall extended from front to back of the building, and was plainly furnished and decorated with flags. On the right were the offices

of the Jersey State Centennial Commission. On the left of the hall was the staircase leading to the ladies' waiting-room. On the right of this staircase was a waiting-room for gentlemen, and on the left a room for editors and reporters. Up-stairs was another hall, plainly furnished as a ladies' waiting-room, and the ladies' committee-rooms occupied the further end of the hall. There were no special exhibits in the New Jersey building, but the red tiles which covered the exterior of the structure were illustrative of that class of products of the State. The cost of the building was about $8,000.

August 24th was "Jersey day," and to New Jersey belongs the honor of having inaugurated the series of State celebrations which formed so attractive a feature in our Centennial Exhibition.

Governor Bedle, of New Jersey, accompanied by several members of his official staff and a party, numbering over forty persons, of distinguished men from the State, were cordially welcomed by President Welsh, General Hawley, and other Centennial officials, and by them conducted to the Judges' Hall, where an eloquent address was delivered by the Hon. Abram Browning, on the growth and present extent of the State and the interesting development of the early and recent history of New Jersey.

At its conclusion, the assemblage proceeded in a body, headed by the First Regiment Band, to the New Jersey State building, where the grand reunion of her citizens now took place. This building was the rendezvous for thousands of Jerseymen during the day, and the head-quarters of the State officials, and from every spire of its old-fashioned, red-tiled roof rustled the national colors.

Every county in the State, from Sussex to Cape May and from Hudson to Camden, was represented in the thronging multitude which, from 9 A. M. till evening, tested the strength and capacity of the spacious structure, and surged restlessly through and around it.

On arriving in the building Governor Bedle made a brief address, in the course of which he alluded to the grandeur and greatness of the Centennial—the greatest Exhibition the world had ever seen—and to the credit and gratitude due to the men who, like John Welsh and Governor Hawley, had given their time, their money and their energy to build it up. With the part taken by New Jersey in accomplishing this great success, no Jerseyman should feel dissatisfied.

General Hawley and Mr. John Welsh, who were next called upon, both expressed their appreciation of the great sympathy and material aid which had been rendered by the State of New Jersey at a time when the prospects of success were so discouraging.

A formal reception was then held by Governor Bedle, which continued until three o'clock, the citizens of the State and many strangers being severally presented to his Excellency.

Pennsylvania.

The building erected by Pennsylvania as the State head-quarters was located on one of the most advantageous spots within the boundaries of the grounds, facing the lake, and between Fountain avenue and the Avenue of the Republic.

The building was quite large, and was so arranged that it presented one of the coolest and most spacious reception-rooms which was to be found in any of the

State buildings. It was one story in height, with attic windows. The front elevation consisted of a Gothic tower with turrets on each side. In these were little balconies from which pleasant views of the grounds were to be had. Above the doorway was a Keystone in gold, with the word Pennsylvania in black letters. The building was long in proportion to its width, and was divided into three sections. The central section consisted of a wide hall which rose clear to the roof, and was neatly and coolly furnished with matting, cane-seated chairs and benches, tables and a piano. The roof was supported by Gothic arch trusses with elaborately turned wood-work. In this room a register for visitors was kept.

On the left of the hall was the office of the State Board of Centennial Managers, and beyond, the Governor's room, used by the Governor of Pennsylvania when he visited the Exhibition. On the right of the hall were the parlors for gentlemen and ladies respectively.

September 28th, 1876, was the greatest day of all the great days during this Centennial year, and was a proud day for the grand old Commonwealth. More than a quarter of a million of people, of whom at least four-fifths were Pennsylvanians, assembled in the Centennial grounds to commemorate the One Hundredth Anniversary of an event—the perfection of the Constitution of 1776—which completed the organization of Pennsylvania as a State.

Not only in the unparalleled magnitude of the attendance, but in the interesting nature of the commemorative exercises, and especially the unsurpassed splendor of the illumination in the evening, was Pennsylvania day peculiarly signalized.

As far as the attendance went the numbers who crowded into the grounds were not only unprecedented in the history of this Exhibition, but far beyond what had ever been known at any previous international fair.

The official count of Pennsylvania day's admissions was as follows: Full fee to the Main Exhibition, 217,526; half fee to ditto, 33,806; cash to the live-stock show, 5,837; free to both shows, 17,750; total, 274,919, the largest number ever known to visit a World's Fair in one day. The only approach to it was at Vienna on the occasion when the admission was only ten cents, when the number present was 173,000. Nothing like it had ever been known before in this country, and the good order that prevailed during the whole day was one of the most marvellous features of the celebration.

The Pennsylvania Building.

At certain points on the grounds the rush was greater than at others, and, of course, in Pennsylvania building was one of these centres. Here a crowd gathered early in the day, gazing in admiration of the beauties of the decorations. Shortly before ten o'clock the veteran corps of the First regiment of infantry, National Guards of Pennsylvania, Colonel Charles S. Smith commanding, after waiting upon Governor Hartranft at the Globe Hotel, conducted him to the State structure, where he was received with the plaudits of the multitude. Upon entering the building he was met by the Centennial authorities, with Director-General Goshorn at their head, who escorted his Excellency to the Judges' Hall, where the principal exercises of the day took place. On their arrival, about eleven o'clock, the ceremonies were opened with the singing of an original

DELAWARE BUILDING.

PENNSYLVANIA BUILDING.

OHIO BUILDING.

ARKANSAS BUILDING.

ode by the Corinthian Quartet, of this city. Upon reaching the interior of the hall, and quietness being restored, Governor Hartranft took the chair and delivered a short address, in which he spoke of the greatness of the occasion, the gratifying attendance of the citizens of this Commonwealth, and of the wonderful results achieved by the Exhibition. He paid a fitting tribute to the Centennial managers, to the working of the World's Fair, and to its importance in history, and concluded by presenting the President of the Centennial Commission, General Joseph R. Hawley. The latter spoke in his happiest manner, and at the conclusion of his remarks Mr. John Welsh, President of the Centennial Board of Finance, directed attention to the unlimited and pronounced success of the show in its every detail. Then followed the special feature of the day, the address by Benjamin Harris Brewster, Esq., orator of the occasion, who entered into a review of the giant progress made in Pennsylvania during the past hundred years, and our Centennial greatness.

Receptions.

After the addresses in Judges' Hall the remainder of the programme was as follows:

From two to five P. M. Governor Hartranft held a public reception in the Pennsylvania State building. The populace came in an orderly line, lasting continuously from two o'clock until after five, and it would be impossible to say how many thousands there were.

From three to five P. M. Mayor Stokley held a public levee in the Philadelphia City building, during which time 7,250 persons shook his Honor's hand.

During the same time Mrs. E. D. Gillespie and the ladies associated with her in the Women's Centennial

Executive Committee held a reception in Judges' Hall. Vocal and instrumental concerts were given during the day by various bands in different parts of the grounds, and by Prof. Widdows on the chimes at Machinery Hall. Balloon ascensions were made in the open space back of the Agricultural Hall for the further amusement of the assemblage.

The Fireworks.

The pyrotechnic display in the evening was the absorbing topic of the day. It was simply immense—eclipsing everything ever before witnessed on this or any other continent. The long and anxiously-awaited programme was opened with a salute of one hundred aerial maroons and the simultaneous illumination of the grounds and buildings with colored lights, these brilliant beams being of every possible tint and hue, and so distributed that every color was made a complement of those nearest to it. The scene then presented was simply indescribable. Every portion of the enclosure was bathed in a halo of splendor; the fountain in the lake sparkled diamonds, emeralds, rubies, and pearls in rapid succession; the lake itself mirrored a loveliness far surpassing the rosiest dreams of beautiful Venice, and in the distance Horticultural Hall gleamed like some fabled palace of the Arabian Nights. While all this grandeur was delighting the almost numberless visitors, Professor Brock sent off three large gas-balloons which carried with them dazzling magnesium lights, illuminating the country for miles around. One hundred Chinese tourbillions of richly-contrasted colors followed next, and then the pyric portrait of General Washington was set off, but owing to the dampness of the weather was only partially successful.

Probably the most beautiful portion of the display were the one hundred twin asteroids, which, after rising to an astonishing altitude, floated off into mid-air, like modern "stars of the East," only the bright, glowing beams changed color every moment, and at last terminated in a burst of magnesium lights, which gleamed in the heavens like new-born suns. Then followed a display of rockets, meteors, and shells, so brilliant, so rich in color, and so rare in form that cheer after cheer greeted the performance, and these signs of approbation did not end until the last bright stars finally faded from sight. The heavens were lit up with myriads of emerald, sapphire, silver, ruby, and azure stars, which ever and anon burst forth in showers of iridescence, and while floating in the air changed color from deep blue to gold, next to green, and then to maroon and purple.

Then followed a cascade of silver fire, jewelled with Roman lights, and amid the splendor burst forth fifty batteries of silver saucissons. The magnificent display ended with a simultaneous *girandole* of 2,000 large rockets, which, bursting in mid-air, formed an aerial bouquet of peerless grandeur, and filled the air with innumerable orbs of such dazzling splendor, that the stars above paled in their presence like candles before a calcium light. The display, as a whole, was a fine pyrotechnic exhibition. Thus ended Pennsylvania day, a day long to be remembered and spoken of by all the thousands who participated in making it so grand a success.

Maryland.

The Maryland State building was modest in appearance, and the exterior colored in light tints, relieved

with red. In front of the building stood two locomotives, exhibited by the Baltimore and Ohio Railroad Company, and affording in their appearance a curious contrast. One of them was built by Phineas Davis, in 1835, and is very small and antiquated. The other is a full-size locomotive of the present day, constructed for the company, at its works, at Mount Clare, near Baltimore, and handsomely finished.

The building consisted of a large hall, with small rooms on either side. Ranged about the hall were cabinets containing oysters found in the Chesapeake and tributary waters; a very beautiful collection of minerals, handsome marbles, sections of woods and large pieces of coal. At each end of the hall was the escutcheon of the State, and on the walls hung a number of portraits of personages prominently identified with the history of Maryland, and contributed by the Maryland Historical Society. Among these were Charles Carroll of Carrollton, Samuel Chase, William Paca, General Smallwood, General Otho Williams, Baron DeKalb, members of the Calvert family, and others. The first room on the left was occupied as an office, and contained a register. On the walls were hung drawings from the Maryland School of Design. On the right were two rooms, one a sitting-room for ladies, and the other for gentlemen, both furnished in a cool and inviting manner. In the ladies' room were hung portraits of Washington and Mrs. Washington, when both were very young.

Delaware.

The head-quarters of the "Diamond State" was located on the west end of State avenue, and the style was of the cottage frame order, with gable and hipped

roofs, which were further broken by dormer windows. In front of the building, above a porch, rose a projecting octagonal tower to the height of forty-three feet; above this floated the State flag.

The exterior was colored in yellow and brown, and the interior was neatly papered in arabesque patterns. The second story was left in uncolored woods, and clear to the roof, with rooms partitioned off, and were used by the attendants or for other purposes. On the first floor was a wide hall, on opposite sides of which were ladies' and gentlemen's reception-rooms. Files of the Delaware papers were kept, with a register for visitors.

West Virginia.

The building which represented the State headquarters was rather incongruous in appearance, it having been enlarged so as to give room for a State exhibition. The front portion of the structure, in consequence of this extension, was different in architecture from the addition. It was built in the form of a cross, with a front elevation rising between the arms. The exterior up to the cornice was of stained wood, to represent oak, yellow pine, and walnut, and relieved with stripes of red and drab. The interior finish was of varnished woods, with stripes of white and brown.

In the rear of the building proper there was an additional structure for exhibition purposes. It was square in shape, and devoid of any attempt at ornamentation. Above the entrance were grouped enormous stalks of white and yellow corn, interspersed with wisps of hay and straw. Ranged about the walls were tall graduated columns made of sections of trees, laid perpendicularly and fastened against the wall so as to show the grain of the wood. There was a great variety of these speci-

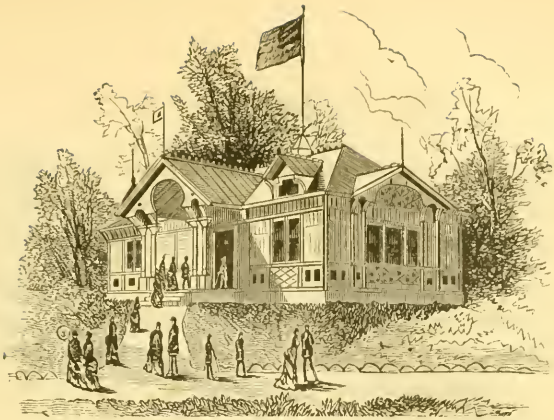
mens, showing the timber production of the State to be particularly rich. Blocks of coal and iron and copper ores were exhibited in profusion, together with specimens of petroleum, wines, agricultural products, limestones, marble, wood-work in axe-helves, crockery manufactured at Wheeling, potters' clay, black flint, fire clay, yellow ochre, millstone rock, etc. The public schools of the State were represented by various specimens of the work of the pupils and text-books.

Maryland, Delaware, Virginia, and District of Columbia.

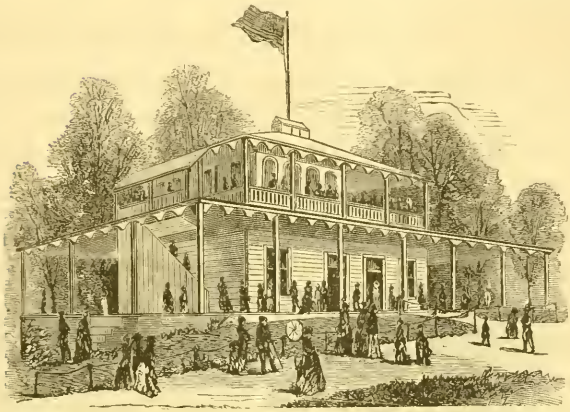
Over 160,000 cash admissions to the main Exhibition made October 19th, the day set apart for the special Centennial Celebration of Maryland, Delaware, Virginia, and District of Columbia, second on the roll of honor of State days. Out of this number it was estimated that at least 90,000 were from these States and the District named. It was by all odds the most exciting day in the history of the Exhibition. So many and far apart were the attractions that people were undecided where they should go and spend the most time.

West Virginia, being a slice of one of the Old Thirteen States, very naturally united with the Old Dominion in the jubilee, and though the State government took no steps in that direction, excursion parties of over a thousand persons from West Virginia arrived in time to take part in the celebration.

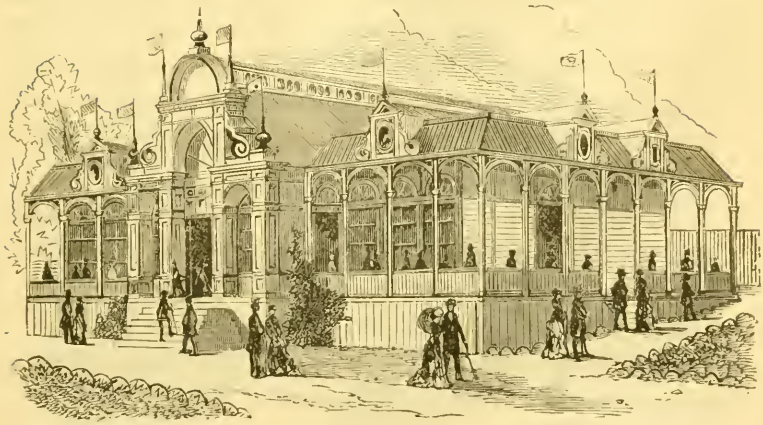
At eleven o'clock the State authorities of Delaware and the city officials of Wilmington arrived in the main entrance to the Exhibition grounds, where they were received by officials of the Centennial and escorted by them to the Delaware State building, adjoining the Maryland building on the east, and which, like the



RHODE ISLAND BUILDING.

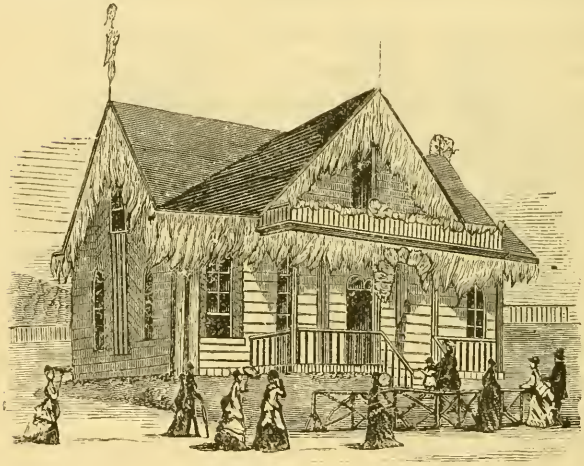


VIRGINIA BUILDING.



PHILADELPHIA BUILDING.

WISCONSIN BUILDING.



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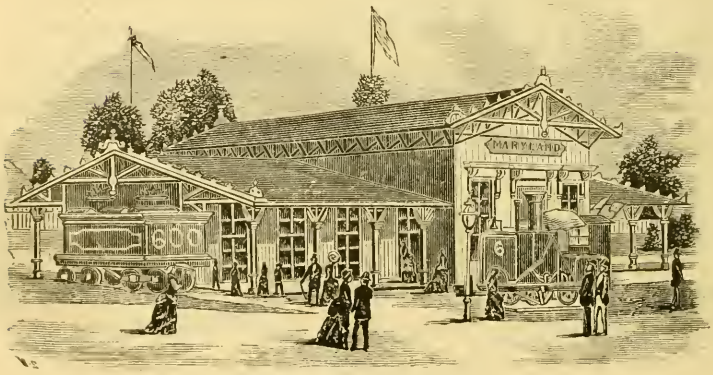


MARYLAND BUILDING.

latter, was profusely and tastefully decorated with State and national colors. Above each building floated the flag of its State, and the Delaware structure displayed the coats-of-arms of the Old Thirteen.

On arriving at the Delaware building General Hawley, on behalf of the Centennial management, welcomed Governor Cochran and all the people of Delaware. He referred to the part which that State bore in the work of founding the government, and to the propriety of its holding such a celebration as the present. Governor Cochran then addressed the assemblage.

When Governor Cochran ended his speech, the Hon. William G. Whitely was introduced by Chief-Justice Comegys. Mr. Whitely delivered an address, giving a history of Delaware from its first settlement to the present day. After outlining the progress of the colony from the two grants made by the Duke of York up to its assertion of independence in 1704, and from that time until the outbreak of the Revolution, the speaker dwelt warmly upon the virtues of the Delawareans who bore such an active part in that contest. He concluded with statistical information as to the State's resources and industries, notable among which are the agricultural, mechanical, and those of iron ship-building, morocco manufacturing and car-building. He stated that the first iron steamship built in this country —the "Bangor"—was built at Wilmington in 1844, since which time 242 iron vessels have been constructed there.

The Reception.

Mr. Whitely's address being ended, Governor Cochran began his reception of visitors, first receiving the respects of the Centennial Commission, Board of

Finance, and other prominent officials of the Exhibition. The guests were introduced by Colonel Maxwell, chief of staff. As many as could shake hands with his Excellency in an hour and a quarter, at the rate of about forty-five a minute, did so. By this time their neighbors of Maryland had assembled in such numbers and become so enthusiastic that the Delaware building began to grow deserted, all attention being drawn to the former quarter.

Maryland.

At half-past twelve o'clock the participants in the Maryland demonstration entered the grounds by the main entrance and proceeded to the Maryland building, in front of which they halted, while Governor Carroll reviewed the Second Brigade Maryland National Guard, composed of the Fifth and Sixth Regiments, which marched past and up George's Hill, the First Brigade Band performing martial and patriotic airs. The marching of the Fifth was noticeably fine and elicited great applause.

The Governor and staff then dismounted and were received by President Welsh and other members of the Board of Finance, who escorted the gubernatorial party to the porch of the Maryland building, amid the strains of "Maryland, My Maryland," by the First Brigade Band, their favorite air, and the appearance of their Governor, who now confronted them from the porch, aroused the enthusiasm of the people to its highest pitch, and their cheers drowned the music. Then followed a medley of "Away Down South in Dixie," "Yankee Doodle" and kindred airs by the band, after which Governor Cochran, General Hawley, Governor Hartranft and the members of the Centennial Commis-

sion and Board of Finance, most of them accompanied by ladies, and several foreign gentlemen, including Mr. Wu Ying Ding, the Chinese mandarin (in full native costume), arrived and entered the building, after which the oratory began.

Among the several speakers, Governor Carroll's address was so short and yet so appropriate that we give it entire:

General Hawley: As a representative of the State of Maryland, and in the name of her people, I thank you for the warm welcome which you have given us. Among the remembrances of this great Exhibition none will more appeal to Marylanders than the kindness which they have received here to-day from the hands of yourself and the management of the Centennial. As to the citizens of Maryland, they and I are here to-day to do honor to our State for her record of '76, to testify our appreciation of the wonderful advance made by our sister States in the past, and to unite in hoping for their continued prosperity in the future. I must congratulate you for the largeness of your attendance here to-day to honor Maryland, the Old Thirteen and the Union.

After the applause which this speech received had subsided, Governor Denison, Commissioner of District of Columbia, said a few words, after which Mr. J. G. L. Findlay, the orator of the day, was introduced and spoke at some considerable length on the history and resources of Maryland.

This was followed by an eloquent and thorough history of the District of Columbia, by the Hon. Thomas Wilson, Commissioner of the District of Columbia.

At the close of Mr. Wilson's address, Governor Carroll took his stand in the reception-room, where over 5,000 persons desirous of giving his hand a friendly shake availed themselves of the opportunity to do so.

Virginia.

The Virginian ceremonies were wholly informal. At the State building there was open house and lunch for all visitors from the Old Dominion wishing to partake of it. The number of Virginians at the Exhibition during the day was estimated at 5,000. Those from West Virginia did not exceed eight hundred, most of whom spent a social half hour in their State Building, from which a fair view of the tournament could be had.

The Centennial Tournament.

This was one of the principal attractions of the many which characterized this day, a genuine Southern tournament, the like of which had never been before seen in Philadelphia.

There were fifteen knights, representing the thirteen original States, the Union, and the Centennial, and the day's work before them was to ride over a given course, thrust their spears through diminutive rings and enjoy the plaudits of the multitude. The course proper, at the foot of George's Hill, was about three hundred yards long; at intervals of fifty yards were three arches, fifteen feet high by ten or twelve feet wide. From the horizontal bar forming the top of each frame hung a wooden rod, ending in a piece of iron a foot or more in length, and from each of these three iron endings was suspended a small red ring, an inch and a half or thereabouts in diameter. The rules of the tournament required that each knight should ride at a full run, and that each knight's spear should be at least six feet long. Every rider then must start a hundred yards or more from the first ring, control his horse, poise his spear and be in perfect condition when the first arch was reached.

To knock a ring from its frail fastening availed the knight nothing; a breath of wind or a touch with the lance would do that; but each rider must thrust his spear through the ring, or through all three of them, if he could, and bring it, still impaled upon his spear, to be laid at the feet of the judges. The rings used on this occasion were much smaller than is customary. Three inches in diameter, and even four inches, is not an unusual size, and a two-inch ring is considered uncommonly difficult to capture. But the rings used were smaller than any of these, bringing into play all the nerve and skill that the riders possessed.

We cannot give here any detailed account of how each gallant knight bore himself in the tournay. The knights were H. Crozier, representing New Hampshire; E. H. McFarland, Jr., representing Massachusetts; Wm. P. Bryan, representing Connecticut; Geo. V. Bacon, New York; C. D. Chapman, New Jersey; H. M. Perry, Pennsylvania; R. L. Kane, Delaware; R. W. Hereford, Maryland; P. A. Scaggs, Virginia; J. M. Hardy, North Carolina; F. Nelson Jarboe, South Carolina; C. A. Fox, Georgia; Charles White, Jr., representing the Centennial, and A. B. Suit representing the Union.

Delaware carried off the honors through the prowess and skill of her champion, the second prize falling to the Centennial, the third to Connecticut, the fourth to South Carolina, and the fifth to Maryland.

In the evening the Judges' Hall was gorgeously decked and brilliantly lighted, for in it was to be crowned the Queen of Love and Beauty. Miss Parke P. Perkins, of Virginia, was the Queen, and seated about her handsomely caparisoned throne were her maids of honor, Misses Ida Taylor, of Washington, Ida

Griffin, of Maryland, and Bess Holland, of Florida. Colonel Stewart delivered a short address, and the Knight of Delaware, advancing, placed upon the Queen's head a handsome crown. A glee was sung by the Virginia jubilee singers, and the maids of honor were crowned by the other victorious Knights, who, taking the arms of their ladies, saluted the Queen. After this the dancing commenced and was continued till a very late hour.

Mississippi.

One of the most interesting of the State buildings was the Mississippi log cabin, which contained a full exhibition of the displays contributed from this portion of the United States, thus affording visitors the privilege of examining the natural and industrial products of this State. The cabin itself was one of the most unique structures on the grounds. Every foot of timber used in its erection was shipped from Mississippi, and carpenters from that State put it up. With its walls of native wood fresh from the forest, its rustic framed windows, Gothic doorway, and overhanging eaves fringed with moss; its balconies of naturally and curiously-carved roots and limbs, and its numberless reminiscences of the untrodden forest, it formed one of the most interesting, if not the most instructive, buildings on the grounds. There were in the building sixty-eight different kinds of wood in the superstructure, not including the door-panels, which were made of forty-eight different varieties. The outside walls were chiefly of hickory, split logs with the bark on, while the door and window-frames were made of many varieties of pine. The entire structure was rich with ornaments, found carved by nature in the Mississippi

forests, while the inner walls were of finely-polished specimens of every variety of pine. Some of these resembled bird's-eye maple in their delicate vein tracings, while others, from the heart of the tree, were almost as dark and brilliant as mahogany. The porticos on both sides were ornamented with mosses, while from the arched verandahs were pendant beautiful hanging baskets.

Ohio.

This State erected a building at the extreme eastern end of the State Row. The structure was partly of stone and partly of wood. The front portion was of different stones about three-fourths the way up the sides, the rest finished in weather-boarding. In the rear was a long extension, entirely of wood. There were rooms on both sides of the central hall, occupied respectively as a general office, Commissioners' rooms, and ladies' parlors. In the latter were portraits of the survivors of Perry's victory on Lake Erie, framed with wood from the ship St. Lawrence. The extension in the rear of the building proper was occupied as a sitting and reading-room for gentlemen, and contained files of the Ohio newspapers, register, etc. The stone used in the building, gas fixtures, furniture, etc., were furnished by Ohio firms.

October 26th was Ohio's day at the Centennial, and that it was a great success the following official count of the admissions on that day will show: Full fee, 121,818; half fee, 482; free, 13,361; total, 135,661; total cash receipts, $61,029.50. More than thirty thousand sons of Ohio, it was estimated, were there with their honored Governor, Governor Hayes, at their head to testify their interest in the nation's festival.

The reception given to the Governor of Ohio was one of the most flattering that was received by any individual at the Centennial Exhibition. From the time that he with his party entered the grounds, where he was received by General Hawley, up to his arrival at the Ohio State building, his progress was one continued ovation.

A passage-way leading from Belmont avenue to the front door of the Ohio building had been formed, and it put the two solid columns of guards with which it was lined to their utmost exertions to keep it open. Through this the gubernatorial party passed and appeared upon the porch. Here the appearance of the Governor was signalized by a perfect storm of applause, which did not subside until long after General McCook, of the Ohio State Centennial Board, had escorted his Excellency into the parlor. The assemblage around the State building had now become, not a crowd, but a crowd of multitudes. From the Southern Restaurant on the east to the Wisconsin building on the west, and south as far as the Government Building, an area of several acres, it seemed that every two square feet was occupied by a human being. It was a countless throng —acres of human faces—certainly not less than seventy-five thousand.

As soon as order was restored, President Hawley, in a few graceful words, introduced Governor Hayes, who addressed the large audience in a speech which was listened to with the deepest attention, and which was greatly applauded. After this was over, he had to go through with the customary hand-shaking infliction, and it was estimated that not less than eight thousand persons clasped hands with him on this occasion.

Indiana.

The Indiana building was constructed of a combination of wood and other building materials, a frame of wood being the support of the building and roof, to which an outer wall of brick, stone, terra-cotta, iron, and coal was attached. There were three entrances by four broad steps to the front and side porches, and an open-roofed balcony extended from each side entrance to the front entrance. The assembly-hall was used as a grand auditorium for miscellaneous gatherings. It was in the form of an irregular cross, fifty-five feet at its longest angle, and had about 1,400 feet of floor. From the level of the ceilings of the side rooms it was spanned by a truss-arched roof at a height of twenty-four feet above the centre of the hall. It was lighted by the rotunda above, and an ornamental fountain played in the centre below. On the walls were 200 tablets, of which number ninety-two were used by the counties of the State for the general statistics of each county, and the remainder given to individuals or firms. There were also committee-rooms, a ladies' parlor, invalids' room, post-office, telegraph-office, baggage-room, and gentlemen's parlor. The whole was surmounted by a handsome truss roof, surmounted by a lighted open rotunda of glass and wood, crested with metallic ornaments and statues. The entire cost of the building did not exceed $10,000.

Illinois.

The structure erected by Illinois was small but neat-looking, with windows projecting from the roof and a turret at the side. It was painted white, and had a verandah in front. A large hall, running lengthwise of the building, occupied the greater portion of the

ground plan. On the walls were exhibited views of Illinois public buildings, and at each end were handsome marble fire-places. A register for Illinoisians only was kept here, and back of the hall were reception-rooms for both ladies and gentlemen.

Michigan.

This State had erected a structure which was one of the most artistically-designed and finely-finished State buildings on the grounds, the airy and graceful proportions of the superstructure culminating in a high villa tower on the south side. The building was made entirely of native woods, and the interior was adorned with rich engravings of oiled and polished wood of every variety grown in the State. It was handsomely though not extravagantly furnished throughout, and the parlor on the second floor was a gem of comfort and good taste. This building was formally opened by Governor J. J. Bagley, of Michigan, who held a reception from twelve to three o'clock. At the opening it was almost immediately thronged with visitors, a large proportion of whom were from Michigan. Governor Bagley took a position on the west side of the assembly room, in front of a banner bearing the State coat-of-arms, and courteously welcomed the visitors as they were presented. Among the more prominent gentlemen from the State noticeable in the throng were Adjutant-General John Robinson, Quartermaster-General S. S. Mathews, Inspector-General L. S. Trowbridge, Surgeon Barrowman, Colonel John Pueford, Colonel G. S. Wormer, aide-de-camps, and J. H. Hopkins, military secretary of the Governor's staff; Colonel W. B. McCreary, State Treasurer of Michigan; V. P. Colyer, State Commissioner; W. J. Baxter, of

the State Board of Education; Colonel Sylvester Larned, and many others.

At half-past twelve o'clock the Pelouze Detroit Cadets, commanded by Colonel J. S. Rogers, United States Army, arrived from their encampment on Belmont Hill. The cadets, numbering 168 muskets, were accompanied by their band of twenty pieces and a corps of twenty drummers. They were drawn up in line on State avenue, and, after stacking arms, entered the building, where they were cordially received by Governor Bagley, who complimented the organization on their fine appearance and soldierly bearing in the grand parade on the Fourth.

Wisconsin.

This State had a building neatly finished in brown tints, with a piazza in front. On the left of the hall were two ladies' parlors, prettily furnished, and on the right a general reception and large reading-room for gentlemen. In the reception-room was a portrait of Joseph Creete, said to have been one hundred and forty-one years old, and who died at Portage City, in 1866. Near by was a portrait of a squaw who is alleged to have reached the astonishing age of one hundred and sixty years.

Iowa.

The Iowa State building was a small structure, colored in chocolate and drab, and had the usual reception-rooms for ladies and gentlemen, plainly but neatly furnished, with register for visitors. In one of the rooms were exhibited some pictures in worsted work representing Henry IV. on Shrewsbury Plain, a Madonna, Abraham and Hagar, and Rebecca and Rowena.

A grand reunion of her citizens was held on September 7th in the Judges' Hall; on which occasion Judge C. C. Nourse, of Iowa, lectured on the history, resources and capabilities of his State. Beginning with the discovery by Fathers Marquette and Joliette, in 1673, of that portion of the West and Southwest ceded by Napoleon to the United States in 1803, he told of the marriage of Julian Dubuque to an Indian squaw in 1788, and his founding of the city which bears his name; of the running of the boundary between Upper and Lower Louisiana in 1804; of the treaty concluded by General Scott at the close of the Black Hawk war, by which the Indians relinquished to the whites a large tract of land west of the Mississippi, comprising a part of what is now Iowa; of the election of the Hon. Ansel Briggs, September 30th, 1846, as Iowa's first Governor, and, finally, of Iowa's admission as a State.

Iowa covers 55,046 square miles; has 35,000,000 acres of land, 12,658,495 of which are under cultivation; and the value of her products in 1874 were $180,963,496. Her manufactures are in their infancy. Of her 1,350,000 inhabitants, 563,000 are of native birth. Her school system is excellent, and she employs over 18,000 teachers. Her free soil, free labor, free schools, free speech, free press, free worship, free men and women, are all, however, what emigration from the other States made them.

Missouri.

This State had a large building near George's Hill as its head-quarters. It had a sharp-pointed roof, from which dormer windows projected, and on the southeast corner a tall observatory. It was painted in white, with red stripes, and had a piazza extending around

three sides. The larger portion of it was occupied by a cool and spacious hall, which was used as a general reception-room and exhibition hall combined. It was painted in light brown, with stripings in red, and had wainscoting of different colored woods varnished. The exhibits included specimens of carving from pine scantling taken from an old church in St. Louis, and a case in which there was a handsome exhibit of minerals, conspicuous among which was a very beautiful pyramid composed of pebbles and small crystals.

Arkansas.

This State erected a spacious and imposing-looking building, on the plateau northwest of the Catholic fountain. It covered an area of 5,000 square feet, was octagonal in shape, the columns being placed in a circle eighty-two feet in diameter, the ceiling being spherical, and an octagonal dome was placed on the top of the roof, which was fifty feet above the floor line.

In the construction of the building a large amount of glass was used, making it one of the coolest and most airy structures on the grounds. The exterior was colored in pale tints, relieved with dark brown; and the interior was painted white, with Howe truss arches of dark blue supporting the roof. The entrance was on the eastern side, with the coat-of-arms of the State, partially surrounded by the inscription, "1776—Arkansas—1876," above the doorway.

The interior decoration was novel. From the centre of the roof were suspended festoons of bunting radiating in every direction and caught up just above the upper windows. This bunting was in different colors, such as red and blue, blue and white, and blue dotted over with little white stars. The posts supporting the roof and the cornice were also trimmed with bunting.

Besides the exhibition room the building contained two apartments, one of which was a reception-room for ladies, very tastefully furnished; and the other was occupied as an office by the Centennial Commissioners from Arkansas.

The exhibition in the hall comprised a valuable and highly interesting collection of the agricultural and mineral resources of the State. In the centre of the hall was a very pretty fountain of iron, bronzed, contributed by the ladies of Arkansas.

On the east and west of the entrance, arranged against the wall, were sheaves of wheat and oats, bundles of millet, timothy and red-top grass, and stalks of corn measuring sixteen feet in height. The grains were well formed and of good weight, while the hay and grass were really luxuriant. There were also sections of trees showing immense growth of timber, specimens of petrified wood, and large bales of cotton, very white and soft in texture. Near these were two counters containing gigantic ears of corn, beans, barley, oats, dried grass, wheat and oat straw, raw cotton, leather, brooms, specimens of work by the pupils of the State Institution for the Blind, wines and leathers.

Kansas and Colorado.

The building devoted to the exhibits of Kansas and Colorado was the largest State building on the grounds, and contained the most comprehensive and exhaustive display of the resources and products of those two States.

It was in the form of a Maltese cross, with offices and reception-rooms at the four corners outside the intersection of the arms of the cross. The length of each arm was 132 feet and the width forty-six feet. The

roof was semi-hexagonal; the height of the wings to the eaves was twenty-four feet, and to the top forty feet. The building was surmounted at the centre by a dome forty-eight feet high. The appropriation made by Kansas towards this building and its display was $38,625.

The west wing, or one-fourth of the building, is occupied by Colorado, the Centennial State, and the rest of the building was taken up by the Kansas display.

In the centre of the floor a cruciform platform, with arms forty feet long, and having tiers of shelving rising in a pyramidal form to the height of five feet, was constructed. Above the intersection of the arms towered, to the height of fifteen feet, a wooden fac-simile of the dome on the Capitol at Washington. This was surmounted, not by the statue of Liberty, but by that of Pomona, the goddess of fruit, bearing upon her right shoulder a basket filled with the choicest gifts of the orchards. Suspended from the roof, directly above this dome, was a magnified imitation of the old Liberty Bell. The body of this was made of grain stalks, the crack being represented by dark millet, and the clapper consisting of a long slender gourd for the tongue, and a turnip-shaped pumpkin for the hammer. It was six feet in diameter at the lips. The platform shelving was laden with a thorough and artistically-arranged representation of Kansas crops of the Centennial year. The colonnade around the base of the dome consisted of hollow glass pillars, containing all the varieties of grain, and having capitals made of heads and stalks of the cereals which the columns respectively displayed.

The hemispherical canopy of the dome was covered with apples and other fruit, arranged with a happy harmonization of color.

The entire end of the northern wing was covered by an agricultural trophy. In the centre was the great seal of the State, stained on a circular glass window. Encircling the great seal was a border, composed of red pop-corn, which in turn was surrounded by a ring formed of ears of yellow corn. Radiating all around from this, and forming a corona, or halo, were alternate strips of cotton and of grain on the stalk. Just beneath the seal was a heap of fruit and vegetables, produced in 1875, and comprising turnips and beets as long as a man's forearm, pumpkins four times as large as one's head, apples and pears weighing two pounds apiece. Supporting this heap was an immense county map of Kansas, twenty-five feet long and fifteen feet wide, and in a massive frame. At each end of the map were sheaves of corn and sorghum, the stalks of which ranged from fifteen to eighteen feet in height. Beneath the map, and apparently supporting the whole trophy, was a tier of shelving laden with over a thousand ovoid glass cases filled with cereals and labelled. These afforded a comparative exhibit of the products of all the counties of the State. Extending entirely around the inside of the walls, and up near the roof, was a fierce array of buffalo heads, eight or ten feet apart. Entirely covering the interior of the end of the eastern wing was another agricultural trophy—the exhibit of the Atchison, Topeka, and Santa Fé Railroad.

While making no claims as a timber State Kansas had one of the finest timber displays on the grounds. It comprised over fifty varieties, and its most interesting feature was the rapid growth shown by the circles in the sections. There was a section of a peach tree, only six years old, six inches in diameter, and one of an apple tree, eight years old, eight inches in diameter.

A section of a walnut tree, five and a half feet in diameter, was also shown. All these articles that are near the walls were arranged with the attractiveness of the most fanciful tapestries or paper hangings, while those out farther on the floor displayed no less skill and taste. The placard, "Woods of Kansas," was beautifully formed of many colored leaves and buds.

The most striking feature of the Colorado exhibit was a sanded, tin representation of a Rocky Mountain peak, down over the crags and ledges of which rushed a roaring cataract that was transformed below into a tranquil stream meandering across a plain, and was the abode of turtles and fish. A dark, deep cavern has its mouth near the base of the peak, and within it were seen stalagmites and stalactites. The mountain was thickly covered with pines and cedars, and with stuffed specimens of the principal wild animals and other game of Colorado.

This display of animals and birds included about 200 mammals and 300 or 400 birds. The collection was part of a private one lately at Denver, Colorado, belonging to a Mrs. M. A. Maxwell, a resident of Boulder, Colorado, but a native of Pennsylvania. Most of the specimens were killed or captured alive by Mrs. Maxwell herself, and she superintended their exhibition. The display of animals occupied an entire wall of one of the wings of the building, and artificial rocks were artistically arranged to a great height, and covered with trees and shrubs, between which the sparkling water fell. Add to this natural scene the presence of deer, foxes, goats, panthers, wolves, squirrels, the rare black-footed ferret, dogs and birds dotted about in the rocks, in the most natural manner

possible, and it was beyond all comparison one of the most effectively arranged displays of the whole Exhibition.

Colorado also exhibited some specimens of the richest ores of gold and silver in the world. These were the tellurides, containing gold, silver, and tellurium. In them native gold and silver appeared like rolls of wire or crisped hair in cavities. They possessed the peculiar property of sending their hidden treasure pure to the surface upon being heated. The majority of other gold and silver ores emit "flux" when subjected to the same process. One specimen possessed an assay value of $120,000 worth of gold and $7,860 worth of silver per ton of ore. A lump of pure gold, worth $60.57, taken from a pound of this ore, was shown.

Among the specimens of argentiferous galena shown was one weighing 4,500 pounds, containing about $800 worth of silver, and another weighing 3,140 pounds, and containing silver worth about $736. Through the kindness of the Kansas State Centennial Board of Commissioners, we are enabled to give an illustration of the inside view of the Kansas and Colorado building.

California.

The building for this State was erected through funds raised by private individuals, the State Legislature having neglected to make an appropriation for the purpose. It was intended as a head-quarters, and all who visited the Exhibition from the Pacific slope were most cordially welcomed.

The building was very large, and handsomely finished, and contained a complete and concentrated exposition of the rich and varied resources of the State. Externally it was very plain, being colored in brownish

tints, and presenting no attempts at architectural display, but inside it was elaborately decorated. The ground plan consisted chiefly of a large and very handsome exhibition hall, with small rooms at each end. From the centre of the hall rose a dome, colored in light blue and purple, relieved with arabesque work.

On the neck of the dome, at intervals, were painted trophies of different flags with the American eagle. The roof was supported with arches covered with crests of different colored woods in various designs. These arches rested upon square columns, painted white with wide panels of very pretty California woods. Between the arches the ceilings and walls were covered in drab and yellow, with gilt lines and flower work. The effect of the whole was light and at the same time rich and strong.

The building was formally opened in the presence of a large assemblage, including many representatives from the Pacific slope, on which occasion the Rev. Albert Williams, of California, made the opening address, followed by several able speakers. Mr. Ellwood Evans, of Washington Territory, spoke in behalf of the States and Territories west of the Sierra Nevadas, thanking the Californians for this welcome. General Hawley, President of the Centennial Commission, Governor Curtin, Governor Axtell, of New Mexico, and the Hon. James H. Campbell, of Pennsylvania, all made very appropriate addresses, dwelling on the very creditable and patriotic share taken by California toward the success of our Exhibition.

CHAPTER XXV.

STATE DAYS, PARADES, ETC.

The Knights Templar Parade.

ON May 30th and 31st the Knights Templar held their Twenty-third Annual Conclave in Philadelphia, and their proceedings were crowned, on June 1st, by the largest and most imposing parade ever held of the order in this or any other country. There were not less than 7,500 Knights in line, and all the commanderies wore, according to orders, the "regulation" uniform, of which the black military chapeau, with the red cross fastening up one side, the red belt and the white baldric, with its black border, are the most conspicuous features.

The morning was delightful, the order among the spectators excellent, and the rattle of the snare-drum harmonizing with the shrill piping of the flute, the martial and patriotic airs performed by the brass bands, inspiriting enough to get up an excitement in spite of the half-callousness to sensation with which familiarity with the extraordinary incidents of the Centennial had filled Philadelphians.

The lines formed on Chestnut and South streets and the streets intervening, their right facing Broad street. At 9.30 the head of the line started from Broad and Chestnut streets, and the whole column began the march in the following order:

Grand Senior Warden Eminent Sir Colonel John P. S. Gobin and aids, mounted; Washington Commandery, No. 1, Washington, D. C.; Eminent Commander Sir E. J. Davis, accompanied by the United States Marine Band of Washington, and escorting Hon. James H. Hopkins, Most Eminent Grand Master of the Grand Encampment of the United States; Grand Officers of the Grand Encampment of the United States. Carriage containing R. E. Sir Charles H. Kingston, Grand Commander of Pennsylvania, escorted by 22 mounted men of Philadelphia Commandery, No. 2. Grand Past Officers of the Grand Commandery of Pennsylvania. Members of the Grand Commandery of Pennsylvania. Pittsburg Commandery, No. 1, 70 men; Philadelphia Commandery, No. 2, 198 men; St. John's Commandery, No. 4, of Philadelphia, 280 men; St. John's, No. 8, of Carlisle, Pa., 25 men; De Molay Commandery, No. 9, of Reading, Pa., 65 men; Pilgrim Commandery, No. 11, of Harrisburg, 55 men; Lancaster, No. 13, of Lancaster, 62 men; Jerusalem, No. 15, of Phœnixville, 56 men; Cœur de Lion, of Scranton, 50 men; Allen, No. 20, of Allentown, 50 men; York, of York, 20 men; Baldwin II., No. 22, of Williamsport, 40 men; Hermit, No. 24, of Lebanon, Pa., 50 men; Northwestern, of Meadville, Pa., 26 men; Kadosh, No. 29, of Philadelphia, about 200 men; Pennsylvania Commanderies, Nos. 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56; Grand Commanderies of Massachusetts and Rhode Island and escort; Sutton Commandery, of New Bedford, Massachusetts; Grand Commandery of New York and several subordinate commanderies from Yew York city and State. Then followed the Grand Commanderies of Connecticut, Ohio, Kentucky, Maine, Indiana, Texas, Tennessee, New Jersey, Georgia, Mississippi, Alabama, Louisiana, Kansas, Maryland and Washington, D. C.; also Commandery from Wilmington, Delaware.

In passing the Washington monument in front of Independence Square every Knight saluted it. The column was about one hour and a quarter in passing the State House.

Particularly noticeable for their fine bearing and general appearance were the Baldwin II. Commandery, of Williamsport, the Detroit Commandery, the De

Molay Commandery, of Washington, D. C., and the Corinthian Chasseur, of Philadelphia. The demonstration reached its climax when the right of the parade arrived at Broad and Filbert streets, the column stretching off into the distant perspective along the west side of Broad street. Here, from the steps of the Masonic Temple, it was reviewed by the officers of the Grand Encampment of the United States and the Grand Commandery of Pennsylvania, immediately after which the commanderies dispersed.

July 3d, 1876.

That Philadelphia is the Mecca of every patriotic American heart which turns as surely as the needle to the pole to the birth-place of American Independence, even a century after it was declared, the unparalleled influx of visitors into the city on the days preceding July 3d and 4th of this Centennial year was a striking proof. It was estimated that not less than 150,000 strangers swelled the population of the city from July 1st to 4th inclusive, and the hospitality of Philadelphia was put to a severe test, but was worthy of the Centennial event.

On the morning of the 3d of July the parade of the Grand Army of the Republic took place—the largest turnout the order ever made, 5,000 men in line.

At nine o'clock the Grand Commander, Governor Hartranft, and Department Commander Latten mounted their horses and rode to Broad and Spring Garden streets, where the Pennsylvania posts were forming. The Governor and staff, when the procession moved, were escorted by George S. Meade Post, No. 1, of Philadelphia, whose members were mounted.

The start was made at ten o'clock, the Pennsylvania

posts being the first to move; marching up Broad street, the posts from Massachusetts, New York, New Jersey, Virginia, Maryland and other States falling in from time to time from the side streets. The parade was a splendid success, being not only one of the most imposing demonstrations we have had in some time, but the finest turnout this order has ever made. Old soldiers from all over the country were in its line, and at least 5,000 men walked in this procession. The soldierly appearance and bearing of the men, in the trying heat, was noticeable, but the tattered old battle-flags, of which there were a score and more, were the cynosure of all eyes. As their torn folds fluttered in the wind—in glorious raggedness—the crowds, which packed the sidewalks in one dense mass, gave vent to their enthusiasm in hearty cheers, and more than one manly face contemplated the old flags with tearful eyes.

On the arrival of the parade at the Masonic Hall it was joined by the boys and girls of the Soldiers' Orphan Institute, the boys on foot with their miniature muskets and the girls in carriages.

At Broad and Chestnut they were joined by a detachment of the Lincoln Institute boys, acting as cannoniers, a detachment from the same institute acting as a color guard for the Grand Army of the Republic, and also a detachment of the Educational Home Cadets.

Wherever these juvenile soldiers appeared they were greeted with encouraging plaudits, their marching and movements comparing very favorably with their seniors.

A special Centennial service was held in the morning in Christ Protestant Episcopal Church in this city,

in which Washington worshipped while President. The edifice was crowded and beautifully decorated with patriotic emblems. The music was grand and of an appropriate character. A sermon was preached by the Right Rev. Bishop Stevens, who gave a history of the church and of persons who attended services therein during the century. Congress assembled for worship in this church on July 20th, 1775.

The midnight parade was the grand feature of the day. The patriotic passion which had boiled all day rose to fever heat in the afternoon, and the great

Torchlight Procession

Was looked forward to with intense interest. The number of spectators on the route, on Broad street and Chestnut street, was simply countless, and was estimated at 300,000 at the very lowest calculation.

All along the route of the parade the houses and stores were beautifully decorated with flags, transparencies and illuminations. On Broad street, opposite the Union League Club house, there was a magnificent arch over the street upon which the names of the States were displayed in glowing lights. The Colosseum, at Broad and Locust streets, had a calcium light which made the whole vicinity shine brilliantly, and the new public buildings displayed a transparency with the words "Welcome all Nations." On Chestnut street, between the Girard and Continental Hotels, "Welcome to all Nations" was expressed in brilliant jets of gas, and just below it was another broad and stately arch, thronged with ladies, which bore on its west side, by which the procession approached the State House, a brilliant transparency, draped with banners, with the words "Welcome, Dom Pedro." On the east side was

the sincere salutation, "Welcome, Rochambeau." So far as popular excitement went nothing could be grander than the display, but the truth is that the display of the people far excelled and transcended that of the parade. The torchlights faded in the glare through which they were carried; the procession was but a mere incident of the night, but the people were grand, victorious, exultant, and swept through the streets like an irresistible tempest. It was a magnificent exhibition of the industrial resources of Philadelphia, and as such must be a source of pride to her citizens.

The scene, when, a little before midnight, the procession, attended by countless multitudes cheering, sending rockets, blue lights and firing guns, with the beating of drums and the blowing of trumpets, reached Independence Hall, was grand in the extreme.

When the midnight fell upon this sea of excitement, the new liberty bell, presented by the patriotic citizen, Henry Seybert, rolled out from the old steeple of the State House the same tones which 100 years ago proclaimed liberty throughout all the land and to all the people thereof. At the moment the streets in front of Independence Hall were crowded with people, wild and transfigured with patriotism, but when the third or fourth stroke of the grand bell fell upon their ears there was applause and hurrahs first, but afterward there was silence. The great tongue of the bell tolled Massachusetts, Connecticut, Rhode Island, New Hampshire, New York, New Jersey, Pennsylvania, Delaware Plantations, Maryland, Virginia, North Carolina, South Carolina and Georgia. A sound like this, yet more eloquent, was heard one century ago. Then the thirteen States declared their independence by the voice of the bell,

but now they proclaimed their union. The great bell ended the 3d of July and nobly began the Fourth.

July 4th, 1876.

The Fourth of July, 1876, was a memorable day in Philadelphia. The excitement of the night previous, the torchlight parade, the tolling of the new bell of liberty from the State House steeple, the midnight festival in old Independence Square, had served only to increase the excitement for the Fourth.

The sun rose upon many thousands of people already thronging the streets; Broad street was crowded even at that early hour, but the grand display was around Independence Hall. The great military parade, the finest ever seen in Philadelphia, came gloriously marching down Chestnut street early in the morning, their colors glowing and their bright bayonets gleaming in the sunlight, while music from many a splendid band filled the air with its inspiriting strains. The Governor of Pennsylvania, the gallant Hartranft, led the troops, surrounded by a staff as distinguished as their own commander.

There were between 9,000 and 10,000 military in line, and the parade was over an hour and a half in passing a given point. They marched over the following route:

Down Chestnut to Fourth, down Fourth to Pine, up Pine to Broad and up Broad to Chestnut again, where Governor Hartranft reviewed the line as it passed that point just before dismissal.

In front of Independence Hall a platform was erected, and from it the parade was reviewed by Major-General Sherman, acting for the President of the United States, who stood in the centre, and on his left was

Prince Oscar of Sweden; on his right was Hon. J. Don Cameron, Secretary of War, and around him were a number of distinguished officers both of our own army and of foreign countries.

Many a famous regiment was in the line, and among those from other States the most warmly welcomed were the following:

The Fourth Virginia Artillery, who made a very fine display.
The Spanish Engineers.
The Seventh New York Regiment.
The Pelouze Cadets, from Detroit.
The Centennial Legion.
Richmond Light Infantry Blues, of Virginia.
Two Companies of National Guards, of Vermont.

The ceremonies in Independence Square began soon after ten A. M. There were probably 50,000 people on that historic ground; even the trees were filled with men and boys who were determined to see what was going on.

The stand upon which the exercises took place was a wooden structure upon which workmen had been engaged for about a week. It extended across the whole width of the north side of Independence Square, in the rear of the State House, projecting from the building to a distance of about seventy-five feet, the rear portion, against the walls of the old State House, being at the height of the second floor windows, from which access to the platform was obtained. The platform sloped gently down toward the front so that at the rail, where the speaker's stand occupied the centre, it was only a few feet from the ground. Seats for 4,000 were provided upon it for invited guests, and it is needless to say that every one was filled.

Among the many distinguished guests present on the platform were Dom Pedro, Emperor of Brazil, Governor Hayes, of Ohio, Generals Sherman and Sheridan, Vice-President Ferry, of Michigan, and numerous other foreign Commissioners, Governors of States, etc.

The ceremonies consisted of orations, odes, hymns and songs, the most eloquent and stirring of all of which was the grand oration by Hon. William M. Evarts. At the close of which the orchestra (of 250 musicians) and chorus played the "Hallelujah Chorus," from Handel's "Messiah," and the ceremonies concluded with the singing of the doxology—the "Old Hundred" —in which everybody joined.

Parade of the National Guard of the State of Pennsylvania.

One of the largest, most imposing, and, in all respects, most complete displays of the citizen-soldiery of Pennsylvania ever seen in its State, took place on August 10th, in Philadelphia, and was witnessed by thousands of spectators, a large number of whom came from the interior of the State and other parts of the country.

The city presented a gala appearance. The display of flags and bunting was very general and very fine, almost equalling the memorable 10th of May, or the Centennial 4th of July. The streets through which the procession passed were crowded with people, but the best of order was preserved, and not an untoward event occurred to mar the interesting occasion.

At various points devices of welcome to the visiting troops were displayed, and notably among them was a large banner hung in front of the armory of the First Regiment, at Broad and Race streets, containing the words "First Regiment: Welcome," and the State

Fencibles, in the same building, displayed a banner containing the words "Welcome, Citizen-Soldiery."

The First Division P. N. G. acted as escort to the visiting troops, and had the right of the line, and this division formed on Broad street, the right resting on Columbia avenue, at 2.45 P. M., and there awaited the arrival of the troops from Camp Wayne, at Fairmount Park, and as fast as the latter arrived they occupied positions assigned them on Broad street.

The troops from the camp arrived in the city by the Reading and Pennsylvania Railroads. None were transported except the infantry and dismounted cavalry. Division commanders moved their mounted batteries and cavalry at such hours as enabled them to reach the line of formation at 2.30 P. M. Upon the arrival of the troops in the city, staff officers were assigned to put the divisions in position.

The route of the procession was down Chestnut street to Third, thence to Market, thence to the eastern end of the New Public Buildings, where the escort halted, and the remainder of the troops passed through and proceeded by the nearest practicable route to the railroad depots, under charge of division commanders, and were taken to their respective quarters in camp.

When the line was formed on Broad street, the entire body of troops was reviewed by Governor Hartranft, who was accompanied by his staff and Major-General Bankson and staff. The Governor rode along the line and critically eyed the various organizations, and was saluted by the different officers as he rode past.

Knights of Pythias Parade.

This Order had their grand Centennial Parade on

August 22d, and it was one of the finest and largest parades of this year of parades.

The Knights of Pythias cannot boast of any antiquity as to their order, it having been established in Washington only ten years ago, but their success has been remarkable. It is estimated that there are now over 150,000 members of the order in this country, out of which number Pennsylvania owns nearly 50,000.

There were nearly if not all of 10,000 Knights in line on this parade. They marched splendidly and gained a favorable record, being enthusiastically welcomed by the crowds of spectators who lined Chestnut, Walnut, Pine, and Broad streets, through which the procession passed.

Among the Knights from other States which participated in the demonstration were the Grand Lodge of Massachusetts, and other members of the Order; five lodges from Baltimore; 150 uniformed Knights from Washington; a large delegation from Detroit, Jackson, Flint, Bay City, and other cities in Michigan, about 400 in number; and a great many New York and Brooklyn lodges.

Switzerland's Day.

Saturday, August 26th, was selected as the day for the reunion of the Switzers and their descendants resident in the United States, because it was the anniversary of the battle of St. Jacob, in 1444, one of the most important epochs in the Swiss history, and one that is commemorated in many of the cantons of Switzerland as a national holiday.

It was one of the most extensive gatherings of the representatives of any European nationality that took place this year. They assembled within the Exhibition Grounds, some 3,000 in number, and marched in pro-

cession to Judges' Hall. In the line of parade were the following societies: Grutli Verein and Swiss Mænnerchor, of Philadelphia; Grutli Verein, from New York, Baltimore, Egg Harbor City, and Scranton, and Societie Tassinoic, Allemania Schwitzer Verein, and Helvetia Lodges, Nos. 1 and 2, of New York. These societies were quite strong in numbers and bore beautiful and expensive flags, Swiss and American. Inside the hall the standard-bearers were ranged on either side of the speakers' stand, and the remainder of the large room was filled with the Swiss, among whom were a large number of ladies. The president, General John A. Sutter, of California, having formally opened the meeting, a choral was rendered by the societies accompanied by the orchestra. Captain John R. Fellman was then introduced as the orator of the day. He spoke of the past history of Switzerland, from its birth in 1307, and its trials and struggles since, amid the terrible wars for five hundred years, etc.

Governor Howell, of Wisconsin, responded, and the satisfied thousands then separated to spend the remainder of the day in investigating the attractions of the Centennial Exposition.

The next day was spent at Schuetzen Park, where the numbers in attendance were even larger than at the ceremonies of the preceding day. The air was delightfully cool in this shady and beautiful resort, and the visitors abandoned themselves to that temperate enjoyment peculiar to inhabitants of central and southern Europe. At eleven and a half o'clock, General Sutter called a meeting to order in the central pavilion, where, after prayer, the Switzer Psalm of Zwingli was chanted by the united singing societies. Mr. Henry Boppe, of Elizabeth, N. J., then read, in German, a paper on

"Switzerland, its Origin and Organization as a State, with its Fundamental Political Principles." He was followed by Professor Perriot, of New York, with the reading of a paper in French on the Swiss people, and what they have attained; he by Mr. Martin Niederman, of New Jersey, with an address in German on the duty of the Swiss abroad. An address on Switzerland, in Italian, and one in German on "The Duty of the Swiss in the United States," wound up the ceremonies of the day. Meanwhile, the societies, locating themselves in different parts of the ground, were singing with great vim and manifest feeling the songs and hymns of Helvetia, and a day was very joyously spent by as respectable a gathering of people as ever assembled on a like occasion.

Parade of Volunteer Fire Department.

Of all the many civic displays in Philadelphia which were such notable features of the Centennial year, there was none more imposing, better conducted, or more popular than the grand parade of the Volunteer Firemen from all parts of the United States, which took place on September 6th. The long line of red, green, blue, and gray shirts, fire-hats, steam and hand-engines, hose carriages, steamers, banners, torches, silver-plated fire-horns, and the entire paraphernalia of the Fire Department, all made up a picture of novelty and striking peculiarity which will long be remembered by the many thousands who witnessed it.

The streets through which the procession passed were literally thronged with spectators, many thousands of whom were visitors from different parts of the country, but owing to the excellence of the police arrangements, the best of order was preserved. Broad street, Chestnut

street, and other thoroughfares, through which the procession passed, were roped along the curbstones by the police, and the crowd kept on the sidewalk, affording plenty of street-room for the firemen.

The city presented a gala-day appearance, the public and private Centennial flags all being thrown to the breeze, and, in some sections of the city, business was suspended until the passage of the parade, which was about an hour and a half passing a given point.

The procession formed on Broad street, displaying northwardly, and shortly after eleven o'clock the head of the line passed up Broad street, from the New Public Buildings to Columbia avenue, countermarching on east side of Public Buildings; thence on west side of Broad to Carpenter, countermarching on east side of Broad to Chestnut, down Chestnut to Fifth, Fifth to Arch, Arch to Broad, and there dismissed.

The number who were in line were variously estimated, but we think a fair estimate would be about 5,000, including over fifty bands, drum corps, and pioneer corps.

The apparatus in the line ranged from the beautiful and costly silver-mounted modern steam-engine, to the primitive wooden, low-wheeled hand-engine, dating back to the latter part of the seventeenth century.

Conspicuous in the line were the following:

The America Engine Company, of Philadelphia, instituted in 1790, which had the old America hand-engine, with a boy dressed as an Indian, on top.

The Good Will Engine Company, of Philadelphia, with the old Good Will hand-engine, built in 1817.

Fountain Hose Company, Binghamton, N. Y. This company had in line what was considered to be one of the most handsome carriages in America. It was

heavily ornamented with silver in exquisite designs, and cost, including remodeling, $3,500.

Rainbow Engine Company, of Reading, Pa. This company was instituted in 1773, and carried in the parade an old hand-engine bearing the same date.

Citizen Fire Company, Mahanoy City, Pa. In this division was an old engine bearing date 1698, very small and made entirely of wood, which came from Bethlehem, Pa.

Odd Fellows' Day.

Of all the grand and imposing demonstrations which have taken place during this Centennial year, perhaps the grandest and most imposing one was that made by the Independent Order of Odd Fellows, on September 20th. It was a grand demonstration, and yet it was not fully up to what that popular order can do, for there were thousands in the city who were not in line.

Preparation for this celebration of the Centennial Anniversary of American Independence had been actively carried on by the order for many months before, and they culminated in a magnificent success.

The order made a demonstration of its strength both in the numbers and *personnel* of the procession that will prove a benefit to its organization. Only fifty-seven years ago the first lodge (Washington, No. 1) was organized by Thomas Wildey and others, in Baltimore. The order now contains nearly half a million members in the United States and Canada and Germany, and also extends to the continent of Australia and the empire of Germany. All these men are banded together for the cultivation of the principles of Friendship, Love and Truth, for the relief of each other

in sickness and want, and for the care of the widows and orphans of deceased members. With such objects, with harmony in its councils, and with such a membership as was represented in the great pageant of September 20th, the order must continue to advance.

The procession was about two hours in passing a given point, and the number in line was estimated at not less than 15,000.

In the line were representatives of every civilized portion of the globe, who came hither to attest their devotion to the principles of the order and to pay homage at the shrine of American liberty. In the wondrous and brilliant gathering, rich in their varied uniforms and remarked for the costly devices, symbols and banners carried, no representation was finer than that contained in the Pennsylvania divisions, either as regards numbers, marching or the general appearance of the men.

Of the 15,000 men in the ranks of the various encampments and subordinate lodges Pennsylvania must have contributed not less than between seven and eight thousand. The uniforms worn by the encampments were as follows: Full black dress coat, pants and vest, black chapeau adorned with purple and black plumes, purple cross belts, heavily fringed with bullion, purple gauntlet black gloves, side swords. The rich and elegant uniforms of the members of the various encampments, the nodding plumes and waving banners, the varied and many colored uniforms of the musicians, the constant motion and the unceasing discord caused by scores of brass bands all playing at once, and no two playing in the same time or tune, all went to make up a scene of excitement and beauty rarely equalled even in this year of great accomplishments.

The banners carried by the fraternity bore the usual devices, symbols and illustrations peculiar to the brotherhood.

In the line was the traditional goat, which it is supposed that candidates for admittance to the order must successfully bestride before gaining the coveted honors. His horns were decorated with colored ribbons, and two silken cords, held by two members of the order, held him captive.

Competent judges estimated that the column was ten miles in length. From the time of its departure down Broad street to the arrival of the last encampment at the Park, it consumed three hours and a half in its passage.

The procession started promptly at eleven o'clock, countermarched on Broad street, and passed out Green street to the Park.

The ground chosen for the final ceremonies was the open space east of the Main Exhibition Building. Here five stands had been erected; the largest in the centre was in the form of steps, terminating at the top with a small temple-like structure, and the orchestra under Carl Sentz occupied the eastern side. Around this, but about 100 yards away, at each of the cardinal points, was a small pavilion for the four orators, and all of these structures were decorated with tri-colored bunting, the national flag and shields of the different lodges.

Shortly after the arrival of the last division in the line the Master of Ceremonies, P. G. M. Isaac A. Sheppard, announced that the ceremonies would begin, after which Carl Sentz's band discoursed popular music. Buck's "Festival Hymn," beginning, "Oh, Peace! on thine upsoaring pinion," was sung by the Handel and

Haydn Society. Rev. J. W. Venable, Grand Chaplain, delivered the invocation, after which F. D. Cleaver spoke on the topic, "Odd Fellowship—A success." "All hail the power of friendship's name," was sung, after which speaking began at once from each of the four stands.

We have not the space here to give even a brief sketch of the eloquent addresses which were delivered on this occasion by the respective orators chosen for the purpose. After their conclusion the orators proceeded to the main stand, when Whittier's Centennial Hymn was sung by the Handel and Haydn Society. At its conclusion the representatives of the North, South, East and West took each other by the hand as a visible type of the brotherhood and fraternity. The scene was impressive beyond expression. The doxology was then sung, the Grand Chaplain pronounced the benediction, and the Centennial celebration of Odd Fellowship passed into history.

Canada's Day.

On October 14th St. George's House was for the first time thrown open to the public, and hundreds of visitors took advantage of the opportunity thus afforded to see Canada's chief executive, and inspect the quaint interior of this the largest of Queen Victoria's three "houses of many gables," as they were aptly termed.

The reception given by Lord Dufferin, the Governor-General of Canada, took place at eleven o'clock A. M., and was largely attended. In addition to the Canadians—principally exhibitors who were presented to his Excellency by Mr. Edward Goff Penney, of the Canadian Commission—a large number of American guests were introduced by Colonel Myer Asch, secretary

of the Centennial Executive Committee, who acted as the representative of Director-General Goshorn. Representatives of the United States Centennial Commission and the Board of Finance attended the reception in a body, and subsequently lunched and spent a social hour with Lord Dufferin and Colonel Sanford, president of the British Commission. During the reception, much amusement, as well as patriotic manifestation, was created among the participants by the ringing out from the chimes in the Machinery Hall tower of such appropriate airs as "The Good Old Roast Beef," "God Save the Queen" and "Rule, Britannia." Towards evening the Governor-General again visited the Canadian section in the Main Building, to which he devoted most of the time fixed by him for his inspection of the Exhibition.

Pittsburgh's Day.

Pittsburgh, with characteristic energy, showed during the progress of the Centennial what could be done in organizing successful Centennial excursions, and that over 15,000 of her citizens availed themselves of the inducements offered in this direction is the best proof of the general appreciation which attended the efforts of those by whom these special trips for large parties were projected. The most successful of these excursions was that of the school children, who, with their teachers and parents, the members of the Board of Education, and several prominent citizens interested in the success of the trip, numbering in all about 2,000 persons, left Pittsburgh at eight o'clock on October 16th, and arrived at the Grangers' Hotel at Elm Station on the following night. On the morning of the 18th the children and teachers to the number of about one thousand arrived from the hotel at Sixteenth and

Market streets, where they were met by a large delegation of the pupils of the public schools of Philadelphia, under the charge of M. Hall Stanton, president, and Henry W. Halliwell, secretary of the Board of Education. The appearance of the Philadelphia pupils elicited frequent expressions of applause, their deportment being altogether unexceptionable. They carried a number of handsome silk banners, and, headed by McClurg's band, marched down Chestnut street at the head of the visitors. The Pittsburgh pupils were marshalled by Mr. W. C. Smythe, under whose management the excursion had taken place, and Mr. John W. Pittock, of the Pittsburgh *Leader*, Superintendent Luckey, and Mr. J. W. Nobbs, chairman of the Central Board of Education. On their arrival at Independence Hall, which was cleared of visitors for the occasion, the entire party marched through, and after a brief inspection of the interior assembled in the square. After a few words of welcome from Mr. M. Hall Stanton and a brief address from the Hon. J. P. Wickersham, Governor Hartranft, who had arrived, was introduced and greeted with three hearty cheers. He said:

My Young Friends:—I am pleased to unite with the municipal authorities of Philadelphia to welcome you to this city upon the occasion of your visit to the Centennial Exposition. One of the great objects hoped for by the projectors of this gigantic enterprise was that it would be an educator to the people. [Cheers.] It is a source of gratification to us all to see how thoroughly these expectations have been realized. And it is, therefore, a cause of increased satisfaction to see so many of the rising generation hastening to avail themselves of the opportunities offered by the Exhibition. In the objects here gathered together from all quarters of the globe, representing the manners, resources, and progress of so many different nations and peoples, you will find great pleasure in proving information already gained as well as great benefit in lay-

ing the foundation of future acquirement. From that pleasure and that profit it would be unjust to detain you by any lengthy remarks. Nothing that may be said can equal the influence of what is here to be seen. Trusting that you will enjoy all the pleasure you anticipate, and that you may also enjoy all the benefits which your teachers and friends hope for you, I commend you to the good offices of the citizens of Philadelphia and the officers of the Exposition. [Cheers.] And I am satisfied I cannot place you in better hands, and that this day will be one which you will long remember, and in after years look back to with pleasure and profit. [Loud cheers.]

At the conclusion of the Governor's address, Mr. Samuel J. Harper, of the Pittsburgh Central Board of Education, made a few remarks in reply to the words of welcome spoken by his Excellency, after which the ceremonies concluded by the singing of "America," the entire audience joining in the national anthem. The visitors then marched through the hall and taking the cars departed for the Exhibition.

Reading's Day

At the Centennial was appropriately commemorated on October 18th. 3,000 excursionists left Reading in two trains, of twenty cars each, on the morning of that day, and arrived at the Centennial depot of the Reading Railroad Company at half-past ten o'clock. Through the courtesy of Mayor Stokley, on behalf of the Philadelphia authorities, the municipal building on the grounds had been secured as the head-quarters of the Reading officials accompanying the visitors, and during the day it was the place of rendezvous for people of Old Berks.

From seven A. M. to one o'clock P. M., a concert was given in the building by the Harmonic Mænnerchor and Germania Orchestra of Reading, the latter consist-

ing of thirty-five pieces. At two o'clock Mayor Stokley, with a number of members of Councils and other officials from the city, arrived at the building, when his Honor, Mayor Evans, of Reading, was introduced to his Honor of Philadelphia, after which the first named inaugurated his reception, shaking hands and exchanging salutations with all visitors. During the reception the Philadelphia Mænnerchor arrived and paid their respects to the two musical organizations of Reading, by whom, subsequently, a second concert was given in the building.

After a hasty look at the international wonders during the day, the party, before returning to Reading, witnessed the pyrotechnic display in the evening.

The display commenced with a grand salute of aerial maroons, directly after which the grounds surrounding the lake, north of Machinery Hall, and other places, were brilliantly illuminated with Bengal lights and other displays, the effect of which was very fine. Then followed a discharge from George's Hill of a number of large rockets and shells, and several magnesium balloons were let off. A simultaneous flight of shells of turquoise and ruby stars followed, and then came an ascent of 100 brilliant tourbillions, followed by a flight of rockets and the discharge of a battery of saucissons. After other displays a representation of Independence Hall, 150 feet long and 100 feet high, was given. A feature of the exhibition was a grand cascade of fire, 210 feet long by 100 feet in length, and the display concluded with a bouquet of 2,000 large rockets.

Woman's Day.

Tuesday, November 7th, had been set apart as Woman's day at the Exhibition, and the thought was

happily conceived in the choice; for while the men were doing their duty at the polls, the women would have a day all to themselves. But Jupiter Pluvius was unpropitious, and the weather was dismal and wet in the extreme. But notwithstanding this the women turned out nobly, and the number of admissions throughout the day, including everybody, was 87,859.

The reception at the Woman's Pavilion was the feature of the occasion.

A platform had been erected near the centre of the building, which was tastefully decorated with bunting. Many members of the Women's Centennial Executive Committee were present, as well as ladies representing similar organizations in distant cities.

The reception commenced at noonday and continued for several hours, during which Mrs. Gillespie, the President of the Women's Executive Committee, made a brief address in keeping with the occasion.

Previous to the reception the lady exhibitors had a little affair which was one of the most interesting incidents of the day. This was the presentation of bronze vases to Mrs. Caldwell, Mrs. Husband, Miss Horner and Mrs. E. Long, four of the lady officers of the pavilion. The presentation was one of those neat little incidents that engender good feeling, and the affair passed off so neatly that all who participated seemed to appreciate the fact that the occasion was quite pleasant.

CHAPTER XXVI

THE LIVE-STOCK EXHIBITIONS.

THE grounds for the Centennial live-stock display were located within 2,000 feet of the main entrance to the Exhibition, between the two chief thoroughfares, viz., Belmont avenue and Forty-first street. They comprised thirty-five acres, and were on the line of the Pennsylvania Railroad. The location, therefore, afforded superior advantages for the receipt and delivery of animals.

A ring one-third of a mile in circumference was put up, and 740 stalls erected, fourteen by fourteen feet, so arranged that after they were used in the horse show, which came off first (September 1st to 14th inclusive), they were divided into stalls, seven by fourteen, for the cattle, which were shown September 11th to October 4th.

The horse show was probably the finest collection of horses ever got together. About two hundred and fifty animals were shown, all of them fine bred, a large proportion imported specimens of the best foreign stock, and every one of them in some way remarkable. About ninety horses were from Canada. They were mostly heavy cart horses, some of them magnificent animals, weighing a ton and over. There were quite a number of the imported Percheron stallions and brood mares, one thoroughbred Arabian, and large numbers of the best American horses. The horse show

closed on the evening of Thursday, September 14th, and it will be a long time before such another collection of horses is exhibited in this country. At half-past three o'clock every afternoon there was a parade of the horses around the grounds, commencing with the heavy draught horses and stallions, and followed at four o'clock by the horses of the other classes. This was an animated and attractive spectacle, and was of particular interest to horse owners and breeders, and indeed to all who take an interest in "man's best friend."

Even those unused to judge of equine worth were compelled to stop and admire the herculean, but beautifully regular proportions of the Canadian and Scotch draught horses, particularly those of the Clydesdale stock. Noticeable among the American sporting horses were Bismarck and a beautiful little, pure-blooded Arabian, "Jenifer." Bismarck, exhibited by F. G. Wolbert, was a blood bay, with black points, sixteen and a quarter hands high, and was foaled April 27th, 1867. He was sired by Hambletonian of Lady Montague, by Mambrino Chief of Bellamira, by Imported Monarch of Kitty Heath, and by American Eclipse of Pomona. He has no public record, but his private one is very fine—in the twenties. The Arabian beauty was exhibited by Colonel W. H. Jennings, of Baltimore. He was a gray stallion with a silvery mane and tail, had small black specks over the clear gray of his body, and was ten years old and sixty inches high. He was sired by a gray Arabian stallion with a chestnut Arabian dam, and was bred on the desert of Sahara by Bedouin Arabs. Egyptian officials and the United States Consul-General in Egypt certify that he is of the stock of the famous Kochlani or Anazah family, of Nedjid, in central Arabia.

One of the largest horses in the show, and a perfect sight in himself, was among the Clydesdale stallions, "Donald Dinnie," an immense dark bay animal, seventeen hands high, and weighing 2260 pounds, or over a ton. He had a beautiful glossy coat, fine arched heavy neck, and intelligent eye. His legs were tremendous and his pasterns covered with a heavy growth of long hair, which hung down nearly covering the hoofs.

But "Donald Dinnie" was thrown in the shade by a pair of immense bay mares, Polly and Fan, exhibited from Dundas, Ontario, sixteen and three-quarter hands high, four and six years old respectively, and weighing *three thousand three hundred and twenty pounds each.*

To lovers of dogs the live-stock department was a particularly interesting sight from September 4th to 8th, when over five hundred thoroughbred dogs, of every conceivable breed, were exhibited, many of them imported animals, and all the choicest specimens of the various kinds.

Some of the bull-dogs were uglier and more dissatisfied-looking than any in the caricatures of Leech or Nast. Among the exhibits were a terrier weighing only two pounds, and several immense Newfoundland dogs. Some handsome Spitz dogs, Skye and Scotch terriers, and greyhounds were exhibited; among the latter a Centennial Hungarian greyhound, seven months old, born in this country, and the property at birth of a member of the Austrian Commission. The dogs were in stalls on an elevated floor or "bench," as it is technically styled, so that visitors could readily examine them. They kept up a continual barking, and did not appear to enjoy being chained to hard boards for the examination of the public. We were

particularly struck with the St. Bernard dogs, with their wide and full heads, deep-set eye, and intelligent and kindly expression.

The display of horned cattle, which lasted from September 21st to October 4th inclusive, was a magnificent one, and attracted crowds of appreciative visitors. The Canadian exhibit was a very fine one, the whole number of animals from that country having excéeded six hundred and fifty. These were selected by a commission appointed by the Provincial government, which paid all transportation expenses, on condition that the animals were such as did credit to the country.

The competition of Canada was not only international, but also between the provinces themselves, as the commission offered special prizes for the best cattle from each province, the same as if the exhibition had taken place at Montreal or Quebec.

Canada had the largest bulls, but they seemed to be coarser than the American, and were in some cases so large, fat and unwieldy as to be scarcely able to waddle around. Canada also had the largest and fattest ox. The English exhibit was the smallest, and owing to the long voyage the animals had to take, were not in good condition. Among them were eight head from the Queen's own herd, which had been purchased by an American and were on their way to Kansas.

The exhibition of sheep, goats and swine commenced on October 10th, and was kept up until October 18th inclusive, with all the music that 400 sheep and 375 swine could give it. Among the sheep the Southdowns of Lord Walsingham, England, were the most notable, many of them having taken the first prize at the Royal British show this year, and were valued at from

$5,000 to $6,000 apiece. One of the largest was an Oxford-down ram, which weighed 400 pounds, and for the use of which for a single season $275 has been paid. This was the largest sheep in the show.

Among the porkers, some of the finest specimens were those of Mr. T. S. Cooper, of Pennsylvania, all imported Berkshires which had won prizes at various European Exhibitions; and the Chester white shown by Messrs. Shaner, Ashbridge & Walter, of Chester county, one of which weighed upwards of 900 pounds and was the biggest hog in the show.

Among the exhibits were those of many other breeders in this State, New York, Connecticut, Maryland, New Jersey, Wisconsin, Ohio, Illinois, Massachusetts, Virginia and Canada.

The basso solos of Centennial swine, and the baritone of International sheep ceased to be heard after October 18th, and the live-stock yards were not again occupied during the remainder of the Exhibition. It had been decided to hold the last part of the live-stock exhibition—the display of poultry—in Pomological Hall, a low frame structure covering nearly an acre, which stood just east of the northern portion of Agricultural Hall.

In this building had been held during the last six months a series of exhibitions, succeeding each other according to the season. Strawberries, raspberries, cherries, apricots, nectarines, apples, pears, peaches, melons, plums, grapes, had all in turn delighted and astonished the thousands of visitors to these interesting displays, as each in turn took place, beginning from the first fruits of 1876 until the luscious last fruits of autumn had been reached. Perhaps the display in this line which attracted the greatest attention was that of California fruit, brought east in refrigerator

cars. It was in fine condition. In size the fruit was unequalled, and its quality was very fine. The peaches were very large and temptingly luscious. Clusters of grapes were shown which seemed fairly enormous. The beauty of them was beyond praise. The apples, pears and plums were almost equally remarkable. Nectarines, figs and almonds, both green and ripe, were also shown. This fruit was brought here by an agent acting for quite a number of fruit-growers.

Almost equally remarkable, and perhaps more surprising to most visitors, was the display of apples from Nebraska. It was very large, and its average quality was very good. One table covered with early fall apples presented a superb appearance, and astonished those not familiar with Nebraska's position among the fruit-growing States.

These exhibitions of fruit were followed up on October 30th by an exhibition of poultry, which lasted until November 6th. This was by far the finest display of its kind ever witnessed in this country.

There was no necessity for asking the Centennial Guards where the poultry show was, when you were within a couple of squares of it.

The exhibit of chickens was very full and large in its variety, comprising every breed and every sort, from the diminutive Bantam to the tall Shanghai. There were Brahmas, Leghorns, Hamburgs, Dominiques, Dorkings, Cochins, Spanish, Polish, Bantams, Game, Houdans, Seabrights, and Malays.

Against the wall there was a long row of pigeon coops, with cages of canaries on top. In one of the former was a beautiful little Bantam hen, with half a dozen tiny little chicks just hatched.

There were numbers of light Brahmas, large beauti-

ful chickens, with all the perfect marks of that breed, in two long rows of cages.

Of the large Cochins there were several varieties, some of them large pure white, others pure black, and others, again, of the buff varieties.

The silver and gold spangled Hamburgs were each of remarkable beauty, as were the golden pencilled and silver pencilled Hamburgs.

The Houdans were chickens which have black bodies, and the crests on the head is of white and black, and so thick as to give them the appearance of owls' heads.

Of other barn-yard fowls, such as turkeys, geese, ducks and peafowls, the display was very fine. But by far the largest exhibit in the poultry line was that of pigeons, which in numbers and variety excelled any display ever yet witnessed in this country. There were pouters, tumblers, trumpeters, barbs, owls, fantails, ruffs, priests, nuns, quakers, jacobins, fairies, archangels, turbets, swallows, magpies, carriers, and others which we may have overlooked. And there were numerous specimens of all the breeds, and every variety of plumage among those displayed. Some were pure white, without a single spray of any other color in their feathers, and some as black as ravens without the slightest spot; and there was every description of mixed colors between. There was also great variety in their size, a few were but little larger than robins, and some of the pouters were as tall as good-sized chickens.

The appliances for hatching eggs by artificial means were very curious and interesting, and as they were in operation, the entire process was shown to visitors. As the chicks were hatched they were immediately adopted by artificial mothers, somewhat resembling monster powder puffs. These feathery coverings kept them warm, and at the same time kept up a free circulation of air.

CHAPTER XXVII.

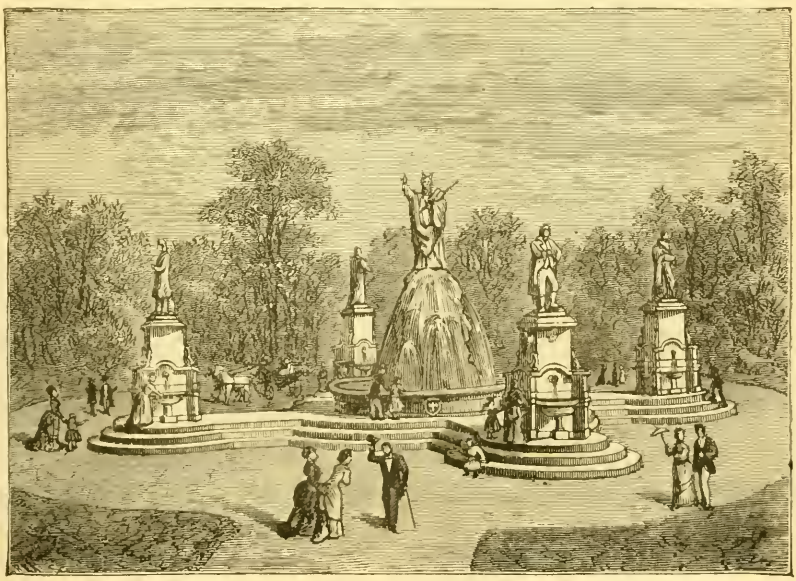
SPECIALTIES.

The Catholic Memorial Fountain.

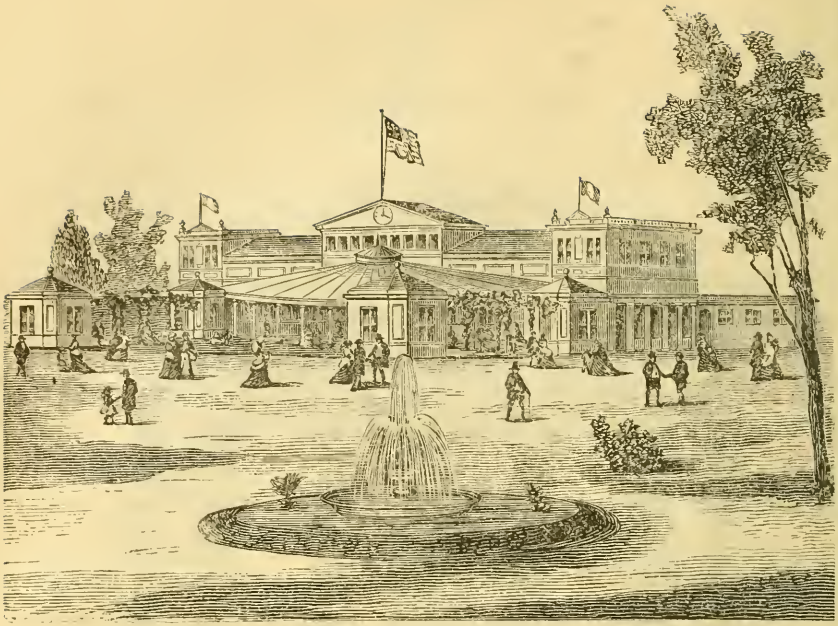
AT the intersection of Fountain avenue and the Avenue of the Republic in the Exposition grounds stood the Memorial Fountain, erected by the Catholic Total Abstinence Union of America, which, though incomplete even at the close of the Exhibition, owing to the non-arrival of some of the pieces of statuary from Europe, showed enough to denote its magnificent proportions when it shall be finished. The design is as follows:

In the centre is a large rock-mound surmounted by a colossal marble statue of Moses, sixteen feet high. Water gushes forth from numerous crevices in the mound, and falls into a circular marble basin forty feet in diameter. The coping wall of this basin is divided into panels, into which are sculptured life-sized medallion-heads of the following Catholics who participated in our Revolutionary struggle: First, Lafayette, the friend of Washington; second, Count de Grasse, commander of the French fleet, which assisted in bringing about the surrender of Cornwallis at Yorktown; third, Kosciuzko, the Polish patriot, who fought nobly for the colonies; fourth, George Meade, the grandfather of General George G. Meade, the partner of Thomas Fitzsimons—when the American army was starving at Valley Forge he subscribed $5,000 to buy clothing for

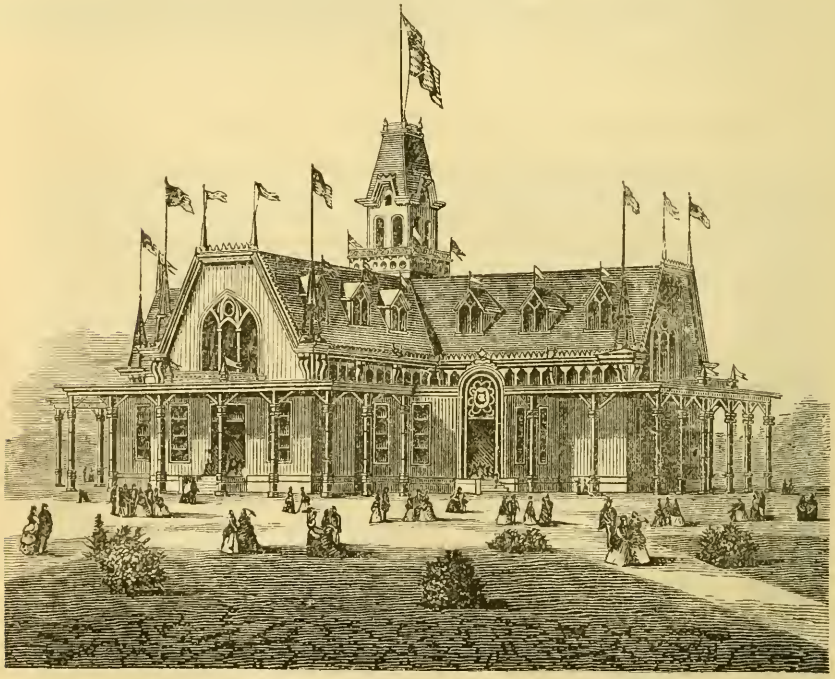
ICE-WATER FREE TO ALL.



ROMAN CATHOLIC TOTAL ABSTINENCE FOUNTAIN.



FRENCH RESTAURANT.



COLORADO AND KANSAS BUILDING.

the soldiers; fifth, Count Pulaski, another native of Poland, who fell fighting for the colonial cause; sixth, Colonel Stephen Moylan, commander of the celebrated Moylan's Dragoons, and one of Washington's special aids; and seventh, Orono, the Chief of the Penobscot Indians of Maine, who held a commission in the Continental army.

Stretching from the basin is a large granite platform, one hundred feet in diameter, in the shape of a Maltese cross. Upon each arm of the cross stands a beautiful marble pedestal, twelve feet high, the sides of which are ornamented with carved lions' heads, out of the mouths of which water flows into basins below. Upon these four pedestals stand four colossal marble statues—each nine feet high—of Commodore John Barry, the father of the American navy; of Charles Carroll, of Carrollton, a signer of the Declaration of Independence; of Rev. John Carroll, his cousin, one of the commissioners of the Continental Congress to Canada, and Father Matthew, the Catholic advocate of Temperance.

The total cost of the fountain will be $52,000. The object in erecting it was to commemorate the services of the heroes of the Revolutionary war, and it is a lasting and most gratifying token of the appreciation by our Irish fellow-citizens of the American Republic.

Centennial Chimes.

Three times a day, at sunrise, noon, and sunset, the Exhibition grounds were enlivened by the music of a chime of bells in the northeastern tower of Machinery Hall, seventy-eight feet high. The bells were thirteen in number, representing the Thirteen Original States, and were manufactured by McShane & Co., of Balti-

more, who claimed that the chime was the finest in the country. They weighed 21,000 pounds, the largest 3,600, and the smallest 350 pounds, and cost $12,000. They were operated upon by Professor Widdows, who formerly had charge of the chimes at the Metropolitan M. E. Church, of Washington, D. C.

The bells were immovably suspended from an immense horizontal square frame on the topmost floor of the tower. Each bell had two hammers, one heavy, the other light, the latter muffled so as to cause a soft tone whenever desirable. On the floor, below the centre of the frame, were twenty-six triangular levers, pivoted at one angle, so that a pull or depression on the outer arm caused the hammer attached to the other arm to strike the bell. These outer arms were connected, by means of long, elastic strips of wood running through the ceiling, with the operating apparatus, which was directly beneath the bells, on the next floor below. On the operating floor there was a frame containing two sets of levers, which looked and worked like pump-handles. The upper set contained thirteen levers, which operated the muffled hammers. The lower set contained the same number and they worked the heavy ones. To prevent too much stiffness the wooden strips, twenty-six in number, were connected with the triangular levers above and with the "pump" levers below by means of leather straps. Some conception of the amount of physical labor which the Professor had to undergo in making the music of these bells, the silvery sound of which struck so many listening and delighted ears, may be formed when we state that the extremities of each set of levers were over five feet apart, and that it required a pressure of twenty pounds to depress some of them to their furthest extent. And yet he never missed a note and never hit a wrong bell.

The Witherspoon Monument.

The Presbyterian Church, after some strenuous efforts to erect a monument upon the Centennial grounds of a representative belonging to the church who had distinguished himself in Revolutionary times, decided that Dr. John Witherspoon was the individual who should be thus immortalized. His name was attached to the Declaration of Independence, and he was the only clergyman who sat in the Continental Congress.

The Rev. Dr. John M. Krebs, of New York, has well portrayed the inflexible Covenanter of 1776 in these words:

> When the Declaration of Independence was under debate, doubts and forebodings were whispered through the hall. The House hesitated, wavered, and for a while liberty and slavery appeared to hang in an even scale. It was then that an aged patriarch arose—a venerable and stately form, his hair white with the frost of years. He cast on the assembly a look of inexpressible interest and unconquerable determination, while on his visage the hue of age was lost in the flush of burning patriotism that fired his cheek. "There is," said he, "a tide in the affairs of men, and we can perceive it now before us. To hesitate is to consent to our own slavery. That noble instrument upon your table, which insures immortality to its author, should be subscribed this morning by every pen in this House. He that will not respond to its accents and strain every nerve to carry into effect its provisions is unworthy the name of freeman! For my own part, of property I have some, of reputation more. That reputation is staked, that property is pledged on the issue of this contest; and although these gray hairs must soon descend into the sepulchre, I would infinitely rather that they descend thither by the hand of the executioner than desert at this crisis the sacred cause of my country!"

This eloquent outburst of patriotic fervor, there is every reason to believe, bore with telling effect upon the fate of the Declaration, which, two days after, was

passed, settling at once the momentous question of a nation's independence.

It was this distinguished patriot that the Presbyterians of the United States determined to honor in a fitting manner by perpetuating his name and history. The corner-stone of this monument was laid on November 16th, 1875, and on October 20th, 1876, the statue was unveiled with very interesting and appropriate ceremonies.

It stands in Fairmount Park, east of the Memorial Hall, on a pedestal of granite, twelve feet in height, and is of bronze, the work of Philadelphia artists, having been modelled by J. A. Bailly, and cast at Robert Wood's bronze foundry, in Philadelphia. It well represents the noble and dignified form and countenance of the eminent patriot, scholar, and divine, and forms a permanent adornment of our beautiful and extensive park.

The total cost was $18,000, and it may be here stated that the affair was not strictly denominational and sectarian in character, as members of many other churches contributed towards the erection of the statue, though the idea was originated by the Presbyterians, and by them carried to a successful termination. To the Rev. Dr. W. P. Breed, of Philadelphia, is due much of the credit for the success of this enterprise.

"Old Abe," the War Eagle of Wisconsin.

One of the chief attractions in Agricultural Hall, during the Centennial, was the famous "Old Abe," the veteran War Eagle of Wisconsin, the hero of no less than thirty-six battles and skirmishes, during the late war. There was always a crowd around him, as he sat perched on a national escutcheon, supported horizon-

tally on a pole, the services of this celebrated Eagle having gained him a national reputation. Among all the incidents of our memorable war, there are few more remarkable than that an Eagle, the emblem of our country, should follow a regiment through all the vicissitudes of a three years' service in the field.

A brief biography of this remarkable bird will not be out of place here, and we glean the following facts from an exceedingly interesting and complete history, written by Mr. J. O. Barrett, and published by Messrs. Atwood & Culver, Madison, Wisconsin.

The bird was caught when only about two months old, by an Indian called A-ge-mah-we-ge-zhig, or Chief Sky, a son of Ah-mouse, chief of a tribe of Chippewa Indians, who took it from a nest on a pine tree, near the mouth of the Flambeau. This Indian sold it to a Mr. Daniel McCann for a bushel of corn, and presented by a Mr. Jeffers to a company organizing for the Eighth Wisconsin Infantry. The Eagle was duly sworn into the United States service by putting around his neck red, white and blue ribbons, and on his breast a rosette of the same colors. Borne upon a shield, at the head of the company, called the "Chippewa Eagles," he accompanied them to the front, and was named "Old Abe," in honor of Abraham Lincoln. With them he shared all the dangers and privations of a three years' campaign, and returned home with the remnant of his regiment a battle-scarred veteran, having been wounded on two occasions, once at the battle of Corinth, October 3d, 1862, and again at the assault on Vicksburg. The most wonderful accounts are given of his behavior during the heat of battle, how he grew wild with excitement at the clash of arms, flapping his wings and uttering startling screams.

"The fiercer and louder the storm of battle, the fiercer, louder and wilder were his screams." It was not surprising that his presence at the head of the regiment should have created such enthusiasm as it did, or that "Old Abe" has acquired such an enviable notoriety.

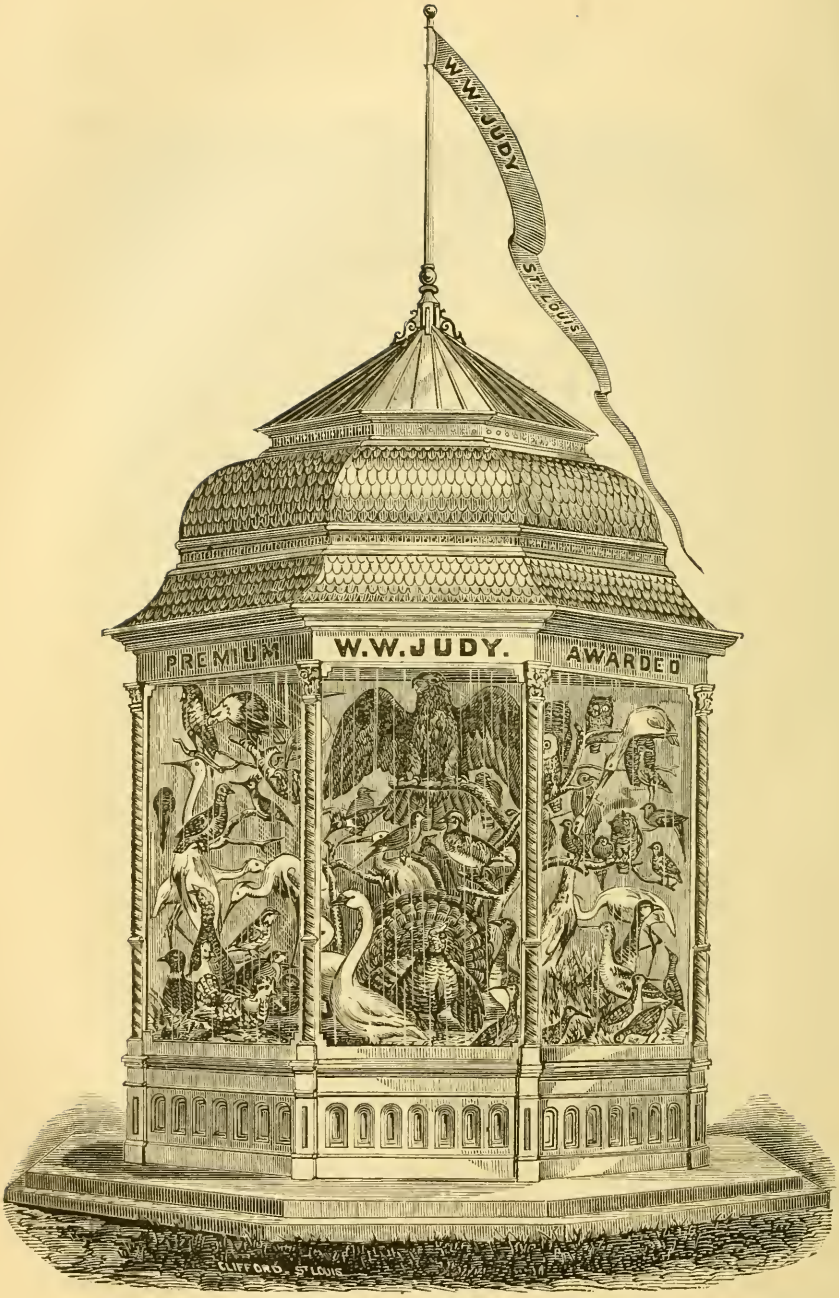
When the regiment returned to Madison, September 22d, 1864, a grand reception was given them, in which, however, the main attention was riveted on "Old Abe," who was *the* hero of the hour. He was on that occasion presented by the regiment, with appropriate ceremonies, to the State of Wisconsin, and accepted, on behalf of the State, by Governor Lewis, who promised that it should be well cared for at the capitol, where it would be preserved to invoke inspiring memories of the brave regiment who had carried it with such honor to themselves and the State. It has a pleasant and well-lighted room in the basement of the State capitol, also the freedom of an adjoining room, and in the summer enjoys the capitol park under the care of his attendant.

He is brought out and paraded on occasions of public military exercises and reviews, and always excites attention and enthusiasm. He has also made himself useful in other ways. Advantage was taken of his celebrity to put him on exhibition at several Sanitary Fairs that were held in the West, for the benefit of sick and wounded soldiers, and very large sums were realized by the sale of his history, photographs and pictures. At the Chicago Sanitary Fair, in the winter of 1864, no less a sum than $16,000 was raised entirely by this means.

The Wisconsin Legislature of 1876, by a joint resolution of Assembly and Senate, authorized Governor H. Ludington to have "Old Abe" borne to the Centennial Exhibition at Philadelphia, by some veteran soldier of

"OLD ABE," THE LIVE WAR EAGLE OF WISCONSIN.

NEVER LOST A BATTLE.



THE KIOSCK OF STUFFED BIRDS.

his old regiment, there to show to the assembled thousands from all parts of the world how happily chosen was our national emblem.

Stuffed Birds.

In the Main Building was a very elegant kiosk of stuffed birds, exhibited by W. W. Judy & Co., of St. Louis, Missouri, of which we have an illustration. Every bird contained in this kiosk is indigenous to the State, and perhaps nowhere else could such a variety of birds be found. With its favorable climate, numerous rivers and small lakes, mountainous tracts and vast prairies, Missouri is peculiarly adapted for all kinds of game and fish.

Captain Judy, himself a skilled sportsman and one of the oldest game-dealers in the West, was appointed to solicit specimens and take charge of their arrangement and classification. A large number were killed by him and others in the immediate vicinity of St. Louis, and preserved by Rudolph Boercher, and in two weeks the collection was complete.

Three whooping cranes, which attracted attention from their large and peculiar marks; most of the specimens of Virginia rail, snipe, plover, and others, were collected for the purpose. An eagle, forming the apex of the pyramidal stand, was killed inside the city limits. All who saw it pronounced it the finest specimen and best-mounted bird on exhibition. The loon, a difficult bird to capture and seldom seen, though remarkable for its habits, was noticed from its rarity. A green bittern was also a fine specimen. There were among the collection over forty varieties of the duck—canvas-backs, the Havre-de-Grace, red-heads, teal and mallard, wild geese, and brant, etc. Snipe, wood-cock,

wild turkeys, wild pigeons of various kinds, grouse, quail, pheasants, and many other game birds were here represented, and every species was marked with a label bearing the common name as well as the scientific one.

The Elevated Railway.

Between Agricultural Hall and Horticultural Hall, there was constructed an elevated railway across the Belmont ravine, which proved to be a very attractive part of the Exhibition.

The question of rapid transit has become one of the problems of this driving age, and the projectors of this railway claim that the desired object is attained. The track on the Centennial grounds was built under the auspices of the West End Passenger Railway Company, who also controlled the narrow-gauge railway encompassing the entire enclosure. The road was the invention of General Roy Stone, of Elmira, N. Y. The track was supported by a single row of iron columns, resting on foundations of timber. The length of the road was 500 feet, and the greatest height above the bottom of ravine thirty feet. The car ran on three rails. One of these occupied the centre of the track, and was laid along the top of a triangular truss. At the base of this truss, and on either side of it, were laid two rails. The car thus moved on three rails—one in the centre and two on the sides. The bottom of the car was concave, and fitted over the central rail, while the sides extended several feet below the line of the centre of the car, and had wheels attached to them which ran on the side tracks horizontally, instead of perpendicularly, as is the case on ordinary rails. Thus the wheels on the central rail were the bearing wheels, while those on the sides were the guiding wheels. The

wheels had rubber tires, which caused them to run smoothly, and deep flanges, which prevented them from running off the track. The locomotive was also constructed in a curious manner. The engine was placed above the tender, and was fed with water and fuel from below. The arrangement of the tender was the same as that of the car, so far as the running gear was concerned.

The car seated sixty passengers, and contained a saloon and two compartments—one each side. The fare was three cents, and it made the trip across the valley and back in two minutes.

Electro-Magnetic Orchestra.

One of the most curious musical instruments ever exhibited anywhere was probably the electro-magnetic orchestra, which was in the eastern end of Horticultural Hall, invented and manufactured by William F. Schmoele, of Philadelphia.

The instrument somewhat resembled an orchestrian in general appearance, and was so arranged that it could be played from a keyboard like an ordinary pipe-organ. The chief improvement was the reading-machine, which was connected with the instrument by wires, along which the currents of electricity governing the action were conducted.

The music sheets were in the form of rolls, which were drawn under a row of charged feelers or "readers," whose office was to distinguish the notes. They were moved by passing between two gum-covered rollers, rotated by a mechanism called a "wind engine." The motor power of this was the compressed air or "wind" of the bellows of the instrument; and it contained in its construction all the necessary elements of a steam-

engine, represented, however, in such different forms that no resemblance to the latter was left. It was a double engine, each pair of opposite wind-pockets being equivalent to a steam cylinder, and the alternate movements of their swinging leaves were the counterparts of the push and return of the piston-head. The noise or puff was prevented by a peculiar construction of the valves, and the manner of working of the cut-off; and the expanding gussets of the pockets took the place of the "packing" in a steam cylinder, over which they had the great advantage that they consumed no power in friction, so that the wind engine was exceedingly economic, using the whole force of the wind without waste. These advantages, and the cheapness of construction of this wood and leather engine, render it an admirable motor for low pressures.

The instrument on exhibition had several hundred "readers" or feelers, standing close together in order that a great many may be placed in a small space. The electricity, which may be called a hundred-fingered performer, pervaded them all, ready to pass at a moment wherever a note occurred. The various instruments, representing a band of twelve pieces, besides the drums, etc., had their appropriate spaces allotted them on the music sheet; and the connections between their "readers" and the performing parts were made by wires, which, when grouped together, formed the cable running from the reading apparatus to the main case. Each note, as soon as detected, was telegraphed to the corresponding performing magnet; and as a great number may be simultaneously read, it followed that the music may be exceedingly varied.

The speed at which the music sheet was drawn through the reading apparatus, and consequently the

general movement of the piece, was controlled by the fly, which was so constructed as to act also at the same time as a governor. This fly, and consequently the rate of performance of the music, was altered at pleasure. The different time values of the notes were represented on the sheet by marks of different lengths, a quarter-note or crotchet, for example, being but half as long as a minim or half-note, and twice as long as a quaver or eighth-note; and so on for all other grades and varieties.

The range of application of this invention is not limited to instruments such as the one we are describing, which is simply its first fruit. It may be applied on a large scale to the building of orchestras, representing hundreds of performers; and on a small scale to the piano and organ, for the playing of our household music. In these latter it does not at all conflict with the retention of the keyboard, so that they may be used for all their present purposes, besides the note-reading and self-playing powers that they additionally acquire. As the music in the shape of printed or gilt notes, or even in the punched form, can be published with all the facilities of the press for indefinite multiplication, it can be furnished at prices not much greater than those of corresponding ordinary sheet music, printed in ink, as soon as there are sufficient instruments in use to call for the printing of editions sufficiently large to make the first cost of the setting up an insignificant item per copy.

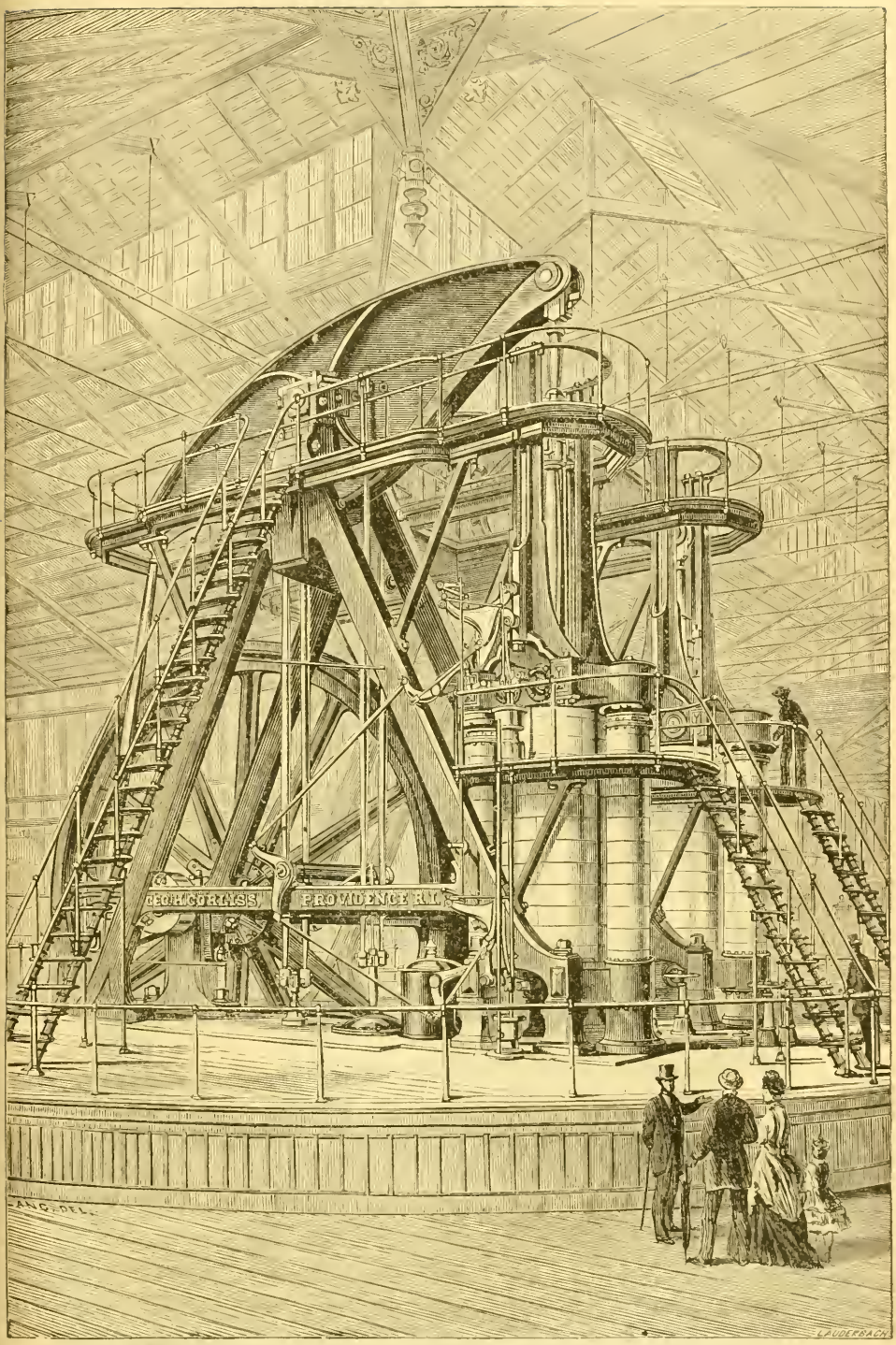
So instantaneous is the transmission and action of electricity that, were a thousand instruments such as the present brought together and electrically connected, they would all synchronously and in accurate concert burst forth into song. Again, applied in another direction—in connection with steam-power—this in-

vention opens the possibility of producing music by a giant orchestra, such as the world has never heard. Doubtless some future Fourth of July will be ushered in by a chorus of steam whistles and hundreds of bells, blending together, not in a confused din, but roaring in concert our national anthems, amid the rolling accompaniment of musketry, and the thunder drumming of artillery.

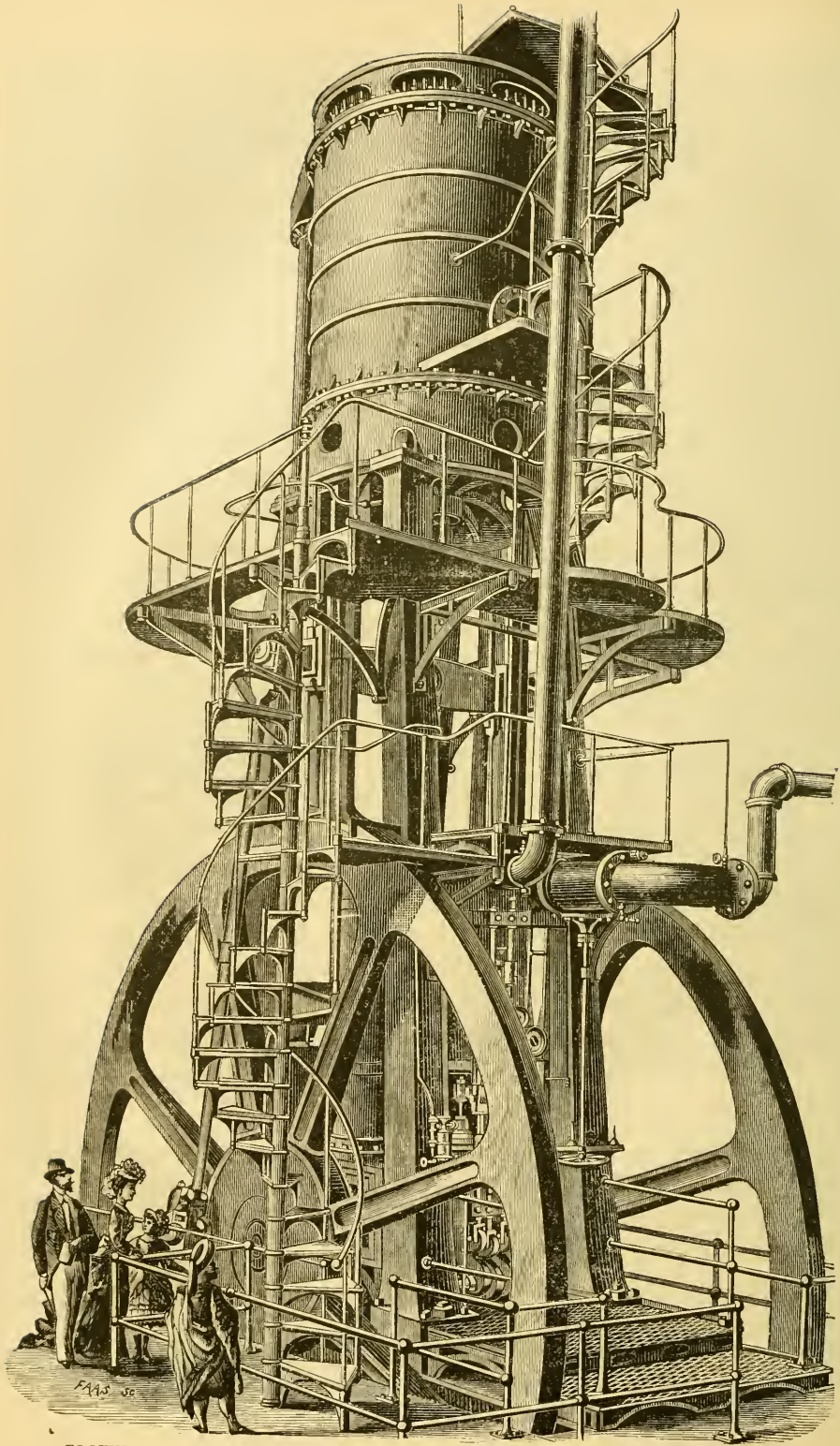
The Corliss Engine.

The grand power which kept in motion the mechanical part of the Exhibition was the Corliss Engine, situated in the centre of Machinery Hall. The engine was nominally of fifteen hundred horse-power, but was capable of doing the work of twenty-five hundred horses, if it had been necessary.

The motive-power consisted of two large beam engines of 750 horse-power each, which had the fly-wheel (a gear) between them, and the cranks of both connected with the same crank shaft, so that, properly speaking, the two engines were only a double engine. The gear fly-wheel connected underneath the floor with the main shaft, which was 252 feet long, and run crosswise of the building. At the ends of this shaft, and at two intermediate points connected with it by rests of beveled gear six feet in diameter, were shafts 108 feet long, running at right angles with the main shaft to points directly under the ends of the separate lines of shafting overhead. At each end of these four connecting shafts were the main pulleys, eight in all. Each pulley was directly under the end of a main shaft overhead, in the hall, with which it was connected by a double belt, and each was in a position to drive a straight line of shafting 635 feet long, or what may be called a separate section of machinery, each section being the whole



THE CORLISS ENGINE.



BLOWING ENGINE, CONSTRUCTED FOR THE EXPOSITION BY I. P. MORRIS & CO.

length and one-fourth the width of one wing of the hall. The main shaft was extended underneath the transept, 100 feet or more, and furnished power for machinery in that section. The main belts were passed through the hall in out-of-the-way places, and were enclosed in glass compartments, thereby making a separate exhibit of the belts. The gear fly-wheel was thirty feet in diameter, two feet across its face, weighed fifty-six tons, and was said to be the heaviest cut wheel ever made. It had 216 teeth, and these were finished with such accuracy and nicety that, although the wheel made thirty-six revolutions per minute, it ran noiselessly. The height of the engine from the main floor was thirty-nine feet, and every part of it was accessible by means of iron staircases and balconies.

Blowing Engine.

Next in prominence to the Corliss giant engine in Machinery Hall was a Blowing Engine, exhibited by the I. P. Morris Company, of Philadelphia, for supplying air to a blast furnace, used in making iron ore. In its design the following points were sought to be obtained: compactness, without sacrifice of accessibility to moving parts; self-adjustment of parts liable to inequalities of wear; steadiness of the whole structure, and preservation of alignment by being self-contained. All the parts are proportioned to the work of supplying blast of ten pounds' pressure steadily, if needed, and though the ordinary working of anthracite coal-burning furnaces does not demand that high pressure, it has been exceeded in one case, thirteen and a half pounds having been blown off for a considerable period of time without damage to the engine.

The Wanich equilibrium valve, with which the en-

gine is fitted, consists in the use of a ring cast on the back of the main valve, extending upward, and bored out so as to envelope and slide freely upon the outside of another ring cast on the steam-chest bonnet, dropping downward and turned off. The rings are, of course, concentric, and the annular space between them is quite small in area, very much less than the aggregate area of the holes for the passage of steam below the pilot valve; consequently, any steam passing the annular opening when the pilot is raised goes freely through into the cylinder, exerting no appreciable pressure on the back of the main valve, permitting it to rise easily.

The blast valves are of selected thick sole leather backed with plate iron; blast piston fitted for either metal, wood, or bag packing; steam piston fitted with metal double rings held out by springs; valves are lifted by cams operating directly against rollers fitted into the bottom ends of the lifting rods.

The cams are adjustable, but not variable, and give facilities for experimenting to determine the best distribution of steam without interference with each other. The cam shaft is driven by spur gears fitted to main shaft. The fly-wheels are large, and weigh nearly eighteen tons. The rim on the side in line with the crank pin is cored out, so that the preponderance of the opposite side will counterbalance weight of pistons, rods, crossheads, etc.

Shafts are of wrought-iron, with ample bearing surface.

The crosshead swivels in the yoke connecting the two piston rods, and is provided with spherical journals for the connecting rods, so that it may accommodate itself to any inequalities of wear in the main shaft or crank pins.

The dimensions of the principal portions of the engine are as follows: blowing cylinder, 90 inches diameter, 7 feet stroke; steam cylinder, 50 inches diameter, 7 feet stroke; two fly-wheels, each 24 feet diameter; bed-plate, 13 feet by 8 feet; total height of engine, 36½ feet. Capacity, 10,000 cubic feet of air per minute.

The Department of Public Comfort.

This building was too well known, patronized as it was by so many hundreds of thousands of visitors, who availed themselves of the conveniences it afforded, to need much description from us.

It stood near the west end of the Main Building, between the Judges' Hall and the Carriage Building, and, as its name implied, was a general reception-room for the convenience of the public. It contained one very large room, ladies' parlor, coat and baggage room, lunch counter, barber-shop, ladies' hair-dressing rooms, lavatories, etc. Entrance to the building and to an open-air gallery over its central portion was free to all, while a moderate charge was made for any of the special services named. The building throughout was ornamental in its character, and well-lighted and ventilated. In connection with the coat and baggage room were ten stations, in and about the Exhibition buildings, where articles of wearing apparel, umbrellas, etc., could be deposited and cared for, or checked for delivery at other stations. The reception-room opened on the east into the telegraph department, where were exhibited and in use all the telegraphic appliances of the day—police and fire-alarm, etc. It was also a station of the corps of Centennial guides. The ladies' parlor was handsomely carpeted and furnished with divans, easy-chairs, mirrors, etc. The reception-room was furnished in oak

and black walnut, and contained a few office desks for the convenience of business parties desiring to hire them, and this was a convenient place where parties met on entering the grounds, made their arrangements for the day's pleasure, and used it as a general rendezvous for business and social purposes, and where all the necessary accommodations of a first-class hotel were found. A register was also kept, free of charge, in which visitors who desired entered their names, address, and date of intended departure, so that friends could readily learn of their whereabouts, and all letters addressed in care of the "Department of Public Comfort" were carefully taken care of until called for, or forwarded to any point requested.

The offices of the Centennial Commission and of the President were also located in this building, as also the Head-quarters of the Press.

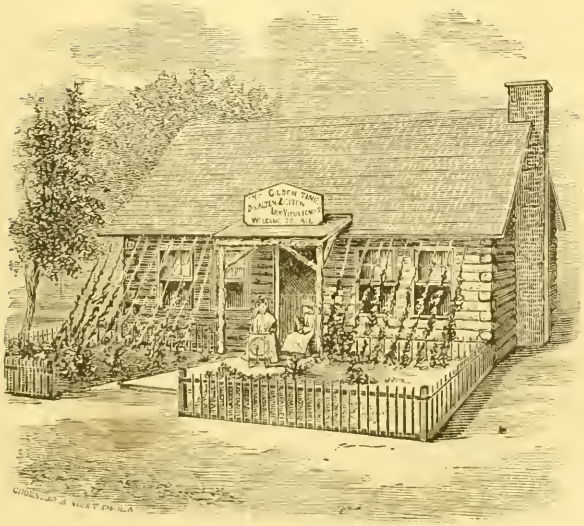
Charities Conducted by Women.

Among the specialties of the Exhibition we know of none more deserving of record in this connection than an admirable report on "The Charities Conducted by Women," which was published by Mrs. Aubrey H. Smith, Mrs. Matthew Simpson and Mrs. Theodore Cuyler, of the Women's Centennial Committee.

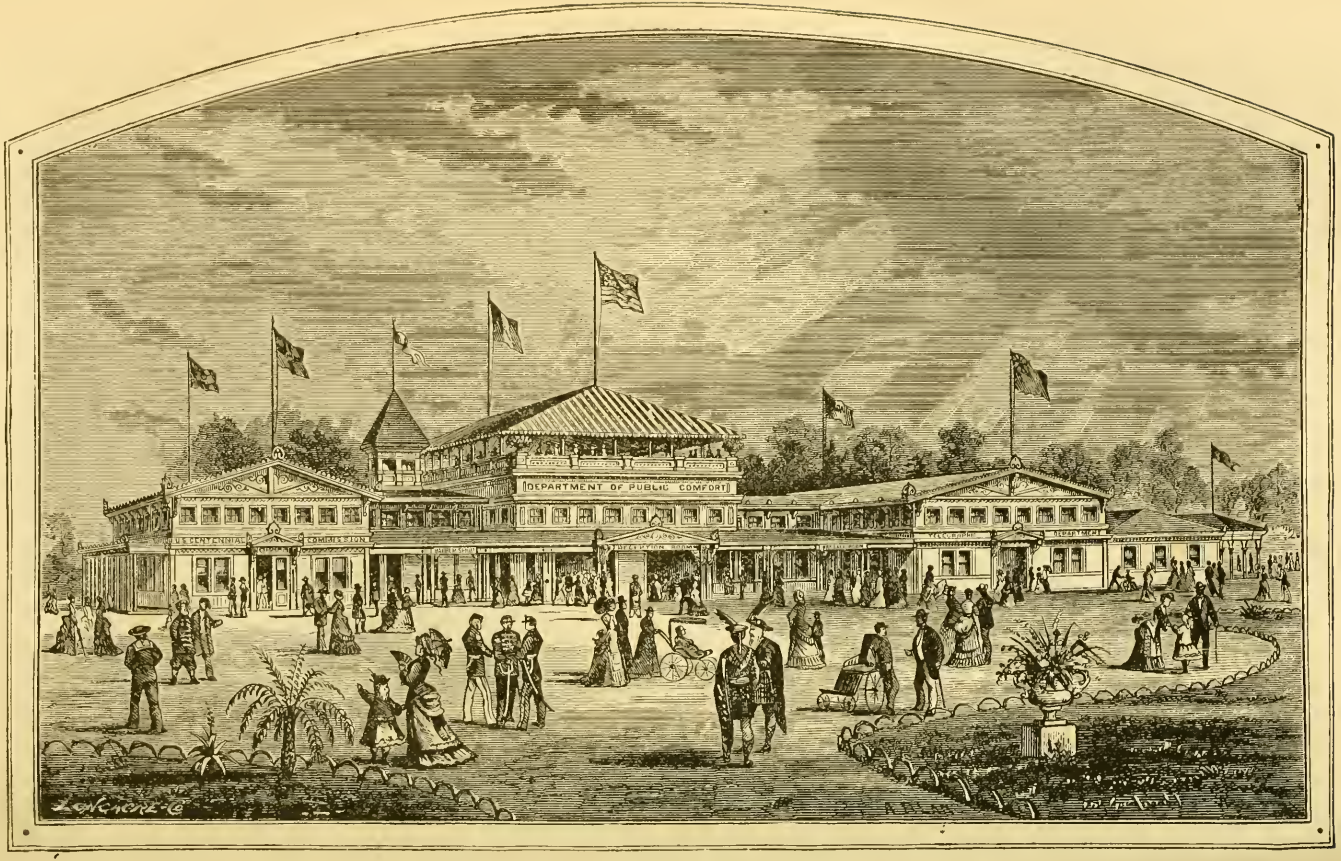
To this sub-committee is due the credit of having brought together for the first time in the history of the world a synoptical view of such of the charities in the United States, Great Britain, Germany, Russia, Denmark and Italy, as have been founded and are managed by women. The idea of such a work was first conceived by Mrs. Bishop Simpson, who desired that enlightened benevolence, the result of woman's heart-work as well as her handiwork, might be seen by the world, but

IOLANTHE DREAMING.

A MODEL IN BUTTER, BY CAROLINE S. BROOKS.



NEW ENGLAND KITCHEN.



DEPARTMENT OF PUBLIC COMFORT.

owing to the press of other duties, she was compelled to resign the chairmanship of the committee.

The modest and appropriate preface to the report gives a very faint idea of the labor which it must have required to get together such a mass of valuable and interesting information, the names of 822 charitable associations conducted by woman being tabulated.

Sleeping Iolanthe.

Beyond all comparison the most beautiful and unique exhibit in the Centennial was an alto-relievo, in butter, of "Iolanthe," the heroine of Hon. Edmund Phipps' lyric drama of that name, which during the greater part of the time was shown in the Woman's Pavilion, but during the last few weeks in Memorial Hall. "Iolanthe" was the beautiful daughter of King Reve, and up to the age of sixteen was blind, yet unconscious of her infirmity. To her the world was all darkness, and as those with whom she came in contact manifested neither by word nor sign that they possessed an additional sense, she remained in ignorance of her misfortune until her sight was suddenly restored by a surgical operation on the eve of her marriage with a prince. Of the two centres of interest presented by the plot of the drama, the one converging about the dreaming princess, and the other indicated by the flood of emotion produced by the unexpected revelation of a new world, the artist of the exhibit chose the first.

The only tools made use of in the apparently difficult task of modelling in butter the expressive face and the bust were common butter paddles, cedar sticks, broom straws and camels'-hair pencils. The substance in which the bust was modelled, and the entire contour, was kept perfect by a liberal supply of ice placed in the tin frame beneath.

This extraordinary work of art, for such it deservedly must be regarded, was executed by Mrs. C. Brooks, of Arkansas.

On October 14th this lady gave an exhibition of sculpturing in butter in the Judges' Hall, in presence of several Commissioners, Women's Centennial Committees, and representatives of the press. Her only tools were two spoon-like pieces of wood with paddle-shaped bodies, and differing only in size—one being for rough and the other for fine work. Taking a little butter at a time she kept pressing that material upon the bottom of a granite-ware basin until she had about a dozen pounds in it. She then put the whole in a refrigerator to give the butter the required degree of plasticity. This being acquired, she took the basin out and began carving the butter with the larger tool. When the outlines of the figure were well advanced, she began to use the finer tool occasionally. Plasticity was restored whenever necessary by means of the refrigerator. In one hour and a quarter after she began work, the shapeless, golden mass was transformed into the relief bust of another sleeping beauty.

New England Log-House.

One of the most interesting and novel features of the Centennial grounds was the above building, which was made in exact imitation of the country dwellings of a hundred years ago.

The New England log-house was all that its name implied, as it was built of logs, and wore an ancient aspect, which was well set off by the fancy modern structures that surrounded it. The interior of the log-house comprised two small low-studded square rooms, which had an exceedingly antiquated look, and which

were filled with old-fashioned furniture and Revolutionary relics. The great open fireplace, which was adorned with appropriate paraphernalia, monopolized nearly all one side of the front room, while the narrow and low windows and doors shared with a few wrinkled pictures and relics the other wall. From the ceiling depended strings of dried apples and peppers, ears of corn and other emblems of the olden time. Here were shown General Stark's spurs, John Alden's desk, and the veritable cradle in which was rocked Peregrine White, born in the "Mayflower," in 1620. The rockers were not there, having been made away with by the ravages of time, but we had the cradle to remind us of that adventurous infant who forced his way into the world at such a trying time. Here, too, was the silver pitcher used by Lafayette in Boston, Captain Nathan Barrett's sword worn at the Concord fight, Governor Endicott's folding chair, which was made for him in Dover more than two hundred years ago, a chest of drawers 200 years old, a clock aged 400, and a large variety of other old relics too numerous to mention. In the bed-room was an old-fashioned bedstead, with a quilt of 200 years old, and a sheet belonging to a Lynn lady who received it from her great-grandmother. There was an old-fashioned kitchen, too, where a boiled dinner, beans, brown bread and old-fashioned puddings were prepared and served up for company in real old-fashioned style every day from 12 M. to 3 P. M. About twenty ladies, dressed in the costume of a hundred years ago, did the honors of this establishment, and conducted the visitors through the different rooms, explaining with courtesy the wonderful articles of furniture and cooking utensils, whose very simplicity made them incomprehensible to the victim of modern

improvements. One of the greatest mysteries of the farm-house was the ladies themselves. By right of their surroundings and quaint costumes they should have been at least a century or more advanced in years, and yet they were as fresh and blooming as any of their fair sisters who had scarcely reached the age of five-and-twenty.

Centennial National Bank.

The branch of this bank, which was located upon the Exhibition grounds, adjoining the Board of Finance building, was the centre of the vast system of direction and control which vitalized the Centennial Exhibition. It possessed the exclusive privilege within the Exhibition grounds of buying and selling foreign and domestic exchange, buying foreign coin, cashing letters of credit, receiving deposits, discounting notes, and, generally, conducting a banking business in all its various forms. It was further designated as the financial agent of the Commission, and in this capacity was charged with the duties of receiving, counting and taking care of the money paid at the gates, and of providing visitors with the requisite half or quarter dollars in exchange for notes. In order to facilitate and expedite fulfilment of this last named condition, twelve exchange counters were provided beside that in the bank itself, and these —situated at various points along the line of the enclosure—reduced to a minimum the trouble of visitors who came to the Exhibition without first providing themselves with the proper admission fee.

Quite the most arduous labor performed was that in connection with the receipt and counting of the gate money; and yet so admirably was this systematized that it was accomplished with amazing celerity. Each

of the turn-stiles was provided with a sheet-iron box that fitted in upon slides beneath the money-drop, and four times each day—at 11.30 A. M., 1, 2.30 and 6 P. M. —these boxes were removed and brought to the bank to have their contents counted, each being receipted for as received. Sixteen persons were employed in the counting-room, and the rapidity and exactness with which the work was performed was altogether astonishing, and its most remarkable feature was that it was so continuously rapid and exact.

In addition to this arduous labor, the bank further greatly forwarded the success of the Exhibition by the facilities which it extended to exhibitors and visitors for transacting business without the serious loss of time attendant upon a journey to the business centre of the city. By a broadly-laid system of correspondence it established relations with all parts of the world, and was enabled to place the here-resident citizens of foreign countries in direct communication with their bankers at home. The extent to which this opportunity for foreign correspondence was made use of was evidenced by the bills of exchange book, the drafts therein recorded ranging over all the important European and South American cities, reaching to China and Japan, and continuing out to the islands of the South Sea.

The extent of the business it transacted in the purchase of foreign money was shown by the curious, and, to a numismatist, the valuable and instructive array of notes and specie from all parts of the world collected in its vaults. In the specie were the greatly bedragoned coins of Japan, beautiful in execution, but with values determinable only by weight; the South German gulden and the skilling of Denmark and Sweden, both out of coinage, the one being supplanted

by the reichs mark, the other by the kronar; the thaler, soon to be withdrawn; the English guinea, also laid upon the shelf, and countless coins of present issue, but rarely seen on this side of the Atlantic, all jostled together in a promiscuous heap.

In bank notes the collection was even more remarkable. Bank of England notes, notes of the Bank of France, German notes, Brazil and Argentine Republic notes, very like our own, only substituting for dollars, milreis and pesos; Cuban notes, notes of Norway, not badly engraved, but colored with incongruous shades of red, yellow and green; Russian notes, etc.

Unquestionably the Centennial National Bank was a very remarkable institution, and a study of its workings gave us a very high respect for the able mind which conceived and carried it to such a successful issue.

The Bible Pavilion.

The Pennsylvania Bible Society had a pavilion located to the south of and opposite to Horticultural Hall, which was erected by special contributions from a few Philadelphians. Here the Bible was obtainable, at cost, printed in 100 different languages, and the work of distribution was very actively carried on throughout the past six months. A book of forty-six pages, published and furnished by the American Bible Society, containing the sixteenth verse of the third chapter of St. John's Gospel, in 164 languages, was given out gratuitously, and about 20,000 copies were issued.

The B'nai B'rith Monument.

This was a contribution on the part of the extensive society known as the B'nai B'rith, and was intended by them to be put up during the Centennial Exhibition,

but owing to unforeseen delays in its shipment from Leghorn it had not arrived up to the closing of the Exhibition. It will be, however, erected on the grounds as soon as it does arrive, and will remain there as a monument of the interest taken in this our Centennial Anniversary by our Hebrew fellow-citizens. It was the work of Mr. Ezekiel, an American sculptor, resident in Rome, one of the ablest and withal most modest artists of whom sculpture in our days can boast. This monument is a statue of Religious Liberty. It represents Republican Freedom, in the figure of a woman eight feet high holding in her left hand the laws of equality and humanity, and symbols of victory; in her right, the genius of Faith raising the burning torch of religion. Liberty is a female of majestic and dignified mien, strikingly grand in the simplicity of her Greek attire. She is clothed in armor, but the mantle of peace held by an Agraffe, so that her right breast and arm are exposed, descends in long broad folds from the left shoulder to the right foot.

The genius of Faith, holding the flaming torch, is a handsome youth, naked, symmetrical in all his forms. The crown of laurel, the instrument of the American Constitution, the colossal eagle crushing the serpent (the symbol of tyranny), typify the glory and power of the country of Washington.

We are indebted for a description of this statue to the translation of an article which appeared in the *Il Diritto*, a leading paper of Rome.

CHAPTER XXVIII.

SPECIALTIES—CONTINUED.

American District Telegraph Office.

A MOST gratifying and marked feature of our Exhibition, and one in which it surpassed any former International Exhibition, was the special provision made for the comfort and convenience of visitors. This was the theme of universal commendation, and of all the facilities which were afforded, none merited or received more general patronage than the American District Telegraph Company of Philadelphia, who had the entire control of the telegraphic department of the Exhibition.

The services of this, one of the most valuable of Philadelphia institutions, were in requisition on the grounds months before the opening of the Exhibition.

On the 1st of September, 1875, the company placed a corps of police at the Centennial buildings, under the charge of Captain W. C. Stewart and Lieutenant Benjamin Seiser, and to them was intrusted the duty of patrolling the buildings night and day, to protect them from robbery, fire, etc. This arduous duty was faithfully yet so quietly performed that very few were aware of their having put out several fires in the buildings which occurred before the opening, from trifling causes, and which, but for their timely presence, might have been disastrous in their results.

On March 1st, 1876, Mr. Philips was appointed

Telegraph Director of the Exhibition, and measures were at once taken, so that by the opening day a perfect net-work of wires, over sixty miles in length, extended all over the Exhibition grounds. Branch offices of the company were located in the Main Building, Machinery Hall, Government Building, Women's Pavilion, Agricultural Hall, American Restaurant and Massachusetts Building. The management of the Telegraph office was placed in the hands of Captain W. C. Stewart, Assistant Superintendent, and the amount of work done, and the corresponding amount of convenience which must have been afforded to visitors, may be gathered from the following facts:

Number of messages received up to Nov. 10th, 1876	20,000
Number of messages sent	35,000
Number of lost children restored by the company	32
Number of adults lost and taken home by the company	5

The entire force required for the working of the offices was:

Male adults	12
Lady adults	6
Messenger boys	60
Total	78

The messages sent and received as above were to and from all parts of the world, as there was direct communication by cable with the Old World at all hours of the day and night. The messenger boys were seen everywhere, conspicuous in their neat uniform, flitting about from building to building delivering notes, packages, etc.

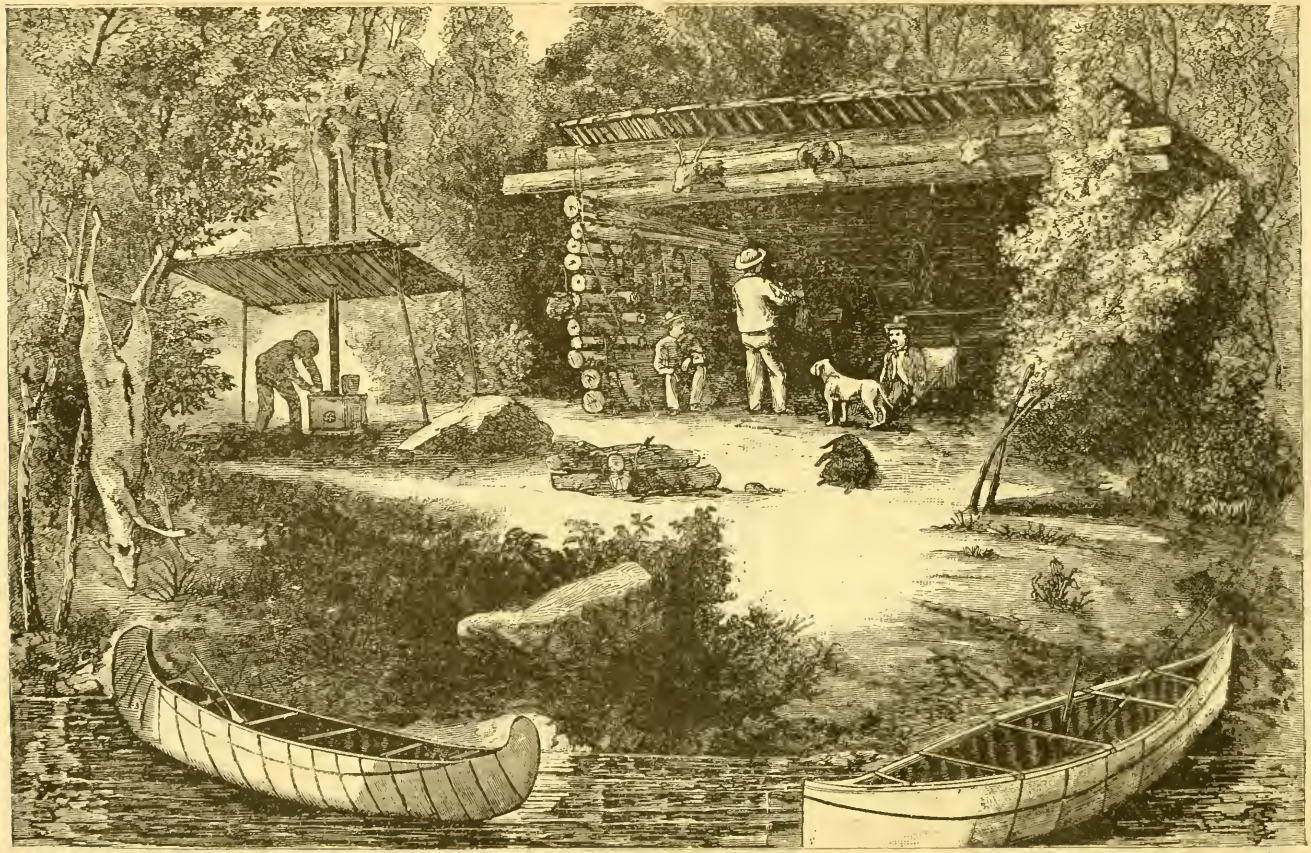
The Fire Alarm Telegraph on the grounds was also in charge of this company, and the alarms were promptly transmitted to the Fire Department on the

occasions of the fires at Lauber's Restaurant, Elm avenue, and others of lesser importance.

The Kindergarten.

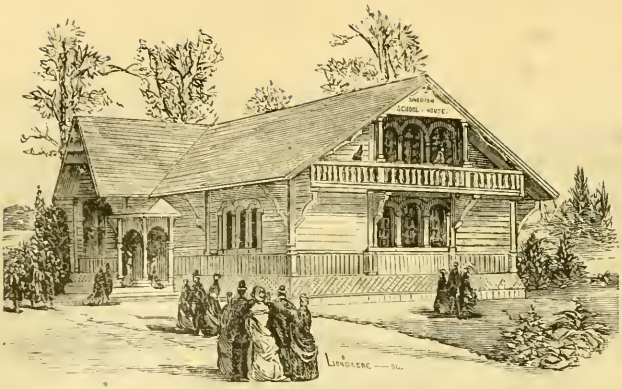
The various educational systems of the civilized world were well represented at the Centennial Exhibition, but none of them were, in our opinion, more instructive and entertaining than the Kindergarten, which was in operation near the Women's Pavilion and only closed on the 1st of November.

This school or playroom was located in the pretty Gothic school-building erected by the Woman's Centennial Executive Committee, and the sessions were held three times a week from ten o'clock until half-past twelve. The juvenile institution was in charge of a Boston lady who, after an examination of the various homes and asylums of Philadelphia, selected a class of sixteen tiny pupils from the inmates of the Northern Home for Friendless Children, all of whom were immediately introduced to the instructive pleasures of the Kindergarten, and at the opening of the Exhibition were far advanced. The system, as originated by Frederick Froebel, of Germany, really begins in the nursery, where the mind of the infant is led onward to a natural yet rapid development, which far better fits it in after life for the reception of new ideas than could be possible were the child allowed to gain a knowledge of the world about him without intelligent direction. In place of rattles, bells, dolls and other toys the babe is first given six balls of the three primary and secondary colors, and these give the child his first idea of difference in color. The mother or nurse, when the child tires of playing with the balls, takes first one and then another, and holding each by

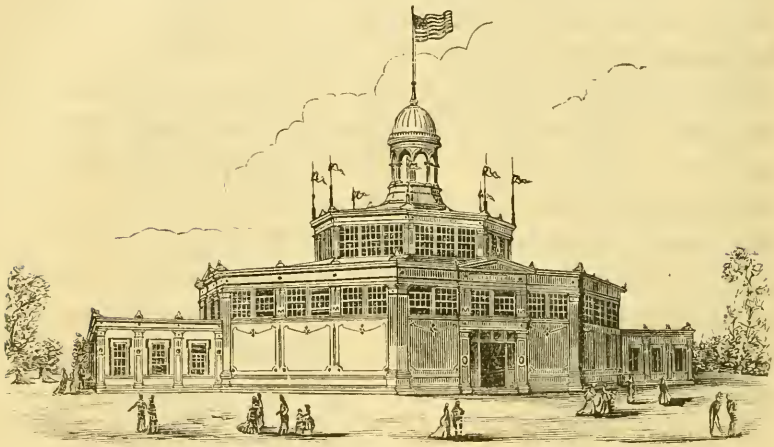


HUNTER'S CAMP.

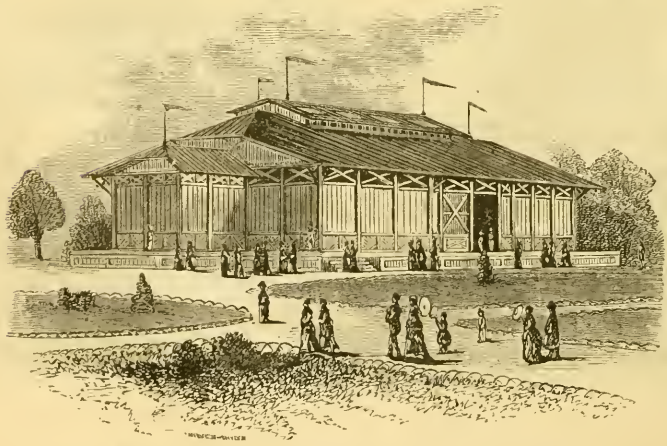
Erected by FOREST AND STREAM Publishing Company, of New York, in Lansdowne Ravine, Centennial Exhibition Grounds, Philadelphia.



SWEDISH SCHOOL HOUSE.



PENNSYLVANIA EDUCATIONAL BUILDING.



EMPIRE LINE—CENTENNIAL BUILDING.

the string to which it is attached, swings it back and forth in some well-defined direction, and general relation to some other object, such as a spool, a small box, etc. This amuses the child, and as the motions are made systematically, he gradually learns the relation of one object to another, and thus gains his first idea of the relation of himself to the world around him. The little student is thus led on from one idea to another until the age of three years is reached, when he enters the Kindergarten proper. Here there are no formidable-looking text-books, no spectacled teacher with a ferrule, no long hours of sitting on a hard wooden bench; not even an alphabet to be found. The lessons were actually play; the children laughed and talked to their hearts' content, only being kept in their seats a little while at a time. Never was seen a more joyous and intelligent class of little ones than the Kindergarten pupils at the Centennial grounds; and so far as actual, valuable education was concerned they were at least two years ahead of their less fortunate companions of the same age.

The Hunter's Camp.

Lansdowne Ravine, the most romantic spot in Fairmount Park, lay half way between Memorial and Horticultural Halls.

Near its eastern end the ravine is crossed by a broad bridge on the boundary line of the grounds, and seventy-five feet above the stream. A little west of this, and at the greatest, coolest depth of the valley, was one of the chief oddities of the Exhibition—the Hunter's Cabin.

It was built of logs in the "salt-box" style, and entirely open in front. Not only was it a fac-simile of

the abode of a Western hunter or trapper, but within and around it were all the paraphernalia that a pushing and ingenious pioneer would be likely to provide. Inside, standing against the walls, or hung on pegs, were fishing-tackle, a panther's head, the horns of Rocky mountain rams, hides of huge black bears, buckskin coats, leggins and moccasins, captured from Indians, a snow-white hide of a polecat (the only one of such a color known to have ever been seen in the United States), stuffed prairie-chickens and ducks, and a score of other curious trophies. There were also several stalwart fellows—practical hunters—in the buckskin garb of their profession. They lounged on the rough log couch, smoked, cooked and ate with sharp sticks for forks and with Arkansas tooth-picks—fourteen inches long—for knives. Just outside the cabin was a camp fire, kept constantly burning; a cord hammock, slung from two trees; the hunter's watch dog—a dwarfed brown bear, tethered to a tree which shaded the kitchen and dining-hall. Below the cabin a dam had been constructed, the stream being thereby made broad and deep enough for the hunters to amuse themselves rowing about in the two Indian canoes which they had there. To cut the story short, this hunter's cabin, with its contents and surroundings, afforded a very complete illustration of the life of a Western hunter.

The Map Fac-Simile Telegraph—A Marvellous Invention.

There was in operation, between the Signal Service section of the Centennial Exhibition and the Chief Signal Office at Washington, on a circuit about 150 miles long, an instrument which transmits by telegraph the weather maps of the Signal Service, hereto-

fore produced only in Washington. These maps contain what are called the isobaric lines, or lines running through the points where the barometer stands highest or lowest, and they show, as well, the different weather areas of the country. It has hitherto been impossible to present these maps to the public, owing to the inability of the ordinary telegraph to transmit anything but words or figures. This invention reproduces the map entire, with its lines and figures. It is then lithographed and printed for distribution on the presses with which the signal office is supplied.

The method may be briefly described as follows: The map, or message, to be sent is first written upon ordinary paper with ink in which a little glycerine has been mixed; and then before the ink is dry it is sprinkled with some powdered shellac which adheres to the ink. The manuscript is then passed between rollers with the face against a piece of hot zinc; the latter takes up the shellac, and a negative is produced in shellac, the best non-conductor of electricity, upon zinc, a good conductor. This plate is then bent around a cylinder, which is rapidly revolved, while a metallic point connected with the conducting wire is held to its surface by a spring and makes a spiral line over the face of the cylinder. At the receiving instrument a similar point traverses the surface of a similar cylinder, upon which is placed a piece of chemically prepared paper.

As the transmitting point comes to the line of writing the receiving point makes a dot on the paper by decomposing the chemically prepared paper, and as every portion of the writing is touched by the transmitting point the result will be a fac-simile of the original writing or device. To produce this result it is necessary, of course, that the two cylinders should

revolve exactly together, as if one should go faster than the other the discolored paper would be a confused mass of dots. In this consists the great novelty of the invention. Isochronous motion of the cylinders is secured by a magnet at the receiving station, which at each revolution of the transmitting cylinder accelerates the motion of the receiving cylinder if too slow, or retards it if too fast. It is believed that this invention will prove a valuable adjunct to the present systems of telegraphy, or may, with further improvement, supersede them.

The Columbus Monument.

On October 12th, with appropriate ceremonies, the Christopher Columbus Monument, erected on the Centennial grounds, a tribute from Italy to America, was publicly unveiled.

The ceremony was of special interest, not only to Italians, who have so nobly labored for this grand consummation of their tribute to the land of their adoption and to the memory of their countryman, but also to the Centennial visitors.

The entire monument cost $18,000, is made of the purest Italian marble, and stands twenty-two feet from the ground, the statue of Columbus being ten feet in height and the pedestal twelve feet. The base is seven feet long by six feet in width, and the weight is about thirty-five tons. The figure represents Columbus, in the costume of his age and clime, standing on a ship's deck, near his feet being an anchor, coils of rope, and a sailor's dunnage-bag; his right hand resting on a globe, fifteen inches in diameter, with the New World outlined on the front face, and supported by a hexagonal column. His left is gracefully extended and holds a

chart of what was once an unknown sea. The head of the statue is bare, and the physiognomy about as represented in the bust of the great navigator at Genoa.

The statue faces east, and on the front cap of the pedestal are the words: "Presented to the city of Philadelphia by the Italian Societies." Beneath this is a medallion representing the landing of Columbus. On the opposite side of the cap is inscribed: "Dedicated October 12, 1876, by the Christopher Columbus Monument Association, on the Anniversary of the Landing of Columbus, October 12, 1492." Underneath is the Genoese coat of arms and the words: "In commemoration of the First Century of American Independence." On the remaining two sides of the pedestal are the coats of arms of Italy and the United States.

The Egyptian Mummy.

In the World's Ticket and Inquiry Office, of Cook, Son & Jenkins, situated on Belmont avenue, near Machinery Hall, there was exhibited a mummy of an Egyptian princess, which attracted no little attention. Some years ago it was presented by the Khedive to the Prince of Wales, who left it in the care of an American gentleman at Luxor. It was obtained from the latter by Dr. J. L. M. Curry, of Richmond, Virginia, on his recent trip up the Nile. The case was worm-gnawed and half decayed, in spite of the well-preserved preparation on the surface, which was covered with hieroglyphics, said to signify prayers that the soul of the princess, having triumphed over evil spirits, may be admitted to life without death, and enjoy eternal happiness. Other characters told that the embalmed remains were those of an Egyptian lady of the highest rank and of the time of the Pharaohs. The skeleton

had been removed from the original case and put in one of glass. Only the face and hands were bare; no bones were visible except the top of the cranium, a portion of those of the hands and the brown, jagged, half-disintegrated teeth, which protruded from the open mouth. The body was covered with a black skin, shrivelled close to the bone, and looked like a skeleton that had been dipped in melted pitch and left out to dry. The trunk and limbs still retained most of their original swathing of coarse linen, but it was tattered, half rotten, of a dirty yellow, with the rags adhering to one another.

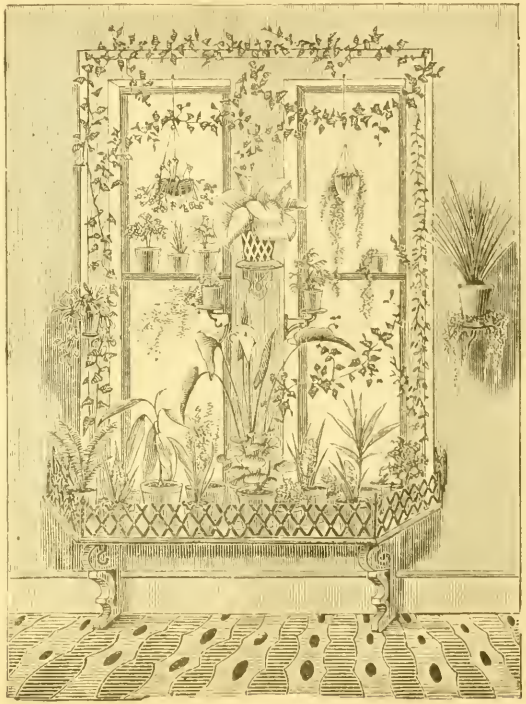
The Centennial Safe.

The large iron safe, known as the "Centennial safe," manufactured in New York, was on exhibit in Memorial Hall. In this safe were deposited albums of the photographs and autographs of the most prominent of the Centennial officers, governors of States, and other leading men; autograph book, called the "United States Centennial Album," a silver inkstand lined with gold, and two pens used in recording the names in the books; one of these pens was presented by Henry W. Longfellow. Among the many other mementos intended to be deposited within this safe is a copy of this work.

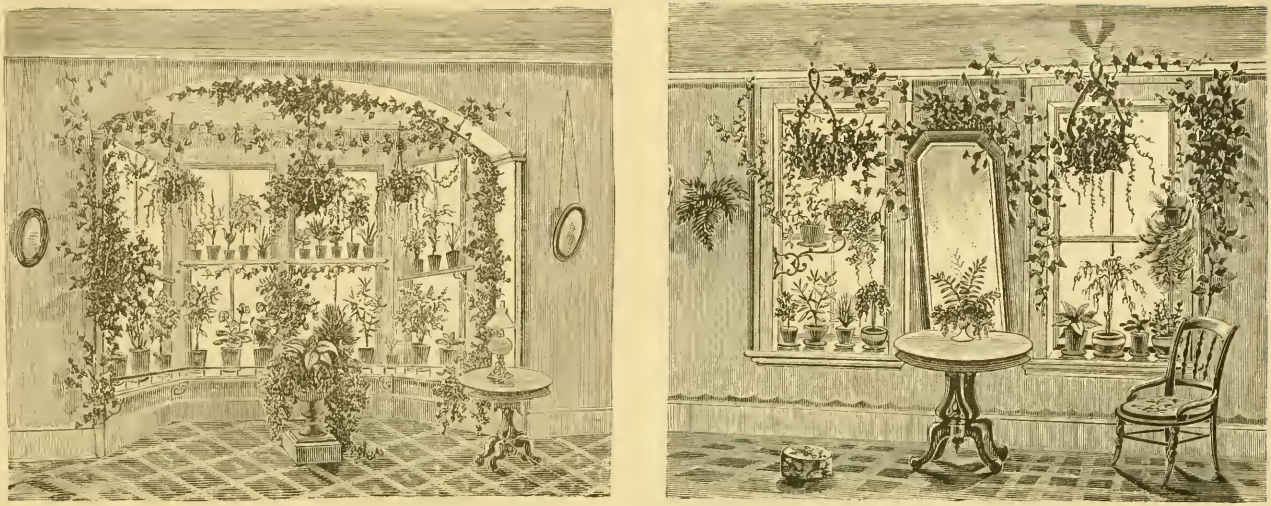
Soon after the conclusion of the Exhibition this safe was to be taken to Washington, and placed within the Capitol, to remain there unopened until the next Centennial, in 1976.

The Smallest Steam-Engine

In the world was exhibited by Mr. Levi Taylor, of Indianola, Iowa; and so small was it that many of its parts could only be distinguished through a magnifying



VICK'S WINDOW GARDENS.



VICK'S WINDOW GARDENS.

glass. While it remained on exhibition at the Centennial, it stood on the platform of the great Corliss engine, and rested on a gold twenty-five-cent piece. The engine was made of gold, steel, and platinum, and the entire apparatus weighed seven grains, the engine alone only weighing four grains. The stroke of the piston rod was one-twenty-fourth of an inch, and the cut-off one-sixty-fourth.

Flowers at the Centennial.

The grounds devoted to horticulture covered an area of about forty acres, and the entire space, exclusive of walks, borders and building sites, was allotted to various countries, which made extensive exhibits in ornamental gardening, and of trees, shrubs and plants of commerce. Many of the trees indigenous to our own country were here to be seen, as also many curious plants recently introduced from Japan, China, and other Oriental countries.

In the place set apart for the display of ornamental gardening, there were several thousands of flowering and perhaps just as many foliage plants, arranged in the different ornamental styles of gardening—carpet, bed, ribbon, geometrical, etc.

One of the most beautiful sights of the Exhibition was that of these flower-beds when in the full height of their bloom. At one time there were over 70,000 hyacinths, all in flower, of every hue and variety, which perfectly dazzled the eye with their brilliancy and loveliness.

But the most beautiful and striking of all the floral displays was the Rhododendron show, which took place in the canvas annex, just north of Horticultural Hall. This splendid collection was brought from England, and comprised over fifteen hundred plants, of fifty-two dis-

tinct and described varieties, all in bloom. The clusters were almost innumerable, and of all varieties of tint, from a pale lilac to a deep crimson.

Words afford no adequate means of describing this rich display of flowers which came back to us from England to outrival the descendant of their own common ancestry—the wild rhododendron of the mountain slopes of our own Alleghenies. The plants from which this magnificent collection were descended were taken from the United States about a hundred years ago, as the gentleman in charge informed us, and therefore exhibited the progress of a century of civilization in horticulture.

The universal popularity of window gardens, whether large or small, simple or elaborate, is the evidence of a growing taste for flowers and ornamental plants in all circles of society.

In European cities, the citizens indulge even more extensively and passionately in their plant pleasures than we do; every house is decorated, from the workingman's window and its few flower-pots of balsams, to the fernery and tile jardinieres of the aristocratic mansion.

The Fern case offers the very simplest of all means of household plant and pleasures. Many who cannot afford a greenhouse, or conservatory, or to go to the expense of fitting up a plant cabinet, will find an abundant solace in this simple and inexpensive method of growing window plants.

CHAPTER XXIX.

HUMORS OF THE CENTENNIAL.

The Deluge.

IT was no wonder that a small family party standing before the "Bridal of Neptune" in the Art Gallery were puzzled trying to make it out.

One of them, a young lady, evidently from Massachusetts, said :

"It is either the deluge, or the bursting of the Worcester dam."

"It can't be the delooge," said another of the party, "for that ain't the costoom of that period."

"Then it's the bursting of the Worcester dam, sure," replied the first young lady, and they all went on perfectly satisfied.

How He Came to See the Centennial.

While I was sitting in the Centennial grounds one day, there sauntered into the room a little boy, poorly but neatly dressed, whose bright face attracted me.

"Do you know," said I, "what picture that is?"

"That's the old Liberty Bell."

"And that?" pointing to another.

"That's old Independence Hall."

I got him to write his name in the visitors' book in a neat, childish hand—"Willie Ferguson, Memphis, Tennessee."

I exclaimed, "What! are you all the way from Tennessee? How did you come on?"

"A man brought me on, but when he got to Pittsburgh he left me, and I came on by myself."

"Did your papa and mamma come too?"

Sadly he said, "I have no father and mother."

"Had you any money?"

"No; I told the conductors I wanted to see the Centennial, and they brought me on."

"Well, what are you doing now, and where do you live?"

"I live in a big boarding house on Belmont avenue, over there, and I wash dishes, scour knives, and do chores."

"How did you get into the Centennial?" said I.

"Why, I paid my fifty cents, like anybody else."

"How are you going to get home?"

"Why, just the way I came on," he said, with a bright twinkle of his clear blue eyes.

And all the time he was standing with one little brown hand on the back of the chair, the other in his pocket, with a broad-brimmed hat stuck on the back of his curly head. With a few more questions on my part, to which he answered that he hoped to be a watchmaker when he grew up to be a man, he bade us goodbye, and started off again.

Taxidermist.

In the Centennial Agricultural Hall there were two immense hogs, stuffed, each bearing a placard telling its age and weight, and, with the name of the man who prepared them for exhibition, followed by the word "taxidermist."

A man and his wife were looking at these with great

interest. After reading the placards, the woman said: "Why, these are taxidermists. I thought they were hogs."

Her husband looked at the creatures with a puzzled expression, and then went carefully over the placards, as if to satisfy himself fully on the point. Finally he replied: "They are hogs. Taxidermist is the name of the place they came from."

Mock Soldiers.

Amusing blunders by visitors were made, it is said, with the figures in military dress. Many supposed them to be a guard posted there for the protection of goods. One young lady was caught in the act of flirting her handkerchief to a dashing young major in the collection.

"Take One."

During the Centennial a firm in Agricultural Hall had a lot of cards printed which they intended to put over their card cases in various parts of the hall, and on them was printed in large red letters, "Take One." Some graceless varlet passing along stole the whole package, and looking around saw a magnificent display of preserved fruits and pickles, from which the owner was unfortunately absent; he placed a ticket on each bottle and can, and then withdrew to observe the general result.

The first that came along was a fat old woman from Missouri. She paused for a moment, rubbed her spectacles, and then reached for a bottle of pickles; she went on a few steps and then returned and gobbled a can of peaches. Two hungry galoots from Kentucky followed in her wake, and off walked two packages of strawberries. A widow with four children next ap-

peared, and they went for some Bartlett pears and some raspberry jam. The news spread like wildfire, and in a few moments hundreds were rushing like mad toward the unfortunate stand. It was not long before the place was entirely stripped, and when the unlucky owner got back all that remained was the empty shelves over which were scattered cards that told the story of his ruin, inscribed with the motto, "Take One."

The Centennial Liar.

Old Mrs. Robertson, who had been to the Centennial, struck it on Pettingill, on her return, with a talk about the exhibition of national prosperity. She told him all about what she had seen, and then what each one of her party had seen. After asking about the butter-woman, and a hundred wonderful things that Pettingill had to say he didn't see, the old lady asked with much interest:

"Well, what *did* you see?"

"I saw," said Mr. Pettingill, looking at her intently, "I saw an ice-cream horse, life-size, galloping around the track."

"Oh, Mr. Pettingill!" said the old lady.

"Yes, madam, you may well say 'oh.' It was wonderful that you didn't see it, but then they took it back, to freeze it hard every five minutes, so you may have missed it."

"Oh, Mr. Pettingill!"

"Yes, madam, and I saw the lard eagle, of which you have spoken, and heard it scream—a wild scream of agony, like a bird that had been talked to death about the Centennial. As I left the grounds on Friday evening, it soared up, and flew off to Cincinnati."

"Oh, Mr. Pettingill!"

"Yes, madam, and I saw the carriage George Washington rode in, and three queens and a jack that he shoved under the seat when he sat outside of the church playing draw-poker, and Mrs. Washington lighted in on him earlier than he expected from a short sermon, and I saw a handful of his hair that Mrs. Washington took out of his head that identical Sabbath morning."

"Oh-h-h, *Mr.* Pettingill!"

"Yes, madam, and I saw the quilt worked by Queen Victoria and the Princess Beatrice, and all the other Princesses, and I counted the nineteen billion, four hundred and sixty-five stitches in it, while I was standing there."

"Oh, Mr. Pettingill!"

"Yes, madam, and I saw the silk-making machine, where you put in a silk-worm at one end and it comes out at the other a full-blown silk dress ready-made, with a live humming-bird in the back."

"Oh, Mr. Pettingill, wait till I go and call Emily to come in and hear all about it," and the old lady hurried out.

"I won't be here when she comes back," said Mr. Pettingill, taking up his hat in a hurry, "and so she may not hear all about it, but I am just determined when I am talking about this Centennial business to tell the truth, the whole truth, and nothing but the truth."

Doing the Centennial in One Day.

Enthusiastic Philadelphian, speaking to a friend from the rural districts: "Have you been to the Centennial, and what do you think of it?"

"Yes; it's magnificent; went all through it yesterday, and saw everything; it's a big show."

"Then you saw the $80,000 set of diamonds; beauties, ain't they?"

"Lem'me see; they are in Machinery Hall, ain't they? Yes, I remember them; they're very nice, but I ain't much on things of that kind; I like machinery better."

"Ah! then you must have been pleased with the immense Corliss engine?"

"I don't exactly remember it. Oh, yes, I do; it was in the Women's Pavilion. Yes, it's a mighty fine thing."

"My friend, I guess you and I saw things a little differently. But tell me, what do you really regard as the best thing in the Exposition?"

"Well, I think the 'Cheese of Paris,' don't you?"

"You mean the 'Siege of Paris,' don't you?"

"It looked like a cheese to me, and I thought it got its name from that."

"Oh, slight mistake. What else did you see to admire?"

"Heaps of things. The five-legged calf, the two-legged horse, the —"

"You have employed your time very profitably, and will be able to tell your friends all about it," interrupted the Philadelphian, as he bid his rural friend a hasty good-bye. And the man, so the story runs, went back to Bucks county, and told his wondering neighbors how he had done the Exposition in one day.

Japanese Prices.

Looking at the pottery in the Japanese bazaar, said a Centennial letter writer, I espied a flower-pot which struck my fancy, and I inquired the price.

"Four dollaire," was the response of the youthful Jap.

The price suiting as well as the article, I determined

to take it on my way out, and in the afternoon again approached the bazaar with that object. This time there was a leathery old Oriental in attendance, with a face like that of a wrinkled old monkey, who, being asked the price, answered:

"Eight dollaire!"

"No," I said, throwing up four fingers, "it was four dollars this morning."

The old heathen opened a mouth like a slit in a side of sole leather, and displaying a row of yellow fangs, ejaculated:

"Oh, noa, he is eight dollaire."

As I retreated I noticed in the little garden which surrounds the bazaar the same kind of flower-pot, in some of which were plants, and I tried the custodian of these, a sober, chestnut-complexioned Jap.

"How much are those?"

"Six dollaire."

Again I explained they were four dollars in the morning, but was only answered by a quiet grin, and—

"Six dollaire."

Approaching the bazaar once more I waited until the withered old swindler was called away for a few minutes, and then hailing the youngest and most amiable-faced Jap I could select, I touched the flower-pot and asked:

"How much?"

The youthful son of Japan picked it up, looked at it, trying to estimate its value, and then turning to me said, evidently at hazard:

"Four dollaire an half."

And I carried it off at the fourth price at which it had been offered me during the day.

CHAPTER XXX.

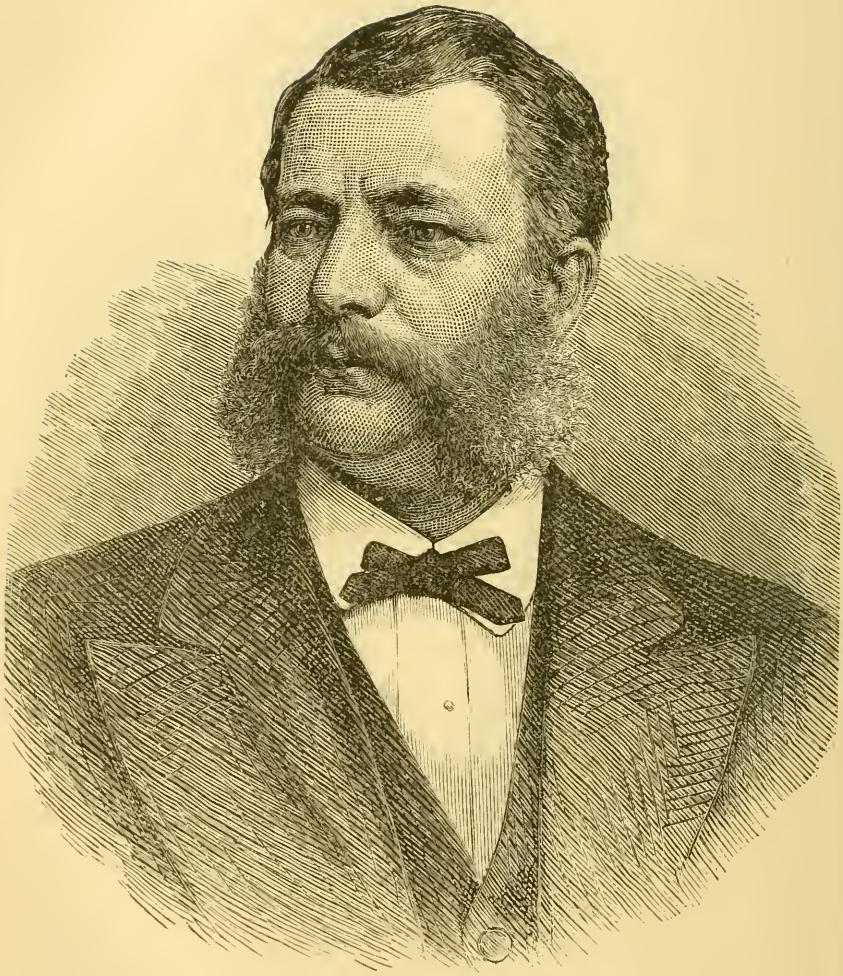
BIOGRAPHIES OF OFFICERS.

General Joseph R. Hawley, President of the Centennial Commission.

GENERAL HAWLEY was born in Stewartsville, North Carolina, on October 31st, 1826; and he spent his youth in the good old "Tar and Turpentine State." When only seven years of age, he was taken by his parents to Connecticut, and graduated from Hamilton College, New York, in 1846. Having read law, he began to practise at Hartford in 1860, and after a very successful career at the bar, became editor of the Hartford *Evening Press*. At the breaking out of the late war, he was chosen Captain of the first company of Connecticut soldiers that enlisted, and rose step by step, through merit, to the rank of Major-General of Volunteers. Since the war, he has been Governor of Connecticut and Representative in Congress, and as Governor, as member of Congress, and as a soldier in the army, he has achieved an honorable reputation for ability, bravery and administrative capacity.

On the organization of the Centennial Commission he was elected President, in 1871, and was re-elected to this responsible position each succeeding year. No one looking at the face of General Hawley can fail to see there the lineaments which say, as boldly as type can, that it is the counterfeit presentment of a man

HON. J. R. HAWLEY, PRESIDENT CENTENNIAL COMMISSION.



A. T. GOSHORN, DIRECTOR-GENERAL.

who will always succeed, and to whom the word fail is unknown. The distinguished part he has taken in bringing to such a glorious consummation our late Exhibition, proves him to have been the right man in the right place.

Alfred T. Goshorn.

The Director-General of the Centennial Exposition, and the master-spirit of the entire display, was Mr. Alfred T. Goshorn, who was born in Cincinnati in 1834, graduated at Hamilton College twenty years later, and who, preferring the profession of law, was admitted to the bar in 1856. Mr. Goshorn did not, however, continue in his chosen profession, but entered into manufacturing business, by becoming proprietor of a large white-lead establishment in Cincinnati.

Entering actively into politics, he was for some time a member of the city government, and of the local Board of Trade, and as a member of the executive committee of the latter organization interested himself in the Industrial Exhibition held in Cincinnati in 1870, of which he was made President, and of which, in its succeeding representative exhibitions, he continued to retain the management. In 1873 Mr. Goshorn was appointed to represent the State of Ohio in the United States Centennial Commission; and immediately after was called to the general direction of the Exposition.

During the year 1873 Mr. Goshorn repaired to Vienna, and there devoted much time and thought to the consideration of the Austrian International Exhibition. On his return to America he entered actively upon the duties of his important post, and soon displayed in his administrative ability, his executive power, and the wisdom of his judgment, as well as the comprehensiveness of his acquaintance with the subject,

a capacity which amply fulfilled the expectations felt in his appointment. All the details of the machinery of the Exhibition were carried out under his sagacious supervision. It is only justice to say that to Mr. Goshorn's admirable qualities are due very much of the success of the Exposition, and that to his guidance is greatly owing its progress to the perfection of excellence which it achieved.

John L. Shoemaker.

Mr. Shoemaker, the Solicitor of the Commission and Board of Finance, has been devoted to the service of the Exposition from the beginning, and his influence and personal character have been important adjuncts in its success. To him is due much of the liberality which was afforded by Philadelphia to the enterprise, while his legal judgment in his professional relations with the boards controlling the Exposition was constantly relied on throughout the progress of the work. Mr. Shoemaker was born in Dublin township, Montgomery county, Pennsylvania, on October 7th, 1832, and is descended from Peter Shoemaker, a prominent member of the Society of Friends, who settled in Germantown, near Philadelphia, where, in 1686, he built what is still known as "Shoemaker's first house," believed to have been the first house built in Germantown. Mr. Shoemaker came to Philadelphia in 1853, and read law; and in 1856 was admitted to the bar, where he has always been looked upon as an honor to the noble profession of law.

He was occupying the position in Council of Chairman of the Committee on Centennial, when, on January 20th, 1870, he made the first public speech and official motion in a legislative body for definite action looking

to the inauguration of the great Centennial movement of 1876.

His resolutions were adopted, and a joint special committee was appointed, with Mr. Shoemaker at its head. The work that Mr. Shoemaker accomplished to further the grandest project of the age—our late Centennial—will, perhaps, never be known. It was appreciated, however; for on May 25th, 1872, he was elected by acclamation Counsellor and Solicitor of the United States Centennial Commission.

Mr. Shoemaker's name will ever be connected with the first Centennial of American Independence.

Daniel J. Morrell.

Hon. Daniel J. Morrell was born at Berwick, Maine, August 8th, 1821, where his youth was spent on a farm, on which his ancestors settled more than a century ago, and his education acquired from Joseph Hoag, the great Quaker preacher. From 1837 to 1855 Mr. Morrell was engaged in mercantile pursuits in New York and Philadelphia, and after that assumed the management of the Cambria Iron Works, at Johnstown, Pennsylvania. He is one of the most eminent and successful manufacturers of Pennsylvania, and has been twice elected to Congress. The feature of his Congressional career, with which his name will longest be associated, was his introduction, on the ninth day of March, 1870, of a bill to provide for the celebration of the hundredth anniversary of American Independence. Upon the organization of the Centennial Commission, provided for in this Act of Congress, the services of Mr. Morrell were recognized by his selection as chairman of the executive committee of the Commission. How well he has fulfilled the expectations

of the country in this difficult position we need not here describe.

John Welsh.

To Mr. John Welsh, President of the Centennial Board of Finance, is due much of the credit for the energetic manner with which the affairs of the Exhibition were pushed forward and at last culminated in so splendid a triumph.

Mr. Welsh is a native of Philadelphia, where he was born in 1805. He was for many years a member of the firm of S. & W. Welsh, general shipping and commission merchants, on Delaware avenue. His reputation as a business man and as an executive officer was, at the time of his election, of the very highest character, and he has proved himself eminently qualified to fill the responsible and honorable position which he occupied over three years.

A successful and honorable man of business, he has been for many years identified with the interests of Philadelphia, and enjoys the confidence and esteem of his fellow-citizens. The best evidence of this was shown in the eagerness of the most prominent and wealthy of the citizens of Philadelphia to affix their names as sureties to the bond of $500,000, required for the faithful disbursement of the Congressional appropriation of $1,500,000. The services of one hundred gentlemen were accepted, and the bond, as filed, represented security at least ten times greater than the amount appropriated by Congress.

Hon. William Bigler.

Among the most active workers in the interests of the Exhibition, the name of ex-Governor William Bigler, of Pennsylvania, stands very prominent. He was

HON. D. J. MORRELL.

EX-GOVERNOR WILLIAM BIGLER.

born at Shermanburg, Cumberland county, Pennsylvania, in December, 1813. While very young, his parents moved to Mercer county, then an unsettled portion of the State. He and his brother John, afterwards Governor of California, received only the common school education of a rural district; but both had an early experience in a printing office, one of the best of schools. After a three years' apprenticeship Mr. Bigler moved to Clearfield, and established the Clearfield *Democrat*. In 1841 he was nominated for the State Senate, and elected by 3,000 majority, receiving every vote in Clearfield county, save one, an instance unparalleled in the annals of our country. In 1857 he was elected Governor of the State of Pennsylvania. He served in the Senate of the United States for six years. On the organizing of the Centennial Commission, to him was assigned the duty of organizing the State of Pennsylvania for the purpose of securing an additional half million in subscription to Centennial stock. To his strenuous efforts was largely due the increase to the subscriptions to the Centennial stock, and he took especial charge of raising subscriptions in New York city, where he was eminently successful.

He has devoted all his time and talents to the interests of the Exhibition, and to him the country is largely indebted for the success with which it was attended.

Frederick Fraley.

The name of Frederick Fraley has been for nearly half a century intimately connected not only with the progress of the city of Philadelphia and the State of Pennsylvania, but also with the great mercantile and commercial interests of the nation.

He was born in 1804, and received a fair classical

and business education. When still young, he became a member of the firm of Reeves, Buck & Co., in the hardware business. He afterwards was elected President of the Schuylkill Navigation Company, which position he filled for over a quarter of a century. As Trustee of the City Gas Works, Chairman of the Finance Committee of Councils, and many other important positions, he has been and is well known to all in Philadelphia. But it was as President of the National Board of Trade that he acquired a national reputation.

In the interest taken in the success of the Centennial enterprise, and the securing of a proper person to fill the responsible duties connected with the office of secretary and treasurer, attention was at once directed to Mr. Fraley, who, after some thought and consideration, consented to give up many other private duties to attend strictly and conscientiously to the labors connected with the office. Only through a thoroughly methodical system, based on years of experience, has he been able to perform the enormous amount of business that devolved upon him. Mr. Fraley has now the proud satisfaction of knowing and feeling that he has nobly and faithfully performed, at an amount of self-sacrifice that no one will ever know, the duties of, perhaps, one of the most responsible and onerous positions that was connected with the Exhibition.

Mrs. E. D. Gillespie.

Considering the noble part that the women of America took in awakening public sentiment and arousing the interest of the whole country in the success of our Centennial anniversary, this history of the Exhibition

would be, indeed, incomplete were we to omit the name of Mrs. E. D. Gillespie from this chapter.

To the untiring zeal and enthusiasm with which Mrs. Gillespie, the President of the Women's Executive Centennial Committee, devoted her energies from the inception to the final closing scenes of this enterprise, is due, in a large measure, the success which crowned the efforts of the American women.

Mrs. Gillespie is the daughter of William J. Duane, formerly Secretary of the Treasury, and the great-grand-daughter of Benjamin Franklin; and adds to this hereditary talent great natural executive ability.

On the organization of the women's executive committee, three years ago, Mrs. Gillespie was elected its president, and the amount of work that was accomplished by and through the agency of this committee was enormous. From the first inception of the great enterprise, they applied their energies to the raising of means for the general purposes of the Exhibition by securing subscriptions to the stock of the Board of Finance. The contributions raised by the women alone towards this general fund amounted to over $95,000. After doing this, the women's executive committee concentrated their energies on raising funds sufficient to erect a building to be specially devoted to the exhibition of women's work in all its branches. For this purpose they raised over $30,000 additional, making in all $126,000; and the result of their labors was the Women's Pavilion, one of the most elegant and beautiful adornments of the Centennial Grounds.

John L. Campbell.

Mr. John L. Campbell may be regarded as the father of the Centennial movement, as we believe him to

have been the first who suggested the idea of exhibiting the progress of our nation in the century that has passed, by holding an International Exhibition in the "Birth-place of Liberty." This was done in a letter written by him so far back as December, 1866, to the Mayor of Philadelphia. It is proper, therefore, that in a complete history of the Centennial enterprise, the name of John L. Campbell should be honorably mentioned. He is a native of the State of Indiana, of which he is one of the most honored and respected citizens. He was born at Salem, October 13, 1827, and was educated at Wabash College, from which institution he graduated with high honors in 1848, to become a tutor and afterwards a professor. He studied law and was admitted to the bar in 1853, but never entered upon the active practice of his profession, for soon after he had finished his legal studies, he was appointed Professor of Mathematics and Natural Philosophy in Wabash College.

As Mr. Campbell had taken such an active part in originating and advocating the plan for the Exhibition, it was natural that he was made a member of the United States Centennial Commission. When it became necessary to have a permanent secretary, the Commission selected Professor Campbell for the position; and his erudition, sound judgment, industry, experience, and indomitable spirit have enabled him to surmount the many obstacles which, at the outset, seemed for a time to threaten the success of the scheme, and to carry it through to its final grand consummation.

H. J. Schwarzmann.

The Chief Architect of the Exhibition was Mr. Schwarzmann, who was born in 1843, in Munich, and

is the son of the celebrated Bavarian fresco-artist. Educated at the Munich Military Academy, he served in the Bavarian army in 1866, but in the following year came to this country. He was employed as landscape architect in laying out Fairmount Park, the Zoological Museum, and other grounds in Philadelphia; and in 1873 visited the Vienna International Exhibition, in behalf of the Fairmount Park Commissioners. Mr. Schwarzmann was the author of the plans which were finally adopted for Memorial and Horticultural Halls, and also the designer of the Judges' Hall, Women's Pavilion, Pennsylvania State Building, German and Brazilian Pavilions, the annexes to the Main Building and Art Gallery, the Photograph Building, and numerous other small structures on the grounds. He also had charge of the water and gas supply, laying out of the walks, and other important duties.

David G. Yates.

Mr. Yates had an arduous and most difficult position to fill in his charge of the Department of Admissions; and that he filled it with universal satisfaction is a high compliment to his patience, judgment, and courtesy. This gentleman was born in Philadelphia, in 1835, and, after studying the art of portrait-painting, finally adopted that of engraving, and established himself in this business in New York, in 1856. At the beginning of the war he accepted a position in the pay department of the United States Treasury in Washington; but after two years returned to the business of engraving in Philadelphia.

CHAPTER XXXI.

DISTRIBUTION OF AWARDS AND CLOSING CEREMONIES.

THE ceremonies attending the distributing the lists of awards, indorsed by the United States Centennial Commissioners, among the chief commissioners of the various countries represented at the Exhibition, were only of less importance than the opening and closing ceremonies, and were very imposing and interesting. They took place on the evening of September 27th in the main hall of the Judges' Pavilion. This had been enlarged by having a number of the smaller apartments thrown into one, and the whole space was very tastefully decorated with the flags of all nations, bunting, flowers, vases and statuary. Opposite the platform, which was on the northern side, and beautified with plants and flowers from the Horticultural Building, was placed the Century Vase, which we have elsewhere described as having been one of the principal attractions of the Main Building.

The room was crowded to its utmost capacity, and there could not have been less than 2,000 persons present. The galleries were filled with ladies, and were decorated with Chinese lanterns.

Punctually at 8 P. M. the Hon. Daniel J. Morrell, President of the Executive Committee, appeared, and was escorted to the platform, where he took his seat as the presiding officer for the evening. The Honorable Board of Judges, with their chief, General Francis A. Walker, next entered, and were similarly received.

Then came the Director-General (Mr. Goshorn), the Foreign Commissioners, the officers of the Centennial Guard, followed by the Presidents of the Centennial Commission and Centennial Board of Finance, leading the Diplomatic Corps.

All the foreign governments—more than thirty in number—which had so cordially co-operated in our great memorial enterprise, were present in the persons of their commissioners and diplomatic representatives; the members of the Centennial Commission and Boards, and numerous officials, representing national, State and local governments, all manifesting the deep interest they felt by their presence on this occasion.

After prayer by the Rev. Dr. Boardman, and a beautiful anthem by the Temple Quartette, of Boston, the Hon. Mr. Morrell delivered the opening address, at the conclusion of which the orchestra performed a medley of national airs, the entire audience rising to each of the following: "God Save the Queen," the "Marseillaise," the Austrian National Hymn, "Die Wacht am Rhein," the Russian and Spanish national airs and "Hail Columbia." But it was with the advent of "Yankee Doodle" that all the enthusiasm of which the audience seemed capable was manifested, they clapping their hands and singing the venerable song in time with the orchestra. The chairman then introduced the Director-General, who was received with great applause, which was repeated during his address, the audience rising to give it.

This was followed by two more pieces by the Temple Quartette, after which the Hon. Joseph R. Hawley, President of the Centennial Commission, to whom had been assigned the duty of delivering the awards, made the following address. It so ably and concisely describes the labors of the Board of Judges that we give it in its entirety:

President Hawley's Speech.

GENTLEMEN:—We have reached another interesting step in the progress of the International Exhibition of 1876. The importance of the work which culminates this evening has been felt by the Commissioners from the beginning. It has never been thought possible to devise or carry out a system of awards that would render absolute justice or obviate criticism, but it was believed that we could, by the plan with which you are familiar, get nearer that result than did our predecessors in other exhibitions. We departed from the usual system of international juries, and called to our assistance one hundred and twenty-five judges from the United States, and an equal number from foreign nations, all selected for their known character and qualifications. Our method also dispensed with graduated medals. It required written reports recommending awards based upon merit, the elements of merit, in the language of the Commission, including "considerations relating to originality, invention, discovery, utility, quality, skill, workmanship, fitness for the purpose intended, adaptation to public wants, economy and cost." The articles exhibited were classified in twenty-eight groups, and to each of these groups a competent number of judges, foreign and American, was assigned. They entered upon their duties May 24. Each group chose a president and secretary, and called to its aid such reporters and experts as were needed. The rules required that the report upon each article or subject should be signed by some one judge and countersigned by at least a majority of his associates in that group. No limitation has been imposed upon the number of the awards. It is apparent that of twenty articles submitted each might be worthy of honor for peculiar merit, or, on the other hand, it might happen that none would deserve special mention. The Chief of the Bureau of Awards, General Francis A. Walker, represented the Commission in its relations with the judges, interpreting and applying the rules, and conveying the decisions of the Commission upon questions that arose from time to time. He classified the reports and prepared them for consideration by the Commission. That body has read every one of the reports, either in committee of the whole or in large sub-divisions thereof. The task is not quite complete. A few reports are not ready for our examination. Final action upon others is delayed by reason of such oversights, alleged violations of the

rules, duplications, overlappings or technical errors as may be expected in so large a mass of work by two hundred and fifty gentlemen, working in twenty-eight groups. The Commission has formally approved reports and awarded thereon the uniform medal and diploma. The lists of awards that we present this evening are classified by nationalities. The lists given to the press are arranged under three several groups. The preparation of diplomas, medals and certified copies of the full reports in each case must necessarily be a work of more time. It was deemed just to the exhibitors to announce the principal facts as speedily as possible. Among the many to whom we feel personally grateful stand prominently the tens of thousands of exhibitors. While commercial and purely material motives and considerations are appealed to in order to induce their participation, it is quite evident that a large part are here on this occasion, somewhat peculiar in the history of great exhibitions, not alone from the United States, but from many nations, chiefly that they may testify their good-will in this our festival year of the country. And then there are many purely governmental exhibits not subject to competitive examination that will nevertheless receive the highest of awards—the continuing gratitude of the whole American people. The special manifestations of friendly interest and cordial good-will presented by many sovereigns can never be forgotten, and they will do much to perpetuate international friendships.

The Commissioners take this opportunity to express their very great pleasure over the happy relations between us and all the gentlemen of the foreign Commissions. It cannot be that anything yet to happen will disturb them. Should heaven continue to smile upon this enterprise, we shall all have great reason to thank Almighty God for this opportunity to make common property of the latest developments for the good of mankind and strengthen the bonds of peace and friendship now happily existing between the United States and all the world.

Gentlemen, I have no order of precedence among you. If any are warmer friends than others, I trust they are those with whom we have sometimes quarrelled. I proceed to deliver your several lists of awards in alphabetical order.

The presentation of the awards was then proceeded with, the name of each country represented at the Ex-

hibition being first called, after which the name of the Chief Commissioner of that country.

This was made an occasion for hearty complimentary applause in honor of each nation, as the representative went up to the platform in turn to receive the list of awards, and shake hands with General Hawley. Brazil, China, Japan, Germany, Netherlands, Russia and Switzerland were especially applauded. The reading out of the name of the Commissioner of Great Britain was the signal for a storm of applause; but this was even surpassed when the Director-General received the large list of awards to exhibitors from the United States.

The system of awards which has been carried out at our Exhibition differed from that of former international exhibitions. Heretofore competition by comparison was the rule, and medals of gold, silver and bronze, with diplomas, were awarded, the degrees of merit in articles of the same class being determined by the relative value of the prizes awarded. At this Exhibition all the medals were of bronze, the same size, weight, material and design, and of the same value. There were no first, second and third premiums. Each medal carries with it a diploma, and the peculiar advantage of the system is that this diploma, embodying the report of the judges, states why the award is given, and the exhibitor is allowed to reproduce it as he may feel inclined.

The medal is four inches in diameter, the largest of the kind ever struck in this country. In the centre of the face is a female figure, representing America, seated on an elevation and holding a crown of laurels over the emblems of industry that lie at her feet. At equal distances apart on the outside zone of the face are four other female figures in bas-relief, which, with appropriate symbols, represent America, Europe, Asia and

Africa, respectively. The reverse side has in the centre the words: "Awarded by the United States Centennial Commission," and on the outside zone: "International Exhibition at Philadelphia, MDCCCLXXVI"—all in raised letters. The zone on each face is separated from the inner area by a wreath of laurels.

The number of exhibitors to whom awards have been given is about 12,000. We refrain from giving any list, however, both from their list not being even yet complete, and also because the lists themselves are nothing more than a record of those who have received an award and that the position of names in the list is no indication of the character of the Judges' reports on the exhibits.

Statistics of Admissions.

Before giving the closing ceremonies of our grand Exposition, we annex a tabular statement showing the number of admissions from the opening day up to November 10th, inclusive:

MONTHLY ADMISSION

From May to November.

MAY.

	Comps.	Exhib's.	Cash.
Wednesday, 10	Estim'd	Estim'd	76,172
Thursday, 11	2,001	2,274	14,722
Friday, 12	162	2,306	10,252
Saturday, 13	357	4,847	11,658
Monday, 15	367	4,585	10,896
Tuesday, 16	305	5,702	7,056
Wednesday, 17	387	6,208	12,117
Thursday, 18	440	6,325	11,054
Friday, 19	480	7,047	16,109
Saturday, 20	546	7,379	18,191
Monday, 22	540	7,928	12,402
Tuesday, 23	579	7,518	17,552
Wednesday, 24	655	8,997	20,538
Thursday, 25	586	6,749	19,821
Friday, 26	587	6,740	16,792
Saturday, 27	540	7,079	20,091
Monday, 29	493	6,772	16,202
Tuesday, 30	637	6,905	41,111
Wednesday, 31	634	8,280	26,249
Total	10,344	113,671	378,980
Grand total for May			613,495

JUNE

	Comps.	Exhib's.	Cash.
Thursday, 1	630	7,046	23,200
Friday, 2	654	8,513	26,687
Saturday, 3	560	7,889	22,292
Monday, 5	775	9,769	27,555
Tuesday, 6	652	9,619	28,354
Wednesday, 7	672	10,203	31,673
Thursday, 8	647	8,799	31,634
Friday, 9	683	8,926	24,693
Saturday, 10	674	9,129	28,948
Monday, 12	715	8,835	21,379
Tuesday, 13	636	8,701	24,223
Wednesday, 14	672	9,279	29,812
Thursday, 15	755	8,887	31,937
Friday, 16	663	8,804	25,903
Saturday, 17	642	8,870	25,902
Monday, 19	734	8,647	23,372
Tuesday, 20	669	8,662	27,204
Wednesday, 21	690	9,075	32,134
Thursday, 22	676	9,229	39,386
Friday, 23	690	8,922	37,693
Saturday, 24	661	8,987	25,103
Monday, 26	813	10,856	21,120
Tuesday, 27	643	9,580	20,340
Wednesday, 28	722	10,256	23,569
Thursday, 29	738	10,319	27,044
Friday, 30	586	11,037	24,541
Total	17,622	238,889	695,666
Grand total for June			952,177

JULY.

	Comps.	Exhib's.	Cash.
Saturday, 1	769	10,650	26,410
Monday, 3	958	11,355	47,786
Tuesday, 4	565	9,639	46,290
Wednesday, 5	917	10,084	51,825
Thursday, 6	661	10,861	46,088
Friday, 7	638	10,415	33,746
Saturday, 8	570	10,247	23,207
Monday, 10	460	10,066	19,133
Tuesday, 11	412	10,101	20,645
Wednesday, 12	420	9,891	20,575
Thursday, 13	390	9,676	18,352
Friday, 14	405	9,849	18,333
Saturday, 15	374	9,653	16,057
Monday, 17	520	9,847	18,270
Tuesday, 18	534	9,547	19,184
Wednesday, 19	516	9,503	18,729
Thursday, 20	429	8,826	16,681
Friday, 21	476	9,202	17,714
Saturday, 22	446	9,349	16,941
Monday, 24	557	10,095	20,778
Tuesday, 25	509	9,086	21,914
Wednesday, 26	493	9,493	22,929
Thursday, 27	511	9,468	24,846
Friday, 28	520	9,537	18,924
Saturday, 29	490	9,452	15,952
Monday, 31	415	10,142	15,207
Total	13,955	255,974	636,518
Grand total for July			906,447

AUGUST.

	Comps.	Exhib's.	Cash.
Tuesday, 1	444	9,260	22,195
Wednesday, 2	428	9,176	24,246
Thursday, 3	454	9,339	27,940
Friday, 4	447	9,329	25,015
Saturday, 5	426	9,570	22,304
Monday, 7	398	10,113	23,401
Tuesday, 8	391	9,069	24,059
Wednesday, 9	376	9,262	29,930
Thursday, 10	346	8,897	26,154
Friday, 11	374	9,241	25,893
Saturday, 12	346	9,503	22,314
Monday, 14	404	9,812	22,664
Tuesday, 15	412	9,059	25,346
Wednesday, 16	386	9,113	28,460
Thursday, 17	306	8,963	27,197
Friday, 18	368	9,150	25,789
Saturday, 19	352	9,252	54,045
Monday, 21	437	9,981	28,981
Tuesday, 22	353	9,319	32,027
Wednesday, 23	381	9,415	40,115
Thursday, 24	479	10,248	56,325
Friday, 25	387	9,426	32,298
Saturday, 26	383	10,075	97,172
Monday, 28	369	10,057	34,799
Tuesday, 29	375	9,767	41,320
Wednesday, 30	352	9,778	43,607
Thursday, 31	360	9,982	45,800
Total	10,534	256,096	908,684
Grand total for August			1,175,314

SEPTEMBER.

	Comps.	Exhib's.	Cash.
Friday, 1	414	9,807	34,199
Saturday, 2	424	10,304	58,591
Monday, 4	808	10,484	35,671
Tuesday, 5	471	10,011	50,426
Wednesday, 6	459	9,805	53,559
Thursday, 7	492	9,921	59,566

SEPT.—*Continued.*

	Comps.	Exhib's.	Cash.
Friday, 8	500	10,050	50,754
Saturday, 9	552	11,064	99,984
Monday, 11	448	10,630	40,838
Tuesday, 12	472	10,402	59,089
Wednesday, 13	532	10,777	72,535
Thursday, 14	554	11,075	78,997
Friday, 15	511	10,816	65,836
Saturday, 16	482	11,200	91,914
Monday, 18	449	11,043	62,832
Tuesday, 19	512	11,121	92,626
Wednesday, 20	516	11,186	100,749
Thursday, 21	597	11,824	118,719
Friday, 22	450	11,216	86,221
Saturday, 23	380	10,585	83,901
Monday, 25	511	11,445	66,317
Tuesday, 26	444	10,986	78,546
Wednesday, 27	1,128	11,661	89,654
Thursday, 28	1,314	16,007	251,332
Friday, 29	473	10,933	71,705
Saturday, 30	415	11,008	103,385
Total	14,308	285,391	2,055,916
Live Stock	1,206	7,793	75,075
Grand total for September			2,439,689

OCTOBER

	Comps.	Exhib's.	Cash.
Monday, 2	480	11,759	65,865
Tuesday, 3	1,020	11,254	77,741
Wednesday, 4	474	11,269	87,640
Thursday, 5	463	11,339	88,977
Friday, 6	513	11,531	76,148
Saturday, 7	457	11,746	72,869
Monday, 9	497	12,145	71,736
Tuesday, 10	492	11,531	79,449
Wednesday, 11	499	12,049	93,622
Thursday, 12	1,583	12,162	100,633
Friday, 13	483	11,685	81,047
Saturday, 14	....	12,414	77,389
Monday, 16	....	12,871	74,657
Tuesday, 17	....	12,146	92,938
Wednesday, 18	....	14,097	124,777
Thursday, 19	....	15,052	161,355
Friday, 20	....	13,530	94,135
Saturday, 21	....	12,113	72,929
Monday, 23	....	12,333	73,924
Tuesday, 24	....	12,237	88,520
Wednesday, 25	....	12,303	106,986
Thursday, 26	....	13,361	122,300
Friday, 27	....	12,517	95,563
Saturday, 28	....	12,242	78,780
Monday, 30	....	14,540	80,039
Tuesday, 31	....	12,132	81,867
Total	....	329,349	2,331,530
Live Stock	161	1,854	12,703
Grand total for October			2,663,879

NOVEMBER.

	Comps.	Exhib's.	Cash.
Wednesday, 1	....	12,763	107,715
Thursday, 2	....	12,724	115,298
Friday, 3	....	12,297	83,894
Saturday, 4	....	12,917	84,130
Monday, 6	....	12,881	77,936
Tuesday, 7	....	11,806	76,101
Wednesday, 8	....	12,539	90,588
Thursday, 9	....	16,154	176,924
Friday, 10	....	15,354	106,367
Total	....	119,435	918,956
Grand total for November			1,038,391

The record for the six months is as follows:

Month.	Days.	Paid.	Total.	Receipts.
May...	19	378,980	613,495	$189,490 35
June...	26	695,666	952,177	347,833 40
July...	26	636,518	906,447	318,199 25
Aug...	27	908,684	1,175,314	415,659 25
Sept...	26	2,130,991	2,439,689	928,056 00
Oct....	26	2,334,530	2,663,879	1,160,811 50
Nov. ..	9	918,956	1,038,391	453,700 00
Total..	159	8,004,325	9,789,392	$3,813,749 75

A recapitulation of the above shows the following:

Number of days open	159
Paid admissions	8,004,325
Free admissions	1,785,067
Total admissions	9,789,392
Grand total of receipts	$3,813,749.75
Average daily cash admissions	50,341
Average daily total admissions	61,568
Average daily receipts	$23,935.85

Let us make some comparisons between our Exhibition and former World's Fairs.

At the Vienna Exposition, the most recent instance, the roster of visitors for the whole period of 186 days, the Exhibition having been kept open there on Sunday, shows the following totals:

Total pay admissions (Vienna), 186 days	3,492,622
Total non-paying admissions	3,247,878
Aggregate admissions of all kinds	6,740,500

Of the other Exhibitions, we can only give the *aggregate* number of visitors, being unable to separate the paying from the non-paying. The whole number who attended the London Exhibition of 1851 was 6,039,195 in 141 days. The aggregate admissions of all kinds to the Paris Exhibition of 1855 was 5,162,330 in 200 days. The aggregate numbers of all kinds attending the London Exhibition of 1862 were 6,211,-103 in 171 days. At the Paris Exhibition of 1867 the whole number of admissions of all kinds was reported at 8,805,969, during a period of 217 days.

The greatest number of visitors on any one day has been as follows at the different International Expositions:

Philadelphia.....257,169, on Thursday, September 28, 1876.
Paris .....173,923, on Sunday, October 27, 1867.
Vienna.....135,674, on Sunday, November 2, 1873.
Paris .....123,017, on Sunday, September 9, 1855.
London.....109,915, on Tuesday, October 7, 1851.
London..... ..... 67,891, on Thursday, October 30, 1862.

Philadelphia, it will be seen, surpassed Paris 83,246.

Considering that Paris has 150 per cent. more population than Philadelphia, and that France contains ten times the population of Pennsylvania, and almost as large a population as the United States, the "turn out" at Philadelphia on the 28th of September was as extraordinary as unprecedented.

The Four Great Days

Were May 10th, the opening day; Fourth of July; Pennsylvania Day, September 28th; and the closing day, November 10th.

The number of paying admissions on May 10th was 76,172, but it is impossible to give the precise number of the free, owing to the imperfect working of the turnstiles. It has been variously estimated at from 150,000 to 200,000. The latter figure is probably the safer to adopt. The number of visitors to the Exhibition on the Fourth of July was 56,494, of which 46,290 paid. Pennsylvania Day drew 274,919 visitors, of which 257,169 paid.

The State Days.

Next in importance to the four days just described came the eight other State days, each of which was the occasion of a reception in the State building by the Governor, and in most instances of an oration on the history, progress and resources of the State. The number of visitors on each State day exceeded that of

any other day of the week in which the celebration occurred. The following is the complete list of the State days, with the official report of the admissions on each:

	Free.	Cash.	Total.
New Jersey, August 24	10,727	56,325	67,052
Connecticut, September 7	10,985	64,059	75,044
Massachusetts, September 14	12,073	85,795	97,868
New York, September 21	12,585	122,003	134,588
Pennsylvania, September 28	17,750	257,169	274,919
Rhode Island, October 5	11,886	89,060	100,946
New Hampshire, October 12	13,881	101,541	115,422
Delaware and Maryland, Oct. 19	15,052	161,355	176,407
Ohio, October 26	13,361	122,300	135,661

The Number of Exhibitors.

The total number of exhibitors in the Centennial Exhibition reached 30,864, and were distributed among fifty countries of the world. The United States headed the list with 8,175 exhibitors; Spain and her colonies came next with 3,822; Great Britain and her dependencies sent 3,584 exhibitors; and Portugal stands fourth with 2,462.

By Departments.

The classification embraces seven different departments, among which the exhibitors are distributed as follows, the first column giving the number of exhibitors in each department from the United States, and the second column the number in each department for the entire Exhibition:

Departments.	American Exhib's.	Total Exhib's.
1—Mining and Metallurgy	644	2,129
2—Manufactures	2,246	8,760
3—Education and Science	381	2,490
4—Art	1,784	4,900
5—Machinery	1,606	2,260
6—Agriculture	1,474	10,217
7—Horticulture	40	108
Total	8,175	30,864

The following statement gives the total number of exhibitors, and the number of American exhibitors at each of the International Expositions which have been held since the system was inaugurated in 1851 at London:

	American Exhib's.	Total Exhib's.
1851—London	499	13,937
1853—New York	2,083	4,685
1855—Paris	144	20,839
1862—London	228	28,653
1867—Paris	705	42,217
1873—Vienna	922	.....
1876—Philadelphia	8,175	30,864

Centennial Revenues.

The Centennial revenue, independent of that from governmental appropriations, subscription to stock and receipts for admissions, was derived from three sources: contracts for concessions, royalties on beer and soda water, and percentages of the receipts of business parties holding concessions. The total amount realized from concession contracts up to May 10th—and few, if any, such contracts were made after that date—is over $290,000, divided as follows among the parties purchasing privileges: The Centennial Catalogue Company, $100,000; Lauber's, the Lafayette, George's Hill, Southern, Trois Freres, and the American Restaurants, each $6,000, or $36,000 in all; Fleming, the tobacconist, $18,000; Rolling Chair Company, $13,000; the soda water venders, $20,000; Department of Public Comfort, $8,500; Centennial Photographic Company, $3,000; Centennial Guide Book Company, $5,000; the Dairymen's Association, $3,000; Virginia Tobacco Manufactory, in Machinery Hall, $3,000; Vienna Bakery, $3,000; proprietor of the pop-corn stands, $8,000;

Gillinder & Sons' glass works, $3,000; Whitman's confectionery stands, $5,000; Centennial National Bank, $5,000; Globe Hotel, $10,300; California Wine Booth, $5,000; Farrell & Co.'s safe deposit in the Main Building, $5,000; Hazelhurst & Young's cut-flower stands, $3,000; American Fusee Company, $1,000; and the following cafes: Glenn's, $5,000; Rudolph & Walter's, $5,000; Cafe Leland, $5,000; Walter & Sinzheimer's, $5,000; Davis', $3,000; Koster & Sinzheimer's, $3,500; Shuster's, $3,000; Mrs. Weaver's (confectionery), $1,500, and Whitney's, $1,400. In addition to the foregoing, the Pacific and Atlantic Telegraph Company paid to the committee 20 per cent. of their receipts for messenger service and 50 per cent. of their other receipts, and the American District Telegraph Company paid 10 per cent. of its receipts for messenger service. Up to the 10th of November the total receipts from royalties on beer and soda water, and from percentages on sales and other business, amounted to $200,010.75, to which may be added probably $5,000 for balances now unpaid, including sums due by the Centennial Photographic Company and the Narrow Gauge Railway, the latter having contracted to pay the Committee 10 per cent. of its gross receipts. From the foregoing it appears that the grand total receipts from these three sources will amount to about $495,000. We may briefly summarize the probable receipts and expenditures as follows:

The first outlay of $7,000,000 will be about covered by the following receipts:

Pennsylvania's appropriation	$1,000,000
Philadelphia's "	1,500,000
Concessions, gifts, and interest	500,000
Stock subscriptions	2,500,000
National appropriation	1,500,000
Total	$7,000,000

The total cash receipts for admissions amounted to about $3,813,750.00; and the total expenses, outside of the $7,000,000 above named, to over $1,830,000. According to this there should be a net profit of about $2,000,000. Probably the cost of the transportation bureau, yet to be ascertained, will be covered by the proceeds of the sale of buildings. It has been semi-officially stated that a dividend of at least fifty cents on the dollar will be declared on the stock, and the projectors of the Permanent Exhibition are taking this stock at the above rate.

Closing Ceremonies.

And now we have reached the close of this, the grandest Exposition of Industry, Art, and Progress, that the world has ever seen.

The formal official ceremonies, which so impressively and appropriately marked the occasion, took place, as had been announced from the commencement, punctually on November 10th, 1876, in the presence of the President of the United States and his Cabinet, the Centennial Commission, and Board of Finance, Foreign Representatives, Governors of many of our States and Territories, United States Senators, and members of the House of Representatives, the Supreme Court of the United States, Mayors of fifty-five cities, Women's Centennial Committee, and many other distinguished bodies.

It had been originally intended to have had the ceremonies take place in the open air, and arrangements had been made for this purpose, by erecting a large platform in front of the western end of the Main Building, which was very handsomely decorated with

flags of all nations. The weather, however, was unpropitious, and as it grew worse as the day wore on, a cold, drizzling, disagreeable rain having set in, it was determined to hold the ceremonies in the Judges' Hall, which was well packed by one o'clock. The gallery was occupied by the orchestra of 110 performers, and a chorus consisting of 450 ladies and gentlemen, selected from all the vocal societies in Philadelphia.

By two o'clock the platform, in the northern end of the hall, was occupied by President Grant and a host of other distinguished and privileged personages, conspicuous among them being Sir Edward Thornton, the British Minister, who wore his court dress to do honor to the occasion.

The ceremonies opened with the performance by the orchestra of Wagner's Grand Inauguration March, after which the Rev. Joseph A. Seiss, of Philadelphia, offered a very eloquent and fervent prayer. The chorus, accompanied by the orchestra, then sang a chorale and fugue from Bach.

Hon. D. J. Morrell, United States Centennial Commissioner for Pennsylvania, and Chairman of the Executive Committee, was now presented by General Hawley, who acted as Master of Ceremonies, and after the hearty applause with which he was greeted had subsided, spoke as follows:

On the 9th day of March, 1870, it was my privilege to introduce in Congress a bill to provide for holding in the city of Philadelphia the Exhibition which this day brings to a close. On the 3d of March, 1871, that bill became a law, but not without opposition and amendments, which took from it all provisions for carrying out the purpose contemplated by the act itself. On the 4th of March, 1872, the Centennial Commission met and organized, and the labor of preparing for the Exhibition was commenced, in the

face of obstacles such as were never encountered in a similar undertaking.

The government had refused aid; local jealousies were powerful; the newspapers of the country, with few exceptions, were lukewarm or openly hostile, and the mass of the people could not be interested in an event which seemed far away in the future. During the first year of the life of the Commission doubt everywhere prevailed, and I am ashamed to say, I shall strive to forget, and I hope that history will not record, how few had faith in the success of our enterprise, and how many wise and eminent citizens rendered a hesitating support, or refused to commit themselves to what, to them, seemed a hopeless cause. In this time of gloom the city of Philadelphia was not afraid to charge itself with the expenses incident to the organization and labors of the Commission, and in this, and all other official acts, her municipal authorities have shown courageous liberality.

The creation of the Board of Finance was the turning-point in the fortunes of the Centennial Exhibition; from that moment its prospects brightened, and, though that Board was confronted with a financial panic and other discouraging events, its executive officers moved forward in the confidence that "knows no such word as fail." By slow and laborious stages public interest was aroused; the Women's Centennial Commission labored with zeal and efficiency; money from private subscriptions to the stock of the Board of Finance flowed into the treasury; the State of Pennsylvania and the city of Philadelphia made liberal appropriations for the uses of the Exhibition, of which a memorial will remain to future Centennials; and, when success was assured, the National Congress recognized its duty and gave us material aid.

"As a woman who is in travail hath sorrow," but afterwards "she remembereth no more her anguish for the joy that a man is born into the world," so the pangs of this great labor are far away and lost in this hour of its triumph.

It is but just, however, in speaking for the executive officers of the Centennial Commission, that I should point the future historians of the Exhibition to the great difficulties which have been encountered and overcome, and claim from them a charitable criticism. In comparing this work with that which has been done elsewhere, I beg them to note that this has been accomplished by the voluntary agents of a free people, clothed with no official or titular prestige or distinction, and without governmental support.

The members of the Commission and the Board of Finance have recognized that they were on exhibition as fully as any material object enclosed within these grounds; that thousands of eyes would scan their every act, after the fashion of these times, which is to attribute mercenary or corrupt motives to all engaged in the execution of public trusts; and I shall esteem above the prizes the nation has won in the Exhibition, an award from that higher group of judges which represents the conscience of the world that this work which we to-day commit to history is free from taint, that good men shall say it was honest. The managers of future Centennial celebrations to be held on these grounds will see and do things more wonderful than our wildest dreams, and the remnants of our finest things may be exhibited by them as proofs of the rudeness of early days; but in the records we have made the full measure of our manhood will go down to them untouched by the gnawing tooth of Time.

Of the Exhibition, now to be numbered with the things of the past, it is difficult to speak. The nations are here; they have made this great spectacle what it is, and they deserve the gratitude of the American people. While they have taught much, they have also learned something, and they have seen in the crowds of American citizens, of all occupations and conditions of life, who have thronged these grounds, a polite, orderly, self-respecting and self-governing people. So far as their representatives have entered into our social life we will hope that they have found that what may be lacking in form is made up in substance; that the simplicity of republican manners is dignified by the sentiment of good-will to men.

The Exhibition was opened by starting in motion the Corliss engine, that giant of wonder to all, which for six months, with equal pulse, without haste, without rest, has propelled an endless system of belts and wheels. Silent and irresistible, it affects the imagination as realizing the fabled powers of genii and afrit in Arabian tales, and, like them, it is subject to subtle control. When these our ceremonies here are ended, the President of the United States, by the motion of his hand, will make the lightning his messenger to stop the revolution of its wheels, and at the same instant to tell the world that the International Exhibition, which marked the Centennial of American national life, is closed.

At the conclusion of this address, Dettingen's "Te Deum" was given with great effect by the Centennial

Chorus, after which the Hon. John Welsh, President of the Board of Finance, was introduced. His appearance was the signal for a storm of most enthusiastic applause, which having gradually subsided, he delivered the following eloquent address:

FELLOW-CITIZENS:—In this closing scene of the International Exhibition, I may well give expression to the grateful emotions which swell my heart, that all who have shared in the labor of its preparation and conduct, in your approval of it meet their coveted reward. The predictions of evil which were made of it—and by many in high places—have not been realized. The nation has not been dishonored. The good name of its people has not been imperilled. This day witnesses that the noble purpose of its projectors has been accomplished. It has hallowed the Centennial year by an inspiration of the past. The circumstances attendant on the nation's birth have been recalled. The patriotic impulses of the people have been quickened. Their love for their country has been strengthened.

The Exhibition has concentrated here specimens of the varied products of the United States, and made better known to us our vast resources. It has brought to us the representatives of many nations—men skilled, accomplished and experienced—and they have brought with them stores of treasures in all the forms given to them by long-practised industry and art. And others are here from new lands, even younger than our own, giving full promise of a bright and glorious future. It has placed side by side, for comparison, the industries of the world. In viewing them the utilitarian revels in the realization that man is striving earnestly to make all things contribute to his convenience and comfort; the philosopher stands in awe at their contemplation as he dwells upon the cherished thought of the possible unity of nations; and he who looks on the grandeur of the scene from a spiritual standpoint is filled with the hope that the day is near "when the glory of the Lord shall cover the earth as the waters cover the sea."

It has taught *us* in what *others* excel, and excited our ambition to strive to equal them. It has taught others that our first century has not been passed in idleness, and that, at least in a few things, we are already in the advance. It has proved to them and to us that national prejudices are as unprofitable as they are unreasona-

ble; that they are hindrances to progress and to welfare, and that the arts of peace are most favorable for advancing the condition, the power and the true greatness of a nation. It has been the occasion of a delightful union among the representatives of many nations, marked by an intelligent appreciation of each other, rich in instruction and fruitful in friendships. It has placed before our own people, as a school for their instruction, a display—vast and varied beyond precedent—comprising the industries of the world, including almost every product known to science and to art.

It has made the country and its institutions known to intelligent representatives of all nations. They have had access to our homes, have become familiar with our habits, have studied our systems of education, observed the administration of our laws, and will hereafter understand why the United States of America exerts so large an influence on other nations, and, consequently, the great truth that in proportion to the intelligence and freedom of a people is their loyalty to their government.

It has concentrated on this spot, in the short term of six months, eight millions of visitors, who have enjoyed all its rare privileges without a disturbance or any personal hindrance from violence or even rudeness. It has exhibited the American people in their true character, respectful of each other's rights, considerate of each other's convenience, and desirous of allowing to others a full participation in their enjoyment. It has afforded an opportunity to show that the administration of an exhibition on a grand scale may be liberal in its expenditure without useless extravagance; that its laws may be strictly enforced with impartiality and without harshness; that its regulations may secure the efficiency of its departments and uniformity in their action; that its whole course has been free from financial embarrassment or even a payment deferred; and that, notwithstanding every part of its machinery was in constant motion, no one of the immense throng within the limits of the Exhibition was sensible of its restraint.

It has shown that the authorities of the great city in which the Exhibition has been held have been actuated by a single eye to the promotion of the public convenience. That, under their supervision, facilities of every kind have been provided, property has been protected, good order has been preserved, unusual health has prevailed, and extortion in its varied forms has been almost unknown; these, combined with the unlimited accommodations for visitors and the hospitality of its citizens, are in beautiful harmony with

the purposes of the Exhibition. Nor has the State of Pennsylvania been less in sympathy. The traditions connected with its soil are its priceless heritage.

The International Exhibition is to be regarded as a reverential tribute to the century which has just expired. That century has been recalled. Its events have been reviewed. Its fruits are gathered. Its memories are hallowed. Let us enter on the new century with a renewed devotion to our country, with the highest aims for its honor and for the purity, integrity and welfare of its people.

On the Exhibition the curtain is now about to fall. When it has fallen, the wonderful creation, in the beauties of which we have so long been revelling, will have passed away. Looking round upon it now, while the scene still glows with its grandeur, and our senses are rejoicing in its delights, I desire to assure all who have contributed towards its production that there is at least one who bears in grateful remembrance whatever they have done. It may have been an humble prayer, the earnings of hard toil, out of their abundance, or the devotion of years of intelligent labor—it matters not. The little brooks and the rivers alike make up the mighty ocean. To all—at home and abroad—who have helped us forward; to the Sovereigns and Governments of other countries who have countenanced and encouraged us; to their representatives who have worked so nobly in our cause; to the exhibitors of our own and other lands, who have done more than can be expressed; to the Congress of the United States of America, for its generous and timely aid; and especially to the President of the United States of America, for his unwavering support and encouragement, are due the grateful acknowledgments of the nation. Would that I were authorized to make such acknowledgments here, or that my own had the value in them to make them acceptable to them all, from the humblest to the highest.

And now, to my fellow-laborers of the United States Centennial Commission, and of my more immediate associates in the Centennial Board of Finance, I need only say that our work has its place in the annals of the nation. If the memories of it be pleasant to our countrymen, we have done well.

Mr. Welsh was several times interrupted in the delivery of this speech by the most hearty and appreciative

applause. The orchestra now performed the Grand Finale to Beethoven's Sixth Symphony in admirable style, and, after an address by the Hon. A. T. Goshorn, Director-General, General Hawley spoke as follows:

The final day of the Exhibition has arrived. Four years and a half ago the United States Centennial Commission, representing every State and Territory, was organized to celebrate the Centennial Anniversary of our national independence by holding an international exhibition of arts, manufactures, and products of the soil and mine. Congress deemed it fitting that the completion of the first century of our existence should be commemorated by a presentation of the natural resources of the country and their development, and of its progress in those arts which benefit mankind, in comparison with those of older nations.

Happily the United States was and is at peace with the whole world. International Exhibitions have become an established factor in modern civilization, but connected with this one were features of peculiar and local interest. They have not interfered with its progress—indeed, the acceptances of other nations, and the very friendly congratulatory letters addressed to the President of the United States on the occasion of the celebration of the Fourth of July, show that they have rather given an opportunity for expressions of cordial good-will that have given very great pleasure to the whole American people. There were many and great difficulties in the path of the enterprise, the usual misapprehensions, the disturbed condition of business and finance at home and abroad, and the slow conversion of a public sentiment which, in the earlier days, feared that justice might not be done to American resources and capabilities. We recall the hours of uncertainty and discouragement solely that we may felicitate ourselves upon results that have answered the hopes and predictions of the most sanguine.

The Exhibition has given us a better comprehension of our own position and progress. We expected and hoped to be taught our shortcomings in some respects, and we shall profit by the lessons. And yet we gather from our countrymen the general impression that they are not a little pleased to see how well our productions in many departments have borne the comparisons to which they have been subjected.

Unquestionably international trade and commerce will be pro-

moted. Our manufacturers, mechanics and artists will show by their works that they have been close students of the admirable exhibits from abroad. The ingenuity and excellence of our mechanics and inventors will be made better known. A higher benefit has been wrought. The bonds of peace have been strengthened. Innumerable ties have been created that will be strongly felt whenever national disagreements are threatened. Our people are so widely scattered, and their relations have been so seriously disturbed, that every patriot anxiously desired them to seize this great occasion to know each other better that they may love each other more. What has been done toward this is one of our most valuable labors. The concurrent and almost wholly harmonious testimony of our critics at home and abroad permits us to feel that we have been on the whole largely successful in all our work. This commendatory judgment is very grateful to us. My associates have given expression to our gratitude. I would gladly add to what they have said, if I could. The Commission thanks the city of Philadelphia, the State of Pennsylvania, the national government, and especially you, sir, our honored President. It thanks the foreign commissioners, one and all, most heartily. It thanks the exhibitors of all nations. It thanks the Women's Centennial Committee. It thanks the American people, whose conduct here has commanded unbroken respect. It warmly thanks its associate corporation, the Board of Finance. Above all, it reverently acknowledges the kind favor of Heaven, which has so smiled upon us that, while we turn somewhat sadly from these scenes of great labor and greater pleasure, all who have been associated here may feel that they have here done something toward advancing the world towards the better day coming. God be praised for the past. God send us all, individuals and nations, a happy future.

At the conclusion of this address, the chorus, orchestra and entire audience joined in singing the national anthem, "My country, 'tis of thee," and never have we heard it sung with more patriotic fervor than on this occasion. To add to the enthusiasm of the hour, the original flag of the American Union first displayed by Commodore Paul Jones on the "Bon Homme Richard," was displayed above the platform, and was received

with loud and long-continued applause. At the same moment a salute of forty-seven guns, one for each State and Territory, was fired from George's Hill by the Keystone Battery, and simultaneously from the United States steamer "Plymouth" in the harbor.

At twenty-three minutes of four o'clock, General Hawley announced that the President of the United States would now formally close the Exhibition. The President here arose and said:

"LADIES AND GENTLEMEN:—I have now the honor to declare the Exhibition closed."

The President then turned to the left, and waved his hand as the signal to the operator of the telegraph instrument immediately behind him to give the signal for stopping the Corliss engine and the machinery in the hall. Mr. Robert B. Manley, the general director, touched the key, and the characters "7–6" were signalled to the main telegraph office. The same current caused the hammer to strike the special gong stationed alongside the Corliss engine, which was the signal to stop, and at the same time all the gongs in the Machinery Hall felt the effect of the electrical current, and gave notice to the exhibitors that the official fiat of the President that the Exhibition had been declared closed was promulgated.

All present then united in singing the long metre doxology to the words,

> "Be Thou, O God! exalted high,
> And as Thy glory fills the sky,
> So let it be on earth displayed,
> Till Thou art here as there obeyed."

And the closing ceremonies of the memorable Centennial Exhibition were over.

And now, that it is all over, who is not ready to say

that the celebration has been most worthy of the country, adding to its fame and its credit throughout the world, and that it has been in the highest degree a satisfactory celebration to the people of the United States? The eight millions of people who passed through its gates as paying visitors have given it their unstinted homage. It received, in all, more than nine million seven hundred and eighty thousand visits during the one hundred and fifty-nine days it has been open—a greater number than ever attended an International Exhibition in the same space of time. All honor and thanks to the faithful, devoted, unselfish gentlemen who have given to it their time, their energies and their talents. Those of them to whom this sentence applies with fitness and all the emphasis with which the acknowledgment can be made, should never be forgotten by their fellow-countrymen.

Beset from the very outset by difficulties and obstructions; supported for more than three years only by the will, the indomitable persistence and abounding faith of the people of Philadelphia and Pennsylvania, it was never clear of some sort of embarrassment until it bloomed upon the world a grand and magnificent success. It is now enshrined in the affections of millions and millions of the American people. No influence can efface the pleasure, and satisfaction, and pride with which it has been seen and enjoyed; and it will endure throughout the lifetime of the generation which saw it and knew it as a beautiful, patriotic and cherished memory.

THE END.

MAP OF CENTENNIAL GROUNDS, PHILADELPHIA, 1876. The numbers following the titles, denote the number which is on the shield attached to each building.

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THE END.

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ALL OF NATURE THAT BREATHES

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