









Printed  
September  
1908

## CHRONOLOGICAL TABLE

Extending over a period of forty-seven years concerning public and semi-public offices of various kinds, and American and Foreign Society Memberships; compiled by  
BURNET LANDRETH  
for *Alumnus Record of Polytechnic College.*

- 
- 1861 Sergeant [1st] Penn. Guards, Philadelphia City Militia.  
1861 Sergeant [4th] Polytechnic Corps.  
1862 Captain, commissioned for two years, Co. I, 17th Regiment, Pennsylvania Militia, Division of General John F. Reynolds.  
1863 Captain, transferred to Co. G, 43d Regiment, Volunteer 90-day Emergency Men, Army of the Susquehanna, General Darlus N. Couch.  
1866-87 Vestryman St. James Church, Bristol, Pennsylvania.  
1870-87 Pennsylvania Horticultural Society, founded 1828, succeeding his father, its first Secretary.  
1872 Philadelphia Society for the Promotion of Agriculture, founded 1784, succeeding his father, once its President.  
1874 Honorary Member Scottish Agricultural Society.  
1874-76 Chief of Bureau of Agriculture, Centennial International Exhibition, 1876, Philadelphia.  
1875 Delegate to the Centennial Commission from the Scottish Forestry Society.  
1876 Zoological Society of Philadelphia.  
1877 Honorary Member Acclimatization Society of Brazil.  
1877 L'Academie Royale d'Agricultura de Swede.  
1877 Named to President elect Hayes by the U. S. Centennial Commission as U. S. Commissioner of Agriculture. Declined.  
1878 American Philosophical Society of Philadelphia, founded 1706.  
1878 Trustee Polytechnic College, Philadelphia, succeeding his father.  
1878 Commander Post 73, Bristol, Pa., Grand Army of the Republic.  
1878 Pennsylvania Historical Society.  
1878-88 Vice-President of the Philadelphia Society for the Promotion of Agriculture.  
1879 Council of Education Permanent Exhibition, Philadelphia.  
1881 Public School Director, Bristol Township, Pennsylvania.  
1882 Council Society of Arts, Philadelphia.  
1883-88 Vice-President of the Society and Member Executive Committee of the Pennsylvania State Agricultural Society.  
1883 Honorary Member Imperial Agricultural Society of Japan.  
1884 Military Society, Army of the Potomac.  
1885 Honorary Member Society of Arts, London.  
1885 Honorary Member Sociedad Nacional de Agricultura de Chile.  
1885 Chevalier Merite Agricole de France.  
1885 Academy of Natural Sciences, Philadelphia.  
1885-87 American Director in Chief, American Exhibition, London.  
1886 Honorary Member Royal Horticultural Society of London.  
1887-9 President of the Pennsylvania State Forestry Society.  
1888-92 President Seedsmen's Protective League.  
1888 American Expert, Paris International Exposition of 1889. Resigned.  
1889 Member of the Alumni Board of the Episcopal Academy, Philadelphia.  
1889 Member United Service Club, Philadelphia.  
1889-1908 President and Organizer Association of Centenary Firms of the United States.  
1889-90 President U. S. Ramie Culture and Manufacturing Association.  
1890-93 Vestryman Christ Church, Eddington, Pennsylvania.  
1891 Archeological Society of the University of Pennsylvania.  
1892 Vice-President Mexican International Steamship Company.  
1893 Officer de Merite Agricole de France.  
1893 Honorary Member Society des Agriculteurs de France.  
1893 Honorary Member Sociedad Agrícola Mexicana.  
1896-8 Chairman General Council Pennsylvania Horticultural Society.  
1897 Member Michéau Legacy, Philosophical Society.  
1898-1906 Member of the Philadelphia Board of Trade, succeeding his brother Oliver.  
1899 President Wholesale Seedsmen's League of the United States.  
1900-1908 Secretary Wholesale Seedmen's League.  
1900 Honorary Member Society of Agriculture and Horticulture of British India.

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frontispiece map, and 18 plates  
(2 folding), in the original Morocco  
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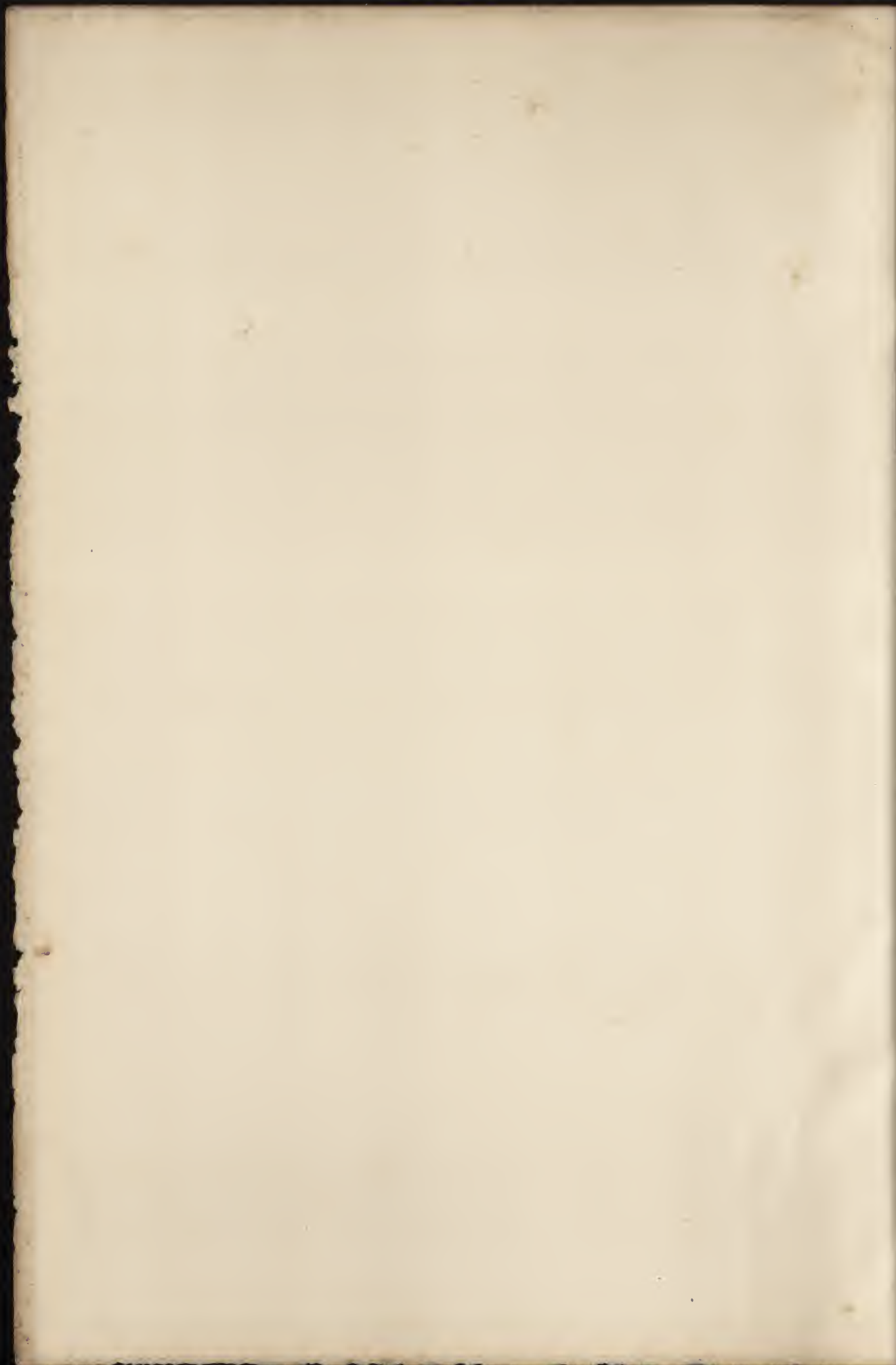
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*Amos L. Smith*







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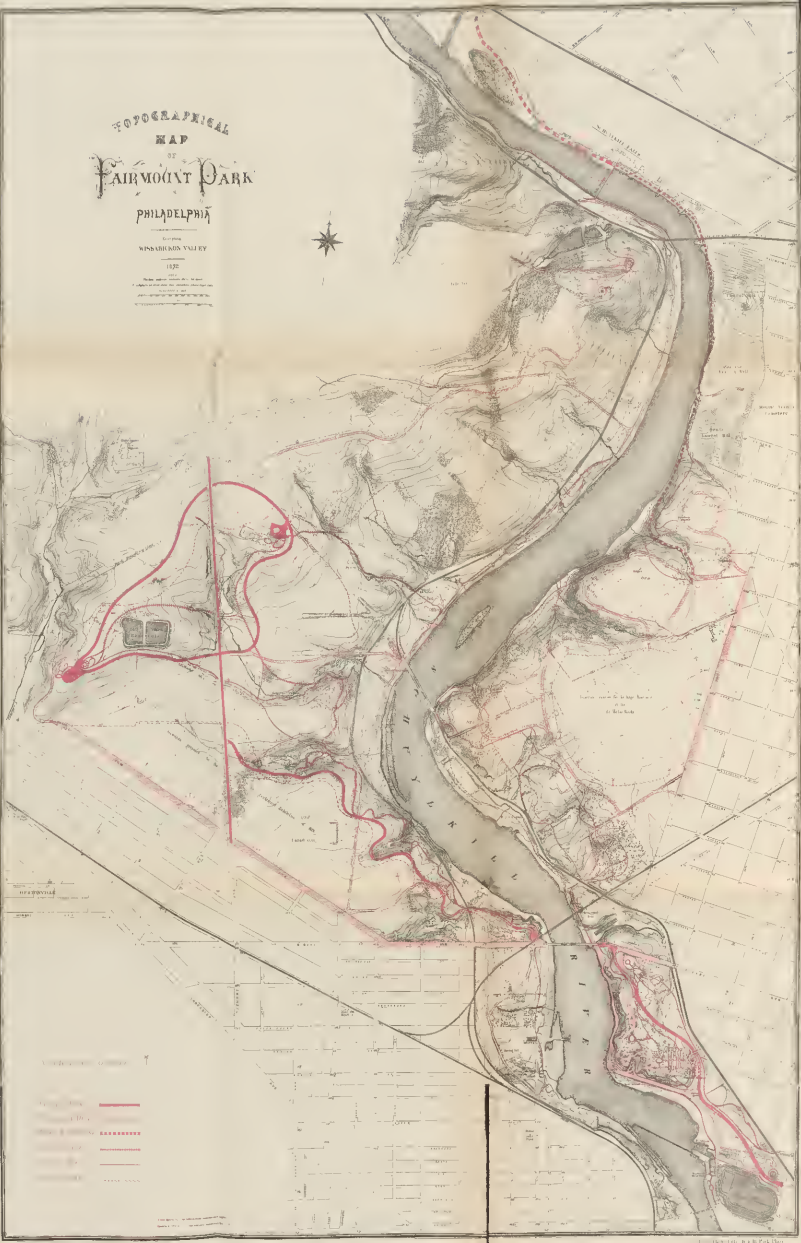


PHOTOGRAPHICAL  
MAP  
OF  
FAIRMOUNT PARK

PHILADELPHIA

WINDMILL HILL VALLEY

1872



- LEGEND
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  -



*Burnet Landreth.*

United States Centennial Commission.

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INTERNATIONAL EXHIBITION.

1876.

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GROUNDS AND BUILDINGS

OF THE

CENTENNIAL EXHIBITION

PHILADELPHIA,

1876.

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EDITED BY

DORSEY GARDNER,

ASSISTANT SECRETARY UNITED STATES CENTENNIAL COMMISSION.

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PHILADELPHIA:

J. B. LIPPINCOTT & CO.

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Entered, according to Act of Congress, in the year 1878, by the

CENTENNIAL BOARD OF FINANCE,

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## PREFACE.

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THE following descriptions of the Grounds and Buildings of the Centennial Exhibition are derived almost wholly from official sources, and are believed to be entirely accurate. The ground-plans and other data regarding the buildings have been taken largely from the reports of the Chiefs of Bureaus in the Exhibition and of the various engineers and architects whose names are given on subsequent pages. Special acknowledgments are due to the officers of the Fairmount Park Commission, of the Pennsylvania Museum and School of Industrial Art, and to the President and Secretary of the United States Government Board, for their kindness in affording the required information.





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## FAIRMOUNT PARK.

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THE extent, picturesqueness, diversity of surface, and accessibility of Fairmount Park were second only to the historical associations connected with the Declaration of Independence among the inducements for holding the International Exhibition at Philadelphia. Located in the northwestern section of the city, and immediately adjoining closely-built districts, the Park extends northward and westward over an area of two thousand nine hundred and ninety-one acres, and contains fifty miles of carriage-drives and one hundred miles of bridle-paths and walks. It lies on both sides of the Schuylkill, a highly picturesque river, which, within the Park limits, receives some twenty tributary streams, principal of which is the beautiful and romantic Wissahickon Creek. From its southern entrance, at Fairmount Water-works, the Park extends up both sides of the Schuylkill River for seven miles, and along the banks of the Wissahickon for over six miles, affording nearly fourteen miles of water-front.\* On either side of these streams it has a remarkable variety of scenery,—hills, ravines, cascades, plateaus, meadows, and old forest-trees; while, in season for the Exhibi-

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\* The vicinity of the Schuylkill proved most desirable, because of the excellent course it afforded for the numerous rowing matches which were held during the Exhibition.

tion, there were created clumps of shrubbery, horticultural gardens, artificial lakes, and fountains, that elicited much admiration.

Immediately after the organization of the Centennial Commission (March 7, 1872), the members of that body visited the Park, under the escort of the Fairmount Park Commission and a committee of the Philadelphia City Councils, and this resulted in the adoption of a resolution (March 11) 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 tract which thereupon was selected was the southernmost portion of the Park, west of the Schuylkill River, the portion most easily accessible and best adapted for building and decorative purposes.\*

A formal transfer of these grounds was made by the Park Commission to the Centennial Commission on July 4, 1873,—the ninety-seventh anniversary of American Independence,—amid imposing ceremonies and many manifestations of popular enthusiasm, while representatives of the City, State, and National Governments participated, and the President's formal invitation to foreign Governments to take part in the Exhibition was pronounced.

The grounds placed at the disposal of the management of the Exhibition included four hundred and sixty-five acres, having an average elevation of over one hundred feet above the Schuylkill River. Of this, an area of two hundred and thirty-

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\* A copy of the topographical map of the Park, prepared by the Fairmount Park Commission, showing the surroundings of the Park and its approaches in 1872,—they were subsequently much improved,—is given as the frontispiece to this volume.

INTERNATIONAL EXHIBITION.

PHILADELPHIA, 1876.

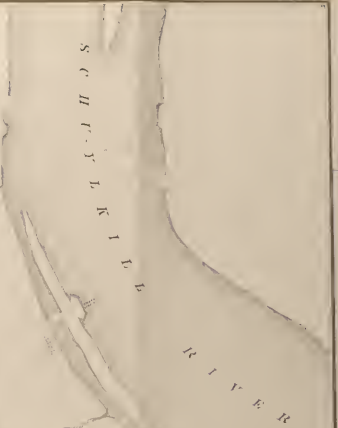
SITUATION PLAN.

H. J. SCHWARZMANN CHIEF ENGINEER

Scale

REFERENCES

- 1. Main Entrance
- 2. Main Hall
- 3. Main Hall - East
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Back of  
Foldout  
Not Imaged



six acres was ultimately included for exhibition purposes by an inclosing fence sixteen thousand feet (over three miles) in length.\* It proved, however, inexpedient, if not impossible, to install in the Park the displays of live-stock or the fields of growing crops needed for the tests of agricultural machinery; and these were accordingly provided for in convenient locations elsewhere. Outside the Park also were the sheds provided for the storage of exhibitors' empty packing-cases, having a capacity of 1,360,000 cubic feet; but, as they were arranged in four parallel rows along two lines of railroad track, they were easily accessible from the Exhibition.

To the facilities for reaching the Exhibition its success was largely due. It was accessible by steam railways, horse-cars, steamboats on the Schuylkill, and ordinary street vehicles, whose carrying capacity per hour was as follows:

Railroads . . . . .	6,250 passengers.
Street cars . . . . .	12,180 "
Steamboats . . . . .	2,500 "
Vehicles . . . . .	1,000 "
Total, hourly . . . . .	21,930 "

making an aggregate of 185,440 possible passengers up to three o'clock P.M., by which time the admissions usually ceased.† As the steam railroads connected directly with the entire rail-

\* Plans of this tract are shown in detail in Plates A and B, following.

† In an emergency these numbers could be increased. On September 28, "Pennsylvania Day," when the total number of admissions was 274,919, there were received at the two steam railroad depots adjoining the grounds 638 passenger trains, composed of 2993 cars, with 130,245 passengers from without the city.

way system of the United States, transportation was extremely easy both for passengers and freight. Both the roads also ran local trains, at frequent intervals, to numerous central points in the city; and, as the six street-car lines which reached the Exhibition, and also the steamboats, issued exchange tickets, good for passage on intersecting lines, a visitor might come from any portion of Philadelphia for a fare not exceeding ten cents. The steam roads were also a highly-important aid in the delivery of materials and goods at the Exhibition, since cars loaded from the steamer at an Atlantic or Pacific port or at inland stations could be run into or alongside the buildings for which they were destined, and their contents unloaded almost at the spot at which they were to be exhibited.

Means of approach to the Park were liberally afforded by the City of Philadelphia, by the erection of elegant and commodious bridges and the opening and paving of the adjacent streets.



MAP, CITY OF PHILADELPHIA AND FAIRMOUNT PARK.

# INTERNATIONAL EXHIBITION.

PHILADELPHIA, 1876.

## SITUATION PLAN.

H. J. SCHWARZMANN, CHIEF ENGINEER.



Scale

REFERENCES

Exhibition Buildings	Green
Residential	Yellow
Commercial	Orange
Public Buildings	Red
Churches	Pink
Government Buildings	Blue
Manufactories	Light Blue
Warehouses	Light Green
Public Squares	Light Yellow
Public Parks	Light Orange
Public Walks	Light Red
Public Streets	Light Pink
Public Roads	Light Blue
Public Canals	Light Green
Public Rivers	Light Yellow
Public Lakes	Light Orange
Public Ponds	Light Red
Public Fountains	Light Pink
Public Gardens	Light Blue
Public Parks	Light Green
Public Walks	Light Yellow
Public Streets	Light Orange
Public Roads	Light Red
Public Canals	Light Pink
Public Rivers	Light Blue
Public Lakes	Light Green
Public Ponds	Light Yellow
Public Fountains	Light Orange
Public Gardens	Light Red



Back of  
Foldout  
Not Imaged



PREPARATION  
OF THE  
GROUNDS AND BUILDINGS.

COMMITTEE (CENTENNIAL COMMISSION) ON PLANS AND  
ARCHITECTURE, 1872.

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HENRY PROBASCO, Ohio.  
WILLIAM HENRY PARSONS, Texas.  
JOHN N. BAXTER, Vermont.

EZEKIEL A. STRAW, New Hampshire.  
DAVID ATWOOD, Wisconsin.  
WILLIAM T. READ, Delaware

GEORGE A. BATCHELDER, Dakota.

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COMMITTEE (BOARD OF FINANCE) ON GROUNDS, PLANS, AND  
BUILDINGS, 1876.

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THOMAS COCHRAN, *Chairman*.  
SAMUEL M. FELTON.

JAMES M. ROBB.  
CLEMENT M. BIDDLE.

WILLIAM SELLERS.

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*Chief Engineer of the Grounds, H. J. SCHWARZMANN.*

## PREPARATION OF THE GROUNDS AND BUILDINGS.

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AT the time the grounds were transferred by the Park Commission to the Centennial authorities, the portion of the Park used for Exhibition purposes was entirely uncultivated. A series of fields, lawns, swamps, and ravines, covering an area of two hundred and eighty-five acres, had to be transformed into building-sites, gardens, and highly-ornamented grounds. To grade the area of the three principal buildings—the Main, Machinery, and Agricultural Halls—it was necessary to move over two hundred thousand cubic yards of earth; and to grade the grounds proper, for avenues, walks, railroads, lakes, etc., it required the removal of over three hundred thousand cubic yards, making in all over five hundred thousand cubic yards; and, as the whole surface was completely turned over, it had to be cultivated by depositing top-soil and manure, preparatory to the creation of the lawns and flower-beds which formed one of the most attractive features of the Exhibition.

To accomplish this work, there was established on January 1, 1874, the Department of Engineering, with Mr. H. J. Schwarzmänn at its head. The chief engineer immediately proceeded to make a complete survey of the grounds, which was completed early in the following April, by the delivery to the Board of Finance of a general plan of the treatment of the grounds, of a scheme of water-supply, of drainage, of sewerage, and of ave-

nues, paths, etc. This work was to be completed within two years, beside the creation of lawns and flower-gardens, the transplanting of over twenty thousand trees and shrubs, and the erection of bridges traversing the ravines, all of which were arranged with reference to the permanent decoration of the Park.

As is shown in the frontispiece, the Exhibition grounds were originally traversed by but one of the thoroughfares which afterwards intersected them,—Belmont Avenue. Those constructed for the purposes of the Exhibition, together with the systems of water- and gas-supply, drainage, sewerage, etc., are fully exhibited in Plate A. The main avenues, dividing the grounds into four nearly equal parts, were Belmont Avenue, two thousand six hundred and twenty-five feet long and sixty feet wide, the Avenue of the Republic, five thousand two hundred and twenty-five feet long and sixty feet wide, and Fountain Avenue, three thousand six hundred feet long and one hundred feet wide. Besides these, State Avenue, two thousand two hundred feet, and Agricultural Avenue, two thousand and eighty-five feet in length, completed the system of principal communication between the buildings. The total length of all the avenues was three miles, and the length of the minor foot-walks seventeen miles, making a series of walks twenty miles long inside the inclosure. All these avenues, with the exception of Belmont, were new, and had to be graded, surfaced, and drained. The nature of the ground, which was formed of clay, made it necessary either to surface all the roads or walks with asphalt or to macadamize them. Notwithstanding the constant and heavy traffic of freight and material, the roads were in perfect condition at the opening of the Exhibition. The whole area of ground



was inclosed by an open board fence, nine feet six inches high, and fourteen thousand six hundred and eighty-three feet, or two and three-quarters miles, in length.

At the outset most of the territory west of Belmont Avenue was a swamp, unfit for building or gardening purposes; and this region, which ultimately comprised a chain of three ornamental lakes, had to be recovered by a system of underground drainage. The drainage of the Centennial grounds involved three different systems: 1st. Drainage by sewers, emptying into the Schuylkill River below Fairmount Dam; 2d. Surface-drainage, emptying into the ravines dividing the east part of the grounds; 3d. Drainage by wells. The first system provided for the grounds covered by the Art Gallery, Main Building, offices, Machinery Hall, and the hill-slope of George's Hill. Inasmuch as the larger portion of the grounds was lower than the sewers of Elm Avenue, while other parts were so distant that sufficient grade could not be given to drain them, for sanitary purposes, into the sewers, it was found necessary to excavate wells to a depth of from ten to fifteen feet into gravel. These were emptied at intervals by the Odorless Excavating Company. All surface-water was collected and drained into the streams of Lansdowne and Belmont Valleys, and no drains from closets, etc., were emptied into these streams. To keep the drainage for sanitary purposes in a good condition, with a number of visitors varying from thirty thousand to one hundred thousand per day, was a work requiring the greatest care and watchfulness. The extent of drainage outside of the buildings was thirty-seven thousand two hundred and eighty-nine feet, or over seven miles.

To make the Exhibition perfectly certain of an ample water-

supply, water-works were provided entirely independent of the city reservoirs, though there were such connections that the latter could be drawn upon in case of need; but in the end the city authorities had to borrow from the Exhibition works the water for cleaning the neighboring streets without the grounds. The building, stand-pipe, engines, and boilers used were such as would be employed in permanent works for a city of forty-five thousand inhabitants, allowing about fifty-seven gallons of water daily for each person.\* The engine-house, situated on the bank of the Schuylkill, at the Belmont steamboat landing, is an ornamental building of brick and stone, surrounded by grounds prettily planted and inclosed. In it was installed as an exhibit, and without charge by the exhibitor, a pair of the "Worthington patent duplex direct-acting pumping engines," which drove water into an ornamental wrought-iron stand-pipe, one hundred and twenty feet high and four feet in diameter, located in the rear of the Art Annex, and from which the supply was distributed to all parts of the buildings and grounds. For one hundred and eighty-five consecutive days these engines furnished a supply which was not interrupted for a moment, although much of the time they were not both used at once, and it never became necessary to employ their fullest capacity. They could, if desired, have raised, the one 6,000,000 gallons, the other 1,000,000 gallons, in twenty-four hours; but the largest daily supply ever needed (August 30) was but 2,805,044 gallons, when each engine ran twelve hours; and the total number of gallons raised during the time of the Exhibition was 499,318,620.

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\* In European cities from twenty-five to thirty gallons of water per head is considered an ample supply.

Of this large supply, about one million gallons daily went to feed the great fountain north of the Machinery Hall. But the use of this great amount of water did not end with the fountain. Besides its ornamental character, it was useful to keep the Lake properly filled, and to produce a pleasing and valuable stream through Lansdowne Valley. It also supplied some five to six hundred thousand gallons daily, during the hours of exhibition, to the condensing apparatus of the Corliss engine, a ten-inch pipe being carried from the centre of the Lake to the condenser of the engine. The number of appliances for using water in the buildings and grounds was as follows:

303 Fire-hydrants.	601 Wash-basins.
924 Water-closets.	32 Ordinary hydrants.
372 Urinals.	95 Sinks.
18 Wash-paves for watering Horticultural Garden.	31 Baths.
	35 Fountains (17 of large size).

All the steam-boilers supplying engines in Machinery Hall, the United States Government Building, Agricultural Hall, Brewers' Buildings, saw-mills, etc.; the locomotives of the Narrow-gauge Railway; the motors for blowing the organs in the Main Building; the tank in the Pump Annex of the Machinery Building; the depot of the Reading Railroad outside the grounds.

The fire-plugs were freely used for sprinkling the roads within the grounds, as well as the Park drives outside the inclosure as far as Sweet Brier Mansion. Of pipes used in distributing water to the Exhibition buildings, exclusive of restaurants, State buildings, etc., there were, as shown on the plan, 4192 feet of wrought-iron pipe and 60,519 feet of cast-iron, a total of 64,711 feet, or over  $12\frac{1}{4}$  miles.

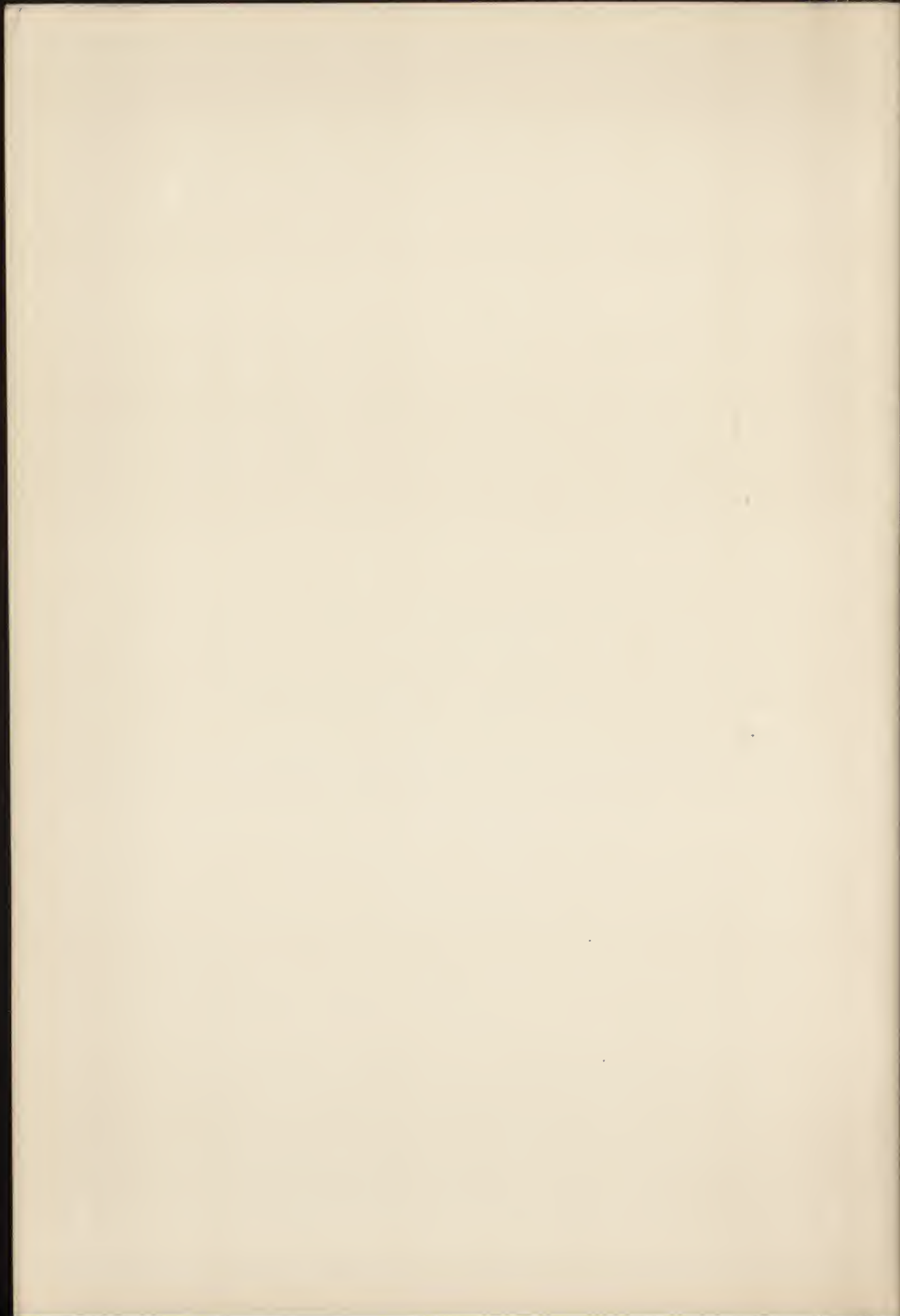
The foregoing statements show an adequate supply of water

in case of fire; but it should be added that the Worthington pumps afforded a sufficient pressure on the fire-plugs to throw streams upon the roofs of the largest buildings. During the Exhibition, however, there was maintained a thoroughly-organized and efficient fire department, supplied with steam and chemical fire-engines, and the most approved fire-apparatus of every kind.

The buildings and grounds were supplied with gas from the city gas-works, and the length of supply-mains on the grounds was 41,466 feet, or nearly 8 miles. The consumption of gas on an average was 157,300 cubic feet per night,—or a total of 33,044,500 cubic feet for the term of the Exhibition.



THE BUILDINGS.



## THE BUILDINGS.

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THE plan originally entertained by the Centennial Commission contemplated the erection of a single large exhibition building, which, by a dual system of classification, should show at once the exhibits made in each class of objects and those made by each contributing nation. From various causes this scheme proved impracticable.

At its first meeting (March, 1872) the Commission appointed a Committee on Plans and Architecture, instructing it to procure a plan for a building covering about fifty acres of floor-space, with estimates of its cost. Time, however, passed before the subscriptions of stock warranted the committee in offering the necessary premiums for designs; and during this interval it became apparent that it would be necessary to have as many as four distinct structures,—(1) a Main Exhibition Building, including the Permanent Memorial Hall; (2) an Art Gallery; (3) a Machinery Hall; and (4) a Conservatory. Proposals were issued to architects and engineers to make estimates for these buildings, and forty-three designs were received in response (July 15, 1873). A second competition ensued, limited to the ten most successful of the first designers, which resulted in the submission of plans of buildings whose estimated cost of erection varied from \$2,554,520 to \$10,050,000. All these exceeded the means at the disposal of the Commission and Board

of Finance. Meantime, also, the State of Pennsylvania and City of Philadelphia had made appropriations which provided for the erection of the Memorial Hall (Art Gallery), Horticultural Hall, and Machinery Building. From this, and from the result of protracted attempts to adapt the designs of the competing architects, and also from the evidences that numerous subsidiary buildings would be needed, it resulted that the Centennial management employed its own engineers to make the plans required. By them were prepared the designs of the principal structures, which are shown in the following pages.

As the time of the Exhibition drew near, and applications for space from home and foreign exhibitors arrived, it became evident that the buildings originally contemplated could not provide room for the objects to be shown; so that an enlargement of the Main Building became necessary, and then the addition of annexes for the metallurgical display and that of carriages and other objects had to be made,—an experience, as to the annexes, which befell all of the principal buildings. Beside this overflow of space, it soon appeared that many important contributors to the Exhibition,—the United States Government Board, for instance, the Women's Centennial Executive Committee, the Boards of most of the States and Territories, several of the foreign Commissions, and a number of individual exhibitors,—preferred to erect buildings of their own, in which their displays were installed wholly or in part. This not only relieved the pressure upon the large buildings, but added much to the variety and extent of the Exhibition. The location of such buildings, as well as the nationality of their occupants, is shown in the preceding plate.

The entire number of buildings, great and small, at the



opening of the Exhibition, was two hundred and forty-nine. Aside from those provided by the Management of the Exhibition, foreign Governments supplied fifteen; States and Territories, twenty-four; private exhibitors, fifty-six, beside forty-one out-door structures of various kinds; while holders of various concessions added forty-one. The positions of these are shown on Plates A and B; and detailed classified lists of all buildings within the Exhibition grounds are appended on pages 143-155.

The problem of reaching so many points of interest which covered so large an area was solved by the creation of the "Narrow-gauge Railway." This consisted of a double-track steam railroad, which nearly encircled the grounds, having a length of twenty-nine thousand feet, or nearly five and a half miles; it had stations at every important building, and its fare was five cents. It was no easy task to locate such a road without destroying the main line of communication for pedestrians or the general harmony of the landscape. Yet it transported during the six months two-thirds of the whole number of visitors without a single accident,—and an examination of the number of passengers on passing trains proved the best instant means of estimating the number of visitors on any day of the Exhibition. The shortest radius on this road was two hundred and fifty feet, and the heaviest grade two and five-tenths feet per hundred.

The irregular shape of the Exhibition grounds increased the length of the inclosing fence to fourteen thousand six hundred and eighty-three feet (two and three-quarters miles). In this fence-line were one hundred and six entrance gates for persons, seventeen for wagons, and forty-one exit gates. Each entrance gate for persons was provided with a turnstile, so constructed

as to give the gate-keeper absolute control over the passage of visitors, and, by electric communication, to instantly register at a central office every revolution caused by an admission. The wagon gates were used by military and other organized bodies, and were placed wherever roadways entered the grounds. The use of the gates varied greatly, those being most employed which stood beside the landing-places of the railways, while those on the northern and western boundaries were of little service. The gate most used was one of those at the Belmont Avenue entrance, between the Main and Machinery Buildings, where 514,290 persons were admitted during the Exhibition, there having been as many as 1870 admissions at this gate during a single hour (October 19); but, on the other hand, the gate at the northern end of Belmont Avenue was used by only 14 persons in a day, and the gate was thereupon closed. The entire number of admissions during the Exhibition was 10,164,489, of whom 8,047,601 paid admission fees, while the remainder either were connected with the Exhibition or held complimentary tickets.

During the preparations for the Exhibition, and throughout its continuance, much use was made of the telegraph,—a special bureau being provided for its management, under the directorship of Mr. W. J. Philips. There were connections by wires between the principal offices within the grounds and those in the city,—with the custom-house, the Police, Water, and Fire Departments, and offices connecting with the general telegraph system of the country and the submarine cables. In all, forty-one wires centred at the general telegraph office within the grounds. The telegraphic system within the grounds was the most complete ever put into operation within an exhibition. It

consisted of several separate and distinct series of wires, for special purposes, as shown on the preceding plate: (1) The Fire-Alarm Telegraph, connecting all the fire-engine houses with the general telegraph office, and in case of emergency with the Philadelphia City Fire Department, and fire-alarm signal-boxes located in a number of the buildings within the grounds; (2) The Police Telegraph for the use of the Guard, with signal-stations at all the entrances and throughout the Main Building and Machinery Hall, connected with the general telegraph office and the headquarters of the Guard, office of the Colonel commanding, etc., etc., and the central office of the City Police Departments; (3) Water Department Telegraph, connecting the water-works without the grounds with the general telegraph office, and thus with the Fire Department; (4) Custom-House Telegraph, connecting the custom-house and the appraisers' offices in the city with the custom-house within the grounds; (5) Municipal Telegraph line, connecting the general telegraph office with the Municipal Building within the grounds, the general office, and the office of the Mayor at Independence Hall, and central station; (6) Telegraph line connecting the Director-General's office with the several Bureaus of Administration, etc.; (7) The Centennial Telegraph, connecting all the principal buildings with the general telegraph office, and used for public and private business; (8) Telegraph wires connecting every turnstile with the office of the Bureau of Admission, so that all the entrances could be recorded automatically; (9) The American District Telegraph, for messenger, police, and fire service, with fifty-one signal-stations, located in the several buildings in the grounds. The employees of the latter delivered notes, telegrams, and packages,

acted as guides, and performed clerical and miscellaneous service upon being signalled by wire. The wires were laid partly underground, and partly from roof to roof of the buildings, so as to avoid the unsightly appearance of telegraph-poles.

The principal buildings of the Exhibition, which are here described at length, were as follows :

1. Main Exhibition Building.
2. Art Gallery (Memorial Hall).
3. Machinery Building.
4. Agricultural Building.
5. Horticultural Building.
6. Women's Pavilion.
7. United States Government Building.
8. Judges' Hall.

The situations of the minor buildings are shown on the preceding plates, and they are enumerated in the chapter commencing on page 143.



THE MAIN BUILDING.

*Chief of the Bureau of Installation (and Superintendent of the Main Building), HENRY PETTIT.*

*Engineers and Architects, HENRY PETTIT, JOSEPH M. WILSON.*

*Contractor, RICHARD J. DOBBINS.*

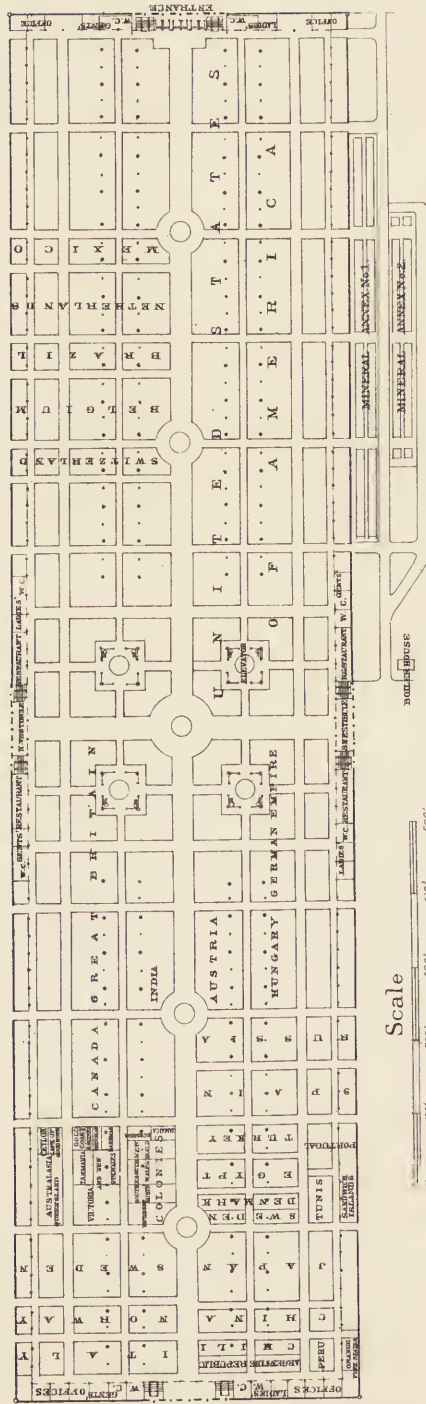
Contract made, July, 1874.

Building finished, February 14, 1876.

Cost, \$1,580,000.



PLATE C.



Scale

0 100' 200' 300' 400' 500'

GROUNDPLAN OF MAIN EXHIBITION BUILDING.



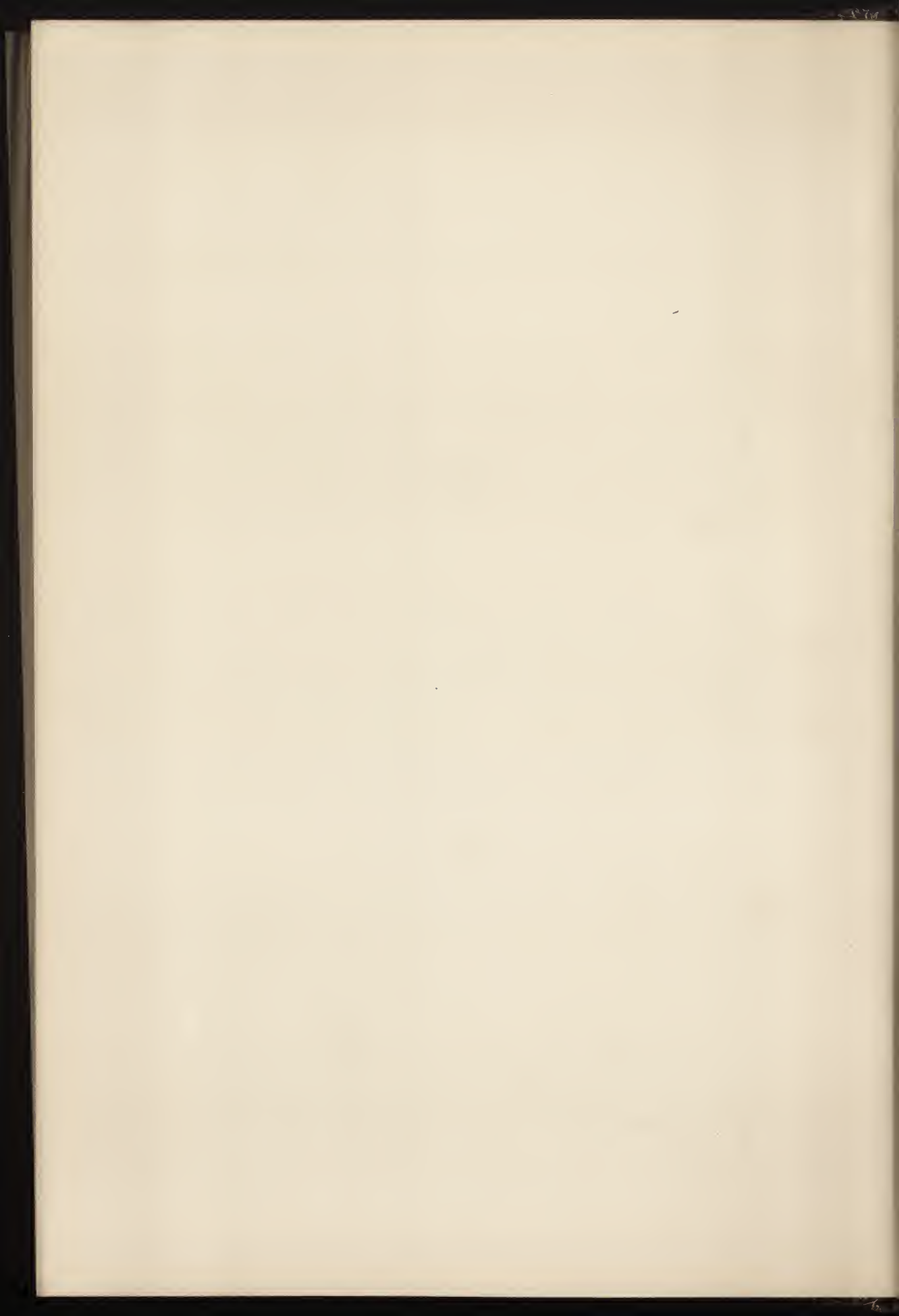






MAIN EXHIBITION BUILDING.







## THE MAIN BUILDING.

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THE Main Building, as its name implies, was the most considerable and most frequented structure in the Exhibition. It had, as originally projected, an area of eighteen acres of floor-space, which it became necessary to increase to twenty. It contained exhibits from all but one of the participating nations.\* It, with its annexes, provided for the installation of three out of the seven departments into which the products shown were divided. It was also the building first reached by visitors, either from the city or arriving by the principal railroads. Its ground-plan, showing the allotment of space among the several countries, and a perspective view of its exterior from the northwest, within the Exhibition grounds, are shown in Plates C and D. The relative position of the annexes to the Main Building, and the installation in them by nationalities, are explained by Plate B.

The building stands upon the Lansdowne Plateau, on the west bank of the Schuylkill River. The site before the Exhibition was comparatively level, with undulations at the east end only, the average elevation being one hundred and fourteen feet above the city datum. During the autumn of 1874 it was graded uniformly previous to putting in the foundation piers.

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\* Liberia exhibited in the Agricultural Hall only.

The structure was built upon a slight incline of two feet in eighteen hundred and eighty, the level of the floor being one hundred and twelve feet above the city datum at the west end, and one hundred and ten feet at the east end, or one hundred and four feet above the crest of the dam at Fairmount Water-Works. The northeast corner tower stands twelve hundred feet southwest from the river-bank. The east entrance, fronting upon an open concourse, formed the principal approach for carriages; visitors were allowed to enter the Exhibition direct by turnstiles in the vestibule of the building. The south entrances formed the principal approaches from street cars from the city, the turnstiles being located upon the line of Elm Avenue, one hundred and seventy feet south of the building itself. The intervening site was utilized for out-door exhibits, or treated as pleasure-grounds. The north entrances formed the direct communication with the Art Gallery and grounds north of the Avenue of the Republic. The west entrance gave direct routes to the offices of administration, the Machinery Hall, Judges' Hall, and grounds west of Belmont Avenue; also to the principal Belmont entrance into the grounds, through which passed the majority of visitors who came by railroad.

The structure was designed as a temporary exhibition building, for use during the year 1876, capable of properly protecting and satisfactorily displaying the exhibits it was to contain, and of affording all requisite facilities for the public. No superfluous construction or decoration was attempted or desired. The necessities of the case required that an area of at least twenty acres should be covered, and at a cost not exceeding one hundred thousand dollars per acre.\* It was also deemed

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\* The actual cost was \$75,569.65 per acre.

necessary, in order to insure sufficient safeguard from danger by fire, to construct the framework of wrought-iron. The forms used were such as would be most available for other purposes so soon as the original one had been fulfilled. They were so combined as to insure rapidity of erection and ultimate removal at a minimum expenditure of time and labor.

The building is in the form of a parallelogram, extending east and west eighteen hundred and eighty feet in length, and north and south four hundred and sixty-four feet in width. The larger portion is one story in height, and shows the main cornice upon the outside at forty-five feet above the ground, the interior height being seventy feet. At the centre of the longer sides are projections four hundred and sixteen feet in length, and in the centre of the shorter sides or ends of the building are projections two hundred and sixteen feet in length. In these projections, in the centre of the four sides, are located the main entrances, which are provided with arcades upon the ground-floor, and central façades extending to the height of ninety feet. Upon the corners of the building there are four towers seventy-five feet in height, and between the towers and the central projections or entrances there is a lower roof introduced, showing a cornice at twenty-four feet above the ground.

In order to obtain a central feature for the building as a whole, the roof over the central part, for one hundred and eighty-four feet square, was raised above the surrounding portion, and four towers, forty-eight feet square, rising to one hundred and twenty feet in height, were introduced at the corners of the elevated roof.

The general arrangement of the ground-plan shows a cen-

tral avenue or nave one hundred and twenty feet in width, and extending eighteen hundred and thirty-two feet in length. This is the longest avenue of that width ever introduced into an Exhibition Building. On either side of this nave there is an avenue one hundred feet in width by eighteen hundred and thirty-two feet in length. Between the nave and side avenues are aisles forty-eight feet wide, and on the outer sides of the building smaller aisles twenty-four feet in width.

In order to break the great length of the roof-lines, three cross avenues or transepts were introduced of the same widths and in the same relative positions to one another as the nave and avenues running lengthwise, viz.: a central transept one hundred and twenty feet in width by four hundred and sixteen feet in length, with one on either side of one hundred feet by four hundred and sixteen feet, and spaces between of forty-eight feet. The intersections of these avenues and transepts in the central portion of the building resulted in dividing the ground-floor into nine open spaces free from supporting columns, and covering in the aggregate an area of four hundred and sixteen feet square. Four of these spaces are one hundred feet square, four one hundred feet by one hundred and twenty feet, and the central space or pavilion one hundred and twenty feet square. The intersections of the forty-eight feet aisles produce four interior courts forty-eight feet square, one at each corner of the central space.

The foundations for the columns consist of piers of rubble masonry with granite cap-stones. The two outer rows of piers have anchor-bolts built in, six feet in depth, to which the columns are bolted, for the purpose of increasing the stability against wind pressure. The superstructure is com-



posed of wrought-iron columns, which support wrought-iron roof-trusses. These columns are composed of rolled channel-bars with plates riveted to the flanges, and stand upon cast-iron bases with lugs let into the granite cap-stone. Lengthwise of the building the columns are spaced at the uniform distance apart of twenty-four feet. In the entire structure there are six hundred and seventy-two columns, the shortest being twenty-three feet, and the longest one hundred and thirty-nine feet ten inches in length. The roof-trusses are similar in form to those in general use for depots and warehouses, and consist of straight rafters with struts and tie-bars. The rafters are made of channel-bars with top plate riveted on; the struts of channels or flat bars, swelled at the centre and held by rivets and sleeves. The tension members are of flat links with upset heads, except for the centre horizontal tie-rod, which is of round iron, with a sleeve-nut at the centre for adjustment. Pin connections are used throughout. The sides of the building for the height of seven feet from the ground are finished with brickwork in panels between the columns; above the seven feet, with glazed sash. Portions of the sash are movable for ventilation. The roof covering is of tin, upon sheathing boards. The ground-flooring is of plank upon sills resting upon the ground, with no open space underneath. All the corners and angles of the building upon the exterior have galvanized iron octagonal turrets, which extend the full height of the building from the ground level to above the roof. These turrets at the corners of the towers are surmounted with flag-staffs, at other places with the national eagle. The building stands nearly due east and west, and is lighted principally by side light from the north and south sides.

Small balconies, or galleries of observation, were provided in the four central towers at the heights of the different stories. These formed attractive places, from which excellent views of the interior could be obtained. No galleries were introduced for the display of exhibits, although some exhibits were crowded out from the ground-floor and obliged to take space in the rooms intended for offices.

A complete system of water-supply, with ample provision of fire-cocks, etc., was provided for protection against fire, and for sanitary purposes.

Offices were placed along the sides of the building in the side aisles, in close proximity to the products exhibited; as many of the twenty-four feet spaces being partitioned off for that purpose as were required, also in the north gallery.

The main promenades through the nave and central transept were each thirty feet in width, and those through the centre of the side avenues and transepts fifteen feet each. All other walks were ten feet wide, and led at either end to exit doors.

The dimensions of the Main Building, the measurements being taken from centre to centre of the supporting columns, are as follows:

Length of Building . . . . .	1880 feet.
Width of Building . . . . .	464 "

CENTRAL AVENUE OR NAVE.

Length between galleries . . . . .	1832 feet.
Width . . . . .	120 "
Height of walls . . . . .	46 "
Height to ridge of roof-truss . . . . .	70 "
Height to top of ventilator . . . . .	80 "

## CENTRAL TRANSEPT.

Length between galleries . . . . 416 feet.  
 Other dimensions same as in nave.

## SIDE AVENUES.

Length between offices . . . . 1832 feet.  
 Width . . . . 100 "  
 Height of walls . . . . 46 "  
 Height to ridge of roof-truss . . . . 65 "  
 Height to top of ventilator . . . . 75 "

## SIDE TRANSEPTS.

Length between galleries . . . . 416 feet.  
 Other dimensions same as in side avenues.

## CORNER TOWERS.

Ground-plan . . . . 24 feet by 24 feet.  
 Height to second floor . . . . 28 " 6 inches.  
 Height to third floor . . . . 46 "  
 Height to top of roof . . . . 75 "  
 Height to top of flag-staffs . . . . 110 "

## CENTRAL AISLES.

Length at east end, 31 panels . . . . 744 feet.  
 Length at west end, 28 panels . . . . 672 "  
 Width . . . . 48 "  
 Height to girders . . . . 22 " 6 inches.  
 Height to top of skylight . . . . 34 "

## SIDE AISLES.

Length at east end, 31 panels . . . . 744 feet.  
 Length at west end, 28 panels . . . . 672 "  
 Width . . . . 24 "  
 Height to girders . . . . 22 " 6 inches.  
 Height to roof, next avenues . . . . 27 " 6 "

## CENTRAL PAVILION.

Ground-plan . . . . .	184 feet by 184 feet.
Height of walls . . . . .	72 " 6 inches.
Height to peak of roof-truss . . . . .	92 "
Height to top of ventilator . . . . .	102 "

## CENTRAL TOWERS.

Ground-plan . . . . .	48 feet by 48 feet.
Height to second floor . . . . .	28 " 6 inches.
Height to third floor . . . . .	46 "
Height to fourth floor . . . . .	72 " 6 "
Height to fifth floor—level of bridges between the towers . . . . .	99 "
Height to top of roof . . . . .	127 " 6 "
Height of longest iron column in turret . . . . .	139 " 10 "
Height to top of flag-staffs on turrets . . . . .	165 "

The following are the area and cubic contents of the building:

	DIMENSIONS IN FEET.	AVERAGE HEIGHT.	SPACE COVERED IN SQUARE FEET.	SIDE OF SQUARE.	PERCENTAGE.	SPACE CONTAINED IN CUBIC FEET.	SIDE OF SOLID CUBE.	PERCENTAGE.
East and west entrance.....	2×24×464	49'. 10 <sup>3</sup> / <sub>4</sub> "	22,272	149'. 3"	0.0255	1,111,344	103'. 6"	0.0239
East and west wings.....	(28+31)×24×464	49'. 7"	657,024	810'. 7"	0.7531	32,536,848	319'. 3"	0.6984
Centre, with north and south entrance.....	416×464	67'. 0 <sup>1</sup> / <sub>2</sub> "	193,024	439'. 4"	0.2214	12,938,112	234'. 9"	0.2777
Whole building.....	1880×464	53'. 5"	872,320	934'. 0"	1.0000	46,586,304	359'. 10"	1.0000

The entire cost of the Main Building may be stated as on the following page.



COST OF MAIN BUILDING.

Grading . . . . .	\$36,504.78	=	37 <sup>1</sup> / <sub>10</sub>	cents per square yard of area graded.
Drainage and sewerage . . . . .	14,482.60	=	14 <sup>1</sup> / <sub>10</sub>	" " " drained.
Water-supply, system of pipes, plugs, etc. . . . .	22,576.35	=	23 <sup>1</sup> / <sub>10</sub>	" " " of the building.
Gas-supply, system of pipes, meters, and fixtures . . . . .	22,696.53	=	02 <sup>1</sup> / <sub>10</sub>	" square foot " " "
Foundations and superstructure (exclusive of painting). . . . .		=	00 <sup>1</sup> / <sub>1000</sub>	" cubic " of contents of the building.
Original bid for 18-acre building . . . . .	\$1,040,000.00			
Increase to 20 acres, addition of central pavilion and central towers . . . . .	380,000.00			
Extras for special arrangements and improvements . . . . .	88,724.20			
	<u>\$1,508,724.20</u>			
Plumbing and sanitary arrangements . . . . .	12,705.15			
Painting inside . . . . .	\$42,324.02			
" outside . . . . .	18,158.85			
	<u>60,482.87</u>			
Flags and trophies . . . . .	9,480.75			
	<u>\$1,591,392.97</u>	=	\$79,569.65	per acre covered.
		=	1.71	per square foot of area covered.
		=	.03 <sup>1</sup> / <sub>10</sub>	per cubic foot of contents of the building.
Office expenses, stationery, printing, lithographing, and advertising . . . . .	4,733.61			
Engineering and superintendence, labor and materials . . . . .	34,069.87			
	<u>\$1,726,456.71</u>	=	\$86,322.84	per acre covered.
		=	1.98	per square foot of area covered.
		=	.03 <sup>1</sup> / <sub>10</sub>	per cubic foot of contents of the building.
Grand total . . . . .				

The architects' design for the building was approved on July 4, 1874. The site was graded during September and October, 1874, and the foundation piers were laid during that same autumn and the next spring. The first iron column was erected May 8, 1875, and the erection of the iron-work was completed by December 2, of the same year. Goods were received into the structure early in January, 1876, and the building was accepted from the contractor February 14, 1876. For all practical purposes it was completed by January 1, 1876, four months before the opening of the Exhibition, the date announced officially by the Centennial Commission, during the spring of 1874, as the time when the building would be ready for the reception of goods.

The area of the Main Building, with its annexes and subsidiary structures, was:

	Sq. Feet.	Sq. Feet.	Acres.
MAIN EXHIBITION BUILDING.			
Ground-floor, inside dimensions . . . . .	823,677		
Galleries . . . . .	52,529		
	<u>          </u>	876,206	20 $\frac{11}{100}$
MINERAL ANNEX.			
Under cover . . . . .	21,600		
Outside platform . . . . .	11,736		
MAIN ANNEX for carriages, etc. . . . .	84,640		
	<u>          </u>	117,976	2 $\frac{71}{100}$
Total . . . . .		994,182	22 $\frac{82}{100}$
IN THE PARK.			
Adjacent to Main Building and Mineral Annex,			
North side . . . . .	75,200		
South side . . . . .	250,997		
Adjacent to Carriage Building . . . . .	26,590		
	<u>          </u>	352,787	8 $\frac{10}{100}$
Total . . . . .		1,346,969	30 $\frac{92}{100}$
Grand total in buildings and Park			

The rectangular arrangement of the building afforded the means of a very simple and efficacious directory system, which proved highly convenient to the administration, the exhibitors, and the public. During its construction the engineers and contractor used a system of lettering and numbering to establish the exact location of each column within the structure, somewhat similar to that used for numbering the houses in the streets of Philadelphia. It proved to be so well adapted to the purpose and so easily comprehended, that it was afterwards continued in use by the Bureaus of Installation and Transportation for the allotment of space and delivery of goods. Commencing at the west end of the building and counting towards the east, the lines of columns were numbered from one to seventy-nine inclusive. Commencing at the north side and counting towards the south, the columns were lettered from A to U inclusive. The exact location of any column was designated by the letter and number of the lines intersecting it at right angles. During the Exhibition exhibitors accepted the same system to designate their post-office address within the grounds. It was also used in the Official Catalogue to designate the location of exhibits enumerated therein. A similar plan was followed in the Machinery and Agricultural Buildings.

The same feature of the rectangular intersection of the aisles and passages made it possible to arrange a system of installation which should properly associate the participating nationalities,—an “installation by races.” It was early evident that the United States, Great Britain, France, and Germany would be the largest exhibitors; and to them were awarded the central locations. France and Colonies, representing the Latin races, were given space adjacent to the northeast central

tower. England and Colonies, representing the Anglo-Saxon races, were given space adjacent to the northwest central tower. The German Empire, and Austria and Hungary, representing the Teutonic races, were granted space adjacent to the southwest tower. The United States was placed in the southeast section. There was comparatively little difference of advantage in any one of these locations over the other, but in order to avoid any possible objection that might be raised on that head, the possibly least desirable of the four sections was reserved for the United States. It was very much desired, in order to make the installation by races complete, to place all the exhibiting nations of Latin extraction in the northeast quarter, adjacent to France, and of Teutonic extraction in the southwest quarter, with Germany, etc., etc. Although this was not deemed necessary to success, it was desired in order to present the international feature in its most complete form. An attempt was made to so arrange the countries, but uncertainty caused by delay in obtaining definite responses from some foreign Governments, and the increasingly urgent demands of American exhibitors for additional space, rendered it impossible. Brazil and Mexico, countries of the American continent, and presenting large exhibits, were placed immediately opposite the United States, in the east wing. China and Japan were placed in the west wing, being geographically west of America. Spain, Egypt, and Turkey were given positions of honor in the centre of the west wing, and Netherlands, Belgium, and Switzerland, similar ones in the east wing. Norway and Sweden were conspicuously placed in close proximity to the west main entrance. Italy and Russia were among the latest in accepting officially, but admirable locations were reserved for them in the west



wing. Several of the foreign Governments—Brazil, Spain, the Netherlands, Egypt, Sweden, Switzerland, China, and others—surrounded their departments with ornamental enclosures, entered through imposing portals.

The Government of the United States contributed nothing toward the installation of the American section; and the handsome display which was made was due to the enterprise of individual exhibitors. Thus, no special enclosure was provided for the American section,—no portals nor pavilions were erected to designate the principal entrances. The exhibits were grouped and arranged without accessory decoration, as effectively as possible, and in this respect the arrangement was in marked contrast to the elaborate and costly enclosures and accessories provided in foreign sections. In order to understand the installation of the American section, it will be necessary to recall the manner in which the floor-space was laid out with main passages, before the allotment in detail was commenced. The entire section was divided, by passage-ways running lengthwise, into three well-defined belts; thus from the outer wall of the building in to the south avenue was the first belt; from the south avenue to the central aisle under the low roof was the second belt; and from the aisle to the nave was the third belt. The width of the first belt, sixty-six feet six inches; of the second, sixty-one feet six inches; and of the third, sixty-four feet. Each belt was nine hundred and seventy-six feet long in the southeast quarter of the building, and was repeated for three hundred feet in the northeast quarter. The total length of each belt was twelve hundred and seventy-six feet.

The Mineral Annex was parallel to the Main Building, upon the south side, and was practically part of the first belt. The

Main Annex was specially constructed for such exhibits as carriages, heating and cooking apparatus, etc., which were too bulky to occupy the limited and more valuable space in the Main Building.

The distribution of space in this department among countries will be understood by reference to Plate B.

The mode of installation pursued in the Main Building was substantially that followed in the others, so that the subject need not be recurred to.

MEMORIAL HALL.

(PENNSYLVANIA) STATE CENTENNIAL SUPERVISORS.

---

ALEXANDER HENRY, Philadelphia.  
J. GILLINGHAM FELL, Philadelphia.  
JOHN O. JAMES, Philadelphia.  
WILLIAM BIGLER, Clearfield Co.

WILLIAM M. LYON, Alleghany Co.  
JOHN H. SHOENBERGER, Alleghany Co.  
GEORGE R. MESSERSMITH, Franklin Co.  
ARIO PARDEE, SR., Luzerne Co.

JOHN H. EWING, Washington Co.

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*Chief of the Bureau of Art*, JOHN SARTAIN.

*Architect*, H. J. SCHWARZMANN.

*Contractor*, RICHARD J. DOBBINS.

Contract made, July 3, 1874.

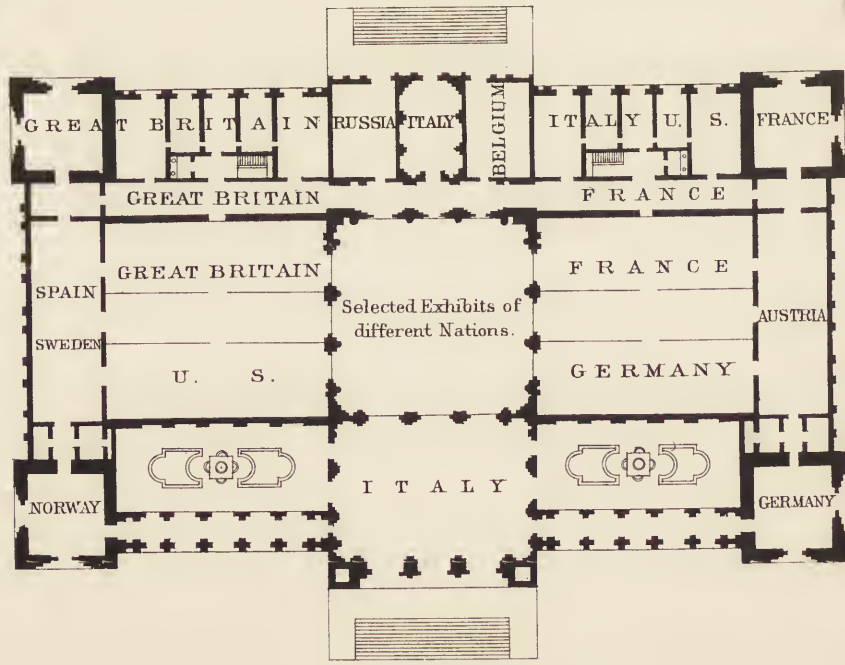
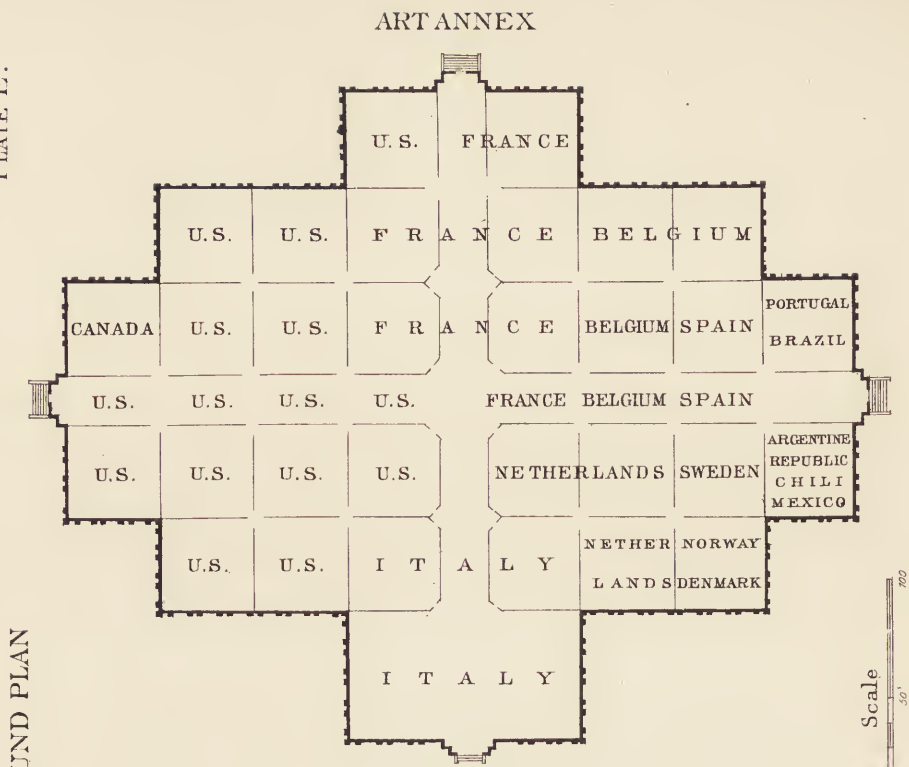
Building finished, March 1, 1876.

Cost, \$1,500,000.





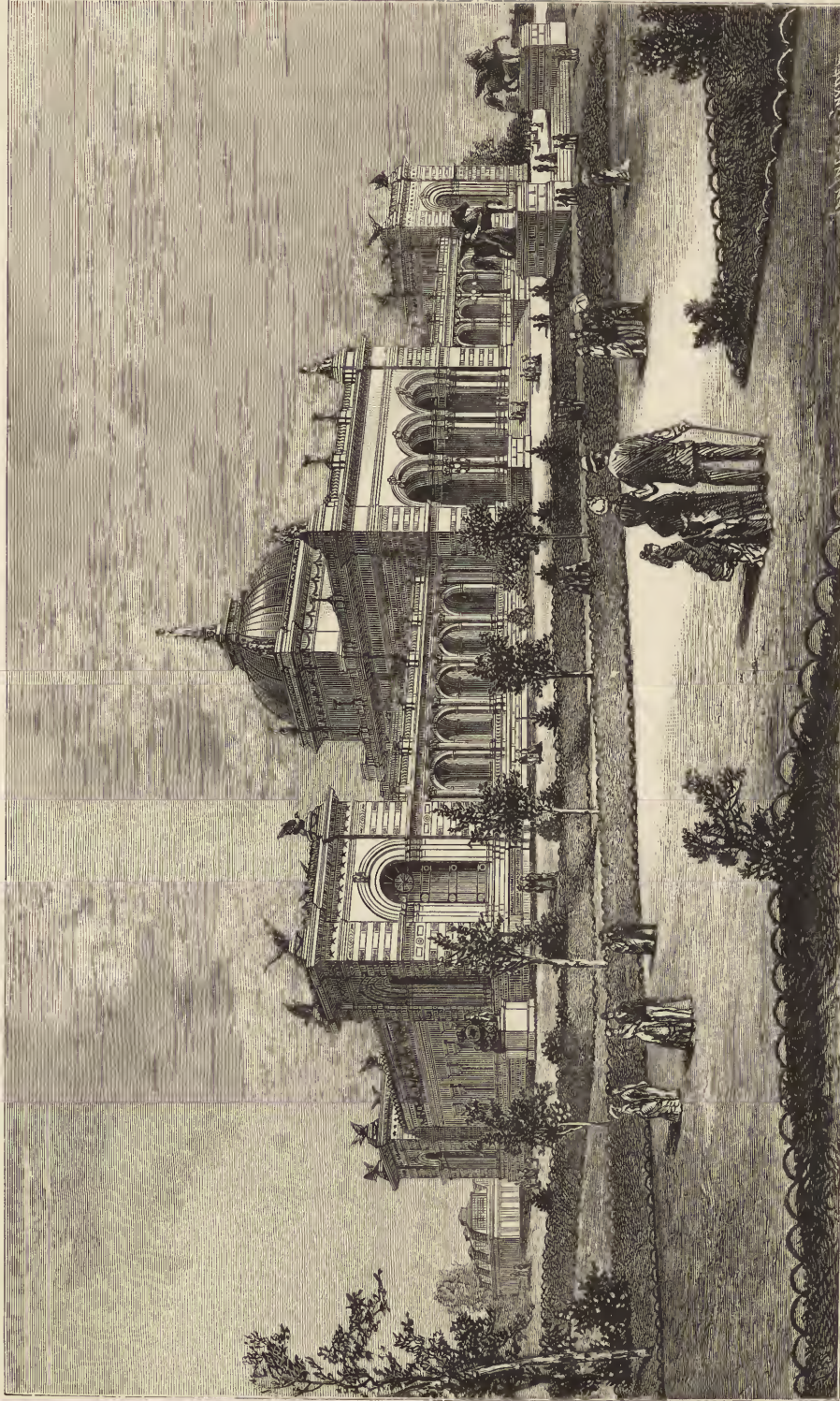
PLATE E.











MEMORIAL HALL (ART GALLERY, WITH ANNEX).



## MEMORIAL HALL.

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FOR some years the Commissioners of Fairmount Park and other citizens of Philadelphia and Pennsylvania had been desirous to bring about the establishment within the Park of a museum of art, science, and industry,—a collection similar to that of the South Kensington Museum, of London. The approach of the Centennial Celebration rendered it possible to do this. The Philadelphia City Councils appropriated (February 22, 1873) five hundred thousand dollars, and the Pennsylvania Legislature (March 27, 1873) one million dollars, “for the erection of a permanent Centennial building in Fairmount Park, which shall remain perpetually as the property of the people of the Commonwealth, for their improvement and enjoyment.” The latter act created a board of State Centennial Supervisors, charged with erection of the building, but provided that during the period of the Exhibition the Art Gallery should be under the sole control of the Centennial Commission. The plans finally adopted were agreed upon by the Board of Supervisors, the Director-General, and the Building Committee of the Board of Finance; and the building was put up under the direction of that committee.

The Memorial Hall is located on a line parallel with, and northward of, the Main Exhibition Building. It is elevated on a terrace six feet above the general level of the Lansdowne



Plateau,—the plateau itself being an eminence one hundred and sixteen feet above the surface of the Schuylkill River. The entire structure is in the modern Renaissance. The materials are granite, glass, and iron. No wood is used in the construction, and the building is thoroughly fire-proof. The structure is three hundred and sixty-five feet in length, two hundred and ten feet in width, and fifty-nine feet in height, over a spacious basement twelve feet in height, and is surmounted by a dome. The main front looks southward, and displays three distinctive features: *First*. A main entrance in the centre of the structure, consisting of three colossal arched doorways of equal dimensions; *Second*. A pavilion at each end; *Third*. Two arcades connecting the pavilions with the centre. The central section is ninety-five feet long, seventy-two feet high; pavilions, forty-five feet long, sixty feet high; arcades, each ninety feet long, forty feet high. The front or south face of the central section displays a rise of thirteen steps to the entrance, seventy feet wide. The entrance is by three arched doorways, each forty feet high and fifteen feet wide, opening into a hall. Between the arches of the doorways are clusters of columns terminating in emblematic designs illustrative of Science and Art. The doors, which are of iron, and in six divisions, are relieved by cast-zinc panels and cast-iron columns. The main cornice is surmounted by a balustrade with candelabras. At either end are allegorical figures representing Science and Art. The dome rises from the centre of the structure to the height of one hundred and fifty feet from the ground. It is of glass and iron, and of a unique design; it terminates in a colossal bell, from which the figure of Columbia rises. A group of colossal size stands at each corner of the base of the dome. These figures

typify Industry and Commerce on the south front, and Agriculture and Mining on the north front. Each pavilion displays a window thirty feet high and twelve feet wide; it is also ornamented with thirteen stars in the frieze, a highly-ornamented cresting, and a colossal eagle at each of its four corners. The arcades, a general feature in the old Roman villas, but entirely novel here, are intended to screen the long walls of the gallery. They each consist of five groined arches; these arcades form promenades looking outward over the grounds, and inward over open gardens, which extend back to the main wall of the building. These garden-plats are each ninety feet long and thirty-six feet deep, and are designed for the display of statuary and fountains. A stairway from the room between the pavilions and picture-gallery reaches the upper line of the arcades, forming a second promenade thirty-five feet above the ground. Its balustrade is ornamented with vases, and is designed ultimately for statues. The cornices, the atticas, and other cresting throughout are highly ornamented. The walls of the east and west sides of the structure display the pavilions and the walls of the picture-galleries, and are relieved by five niches, designed for statues; the frieze is richly ornamented above it; the central dome shows to great advantage. The rear or north front is of the same general character as the main front, but in place of the arcade is a series of arched windows, twelve in number, with an entrance in the centre; in all, thirteen openings above, in an unbroken line, extending the entire length of the structure; between the pavilions is the grand balcony, a promenade two hundred and seventy-five feet long and forty-five feet wide, and elevated forty feet above the ground, overlooking northward the whole panorama of the Park grounds.



The main entrance opens on a hall eighty-two feet long, sixty feet wide, and fifty-three feet high, decorated in the modern Renaissance style; on the farther side of this hall three doorways, each sixteen feet wide and twenty-five feet high, open into the centre hall; this hall is eighty-three feet square, the ceiling of the dome rising over it eighty feet in height. From its east and west sides extend the galleries, each ninety-eight feet long, eighty-four feet wide, and thirty-five feet in height. These galleries admit of temporary divisions for the more advantageous display of paintings. The central hall and galleries form one grand hall two hundred and eighty-seven feet long and eighty-five feet wide, capable of holding eight thousand persons,—nearly twice the dimensions of the largest hall in the country. From the two galleries doorways open into two smaller galleries, twenty-eight feet wide and eighty-nine feet long. These open north and south into private apartments, which connect with the pavilion-rooms, forming two side galleries two hundred and ten feet long. Along the whole length of the north side of the main galleries and central hall extends a corridor fourteen feet wide, which opens on its north line into a series of private rooms, thirteen in number, designed for studios and smaller exhibition-rooms. All the galleries and the central hall are lighted from above; the pavilions and studios are lighted from the sides. The pavilions and central hall are designed especially for exhibition of sculpture.

During the time of the Exhibition, in order to increase the amount of wall-space in the building, it was found necessary to subdivide the great galleries by means of temporary partitions into three each, thus producing an additional surface for pictures of nearly eight hundred linear feet, the dividing screens

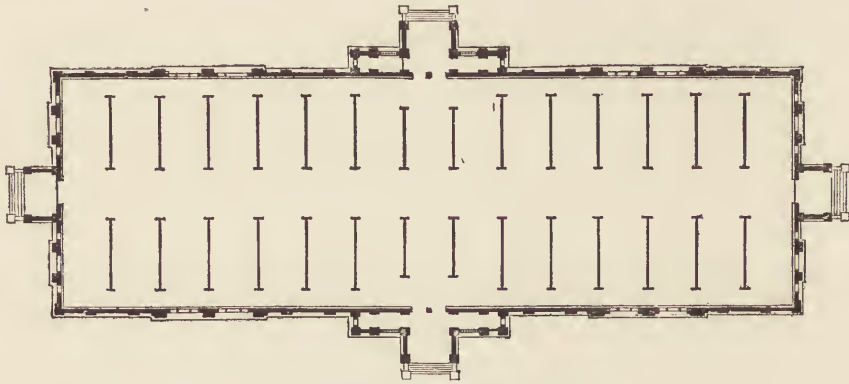
being available on both sides. This important gain was further extended by closing for the time the four great openings into the central hall under the dome, and covering them also with pictures. The fine architectural effect of the interior was thus seriously impaired, but the necessities of the situation rendered the measure unavoidable.

Until the organization of the Bureau of Art (September, 1875) it was supposed that the Memorial Hall would accommodate all the works of art to be exhibited, or at least all the paintings and statuary; but, as definite applications for space began to arrive from home and abroad, it soon became manifest that its capacity was wholly inadequate. It thus became necessary to erect, just north of the Art Gallery, the building known as the Art Annex. This, with the Photographic Hall, completed the provisions made for installing the Department of Art.

The plan of the Art Annex was rectangular, three hundred and ninety-five feet long by two hundred and twenty-two feet ten inches wide. It was divided by two corridors transversely and longitudinally, each twenty feet wide. It contained one large room fifty-five feet wide by one hundred feet long, and thirty smaller rooms, each about forty feet square. The light to these rooms was obtained through lanterns in the roof, the rays being broken by obscured glass in suspended ceilings. The general design throughout was Renaissance. The four entrances to the building were approached through vestibules, on either side of which were offices. The exterior walls were of brick, plastered on the inside, with cemented mortar on the outside. The inner partitions consisted of studding lined with boarding on both sides. The roof was formed of lattice-trusses composed of iron and timber, the upper chords supporting lanterns and the

lower chords carrying the suspended ceilings. The general outline of the exterior was broken with pilasters, with recessed window-panels between them. The ground-plan explains the general arrangement and the peculiar construction, which is believed to be unique, and shows what galleries were occupied by the several nationalities. The peculiarity of plan is that none of the thirty square galleries have the best exhibiting portion of their walls pierced through with doors. The means of ingress and egress are confined to the corners of the room, which are the least desirable places in which to hang pictures, thus leaving the valuable centre of each wall available for use. Probably this arrangement was here adopted for the first time, as an unvarying system throughout a building. As the necessity for constructing the Art Annex could not be foreseen, because it grew out of the gradually increasing demands for more and more space beyond all reasonable expectation, the building was ordered at so late a period that it was found impossible to erect it on fireproof principles and yet have it ready in season for the opening. Still, measures were adopted for making it thoroughly safe. Although neither lights nor fire were to be used, owing to the season of the year in which the Exhibition was held, means were provided in abundance to guard against any possibility of accident by fire. Within the Annex four plugs, with hose attached ready for instant use, were placed at suitable distances apart, and relays of the fire-brigade were on constant duty day and night in addition to the force of guards and janitors. Patent fire-extinguishers were also ready for any sudden emergency, and the outside of the building was equally well furnished; and as the building was of but one story, and therefore low, access to the roof was easy.

The form of the Photographic Hall was a parallelogram, two hundred and fifty-eight feet long by one hundred and seven feet wide, with walls twenty feet high. It consisted of one main hall divided into sectional galleries by wood partitions. The roof was formed of lattice-trusses, supporting skylights. The general style was Renaissance. There were entrances on



PHOTOGRAPHIC HALL. GROUND-PLAN.

all four sides of the building, the two main entrances having ladies' and gentlemen's reception-rooms on each side. The general outline of the exterior was broken by pilasters, the space between being formed into panels and stencilled. The wall-space was multiplied many times by the erection of twenty-eight screens, placed sixteen feet apart in two ranks, well lighted on both sides from a continuous skylight, with a broad avenue in the middle between them, making a total wall-surface available for exhibits of more than twenty-one thousand square feet. The arrangement may be better explained by the ground-plan given above.

Each nation exhibiting works of art was afforded space for representative products in the Memorial Hall. Those which exhibited in the Art Annex were



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United States,	Sweden,
France,	Norway,
Spain,	Canada,
Italy,	Mexico,
Belgium,	Brazil,
Netherlands,	Argentine Republic.
Denmark,	

In the Photographic Hall were exhibits from

United States,	Russia,
Great Britain,	Canada,
France,	Mexico,
Germany,	Brazil,
Austria,	Argentine Republic,
Belgium,	Australia,
Denmark,	Japan.
Sweden,	

The Art Annex and Photographic Hall were of temporary construction, and, like most of the buildings, were removed at the close of the Exhibition.

In accordance with the design of establishing a permanent museum within the Park, which is referred to at the beginning of this chapter, a committee of citizens of Philadelphia was formed in advance of the opening of the Exhibition (July 20, 1875), who framed the design of the "Pennsylvania Museum and School of Industrial Art." Its purposes, as stated at the time, were "To establish in Philadelphia, for the State of Pennsylvania, a Museum of Art in all its branches as applied to Industry, and in all its technical applications, and to provide in connection there-

with, with a special view to the development of the Art Industries of the State of Pennsylvania, opportunities and means of giving instruction in drawing, painting, modelling, and designing, in their industrial applications, through lectures, practical schools, and special libraries;" and a corporation was formed to carry out these designs. The management was placed in the hands of a board of trustees, consisting of thirty-two persons, twenty chosen by the members, together with the Governor of Pennsylvania, the Mayor of Philadelphia, and one to be chosen annually by each of the following bodies: the Senate and the House of Representatives of Pennsylvania, the Select and Common Councils of the City of Philadelphia, the Pennsylvania Academy of the Fine Arts, the Philadelphia School of Design for Women, the University of Pennsylvania, the Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts, the Fairmount Park Commission, and the Board of State Centennial Supervisors.

The State and municipal authorities having charge of the Memorial Hall assented to its use by the Museum. Subscriptions were liberally made toward its endowment; and its managers had exceptional facilities during the period of the Exhibition for the purchase of objects therein shown,—works in marble and metal, textile fabrics, embroidery, tapestry, pottery, glassware, relics, etc. In addition to these purchases much was added in the form of gifts from foreign commissions and private exhibitors, and of loans of objects which virtually amount to gifts, such as the very complete collection in mining and metallurgy which was shown in the Exhibition by the American Institute of Mining Engineers. The stores thus collected, which are constantly being added to, are arranged in the most attrac-

tive galleries of the Memorial Hall, and may be examined daily by the public.

As an outgrowth of the Museum there have been established schools for industrial art education, in which gratuitous instruction is given in drawing, modelling, geometrical designing, coloring, lithography, wood-engraving and carving, decorative painting, metal-working, etc., also in classes for art needlework. These classes are held both in the daytime and in the evening. From considerations of accessibility, the schools are not held in the Memorial Hall, but in a central location in the city.

Thus, the Pennsylvania Museum and School of Industrial Art promises to be among the most permanent and beneficent results of the Exhibition.

THE MACHINERY BUILDING.



*Chief of the Bureau of Machinery*, JOHN S. ALBERT.

*Engineers and Architects*, HENRY PETTIT, JOSEPH M. WILSON.

*Contractor*, PHILIP QUIGLEY.

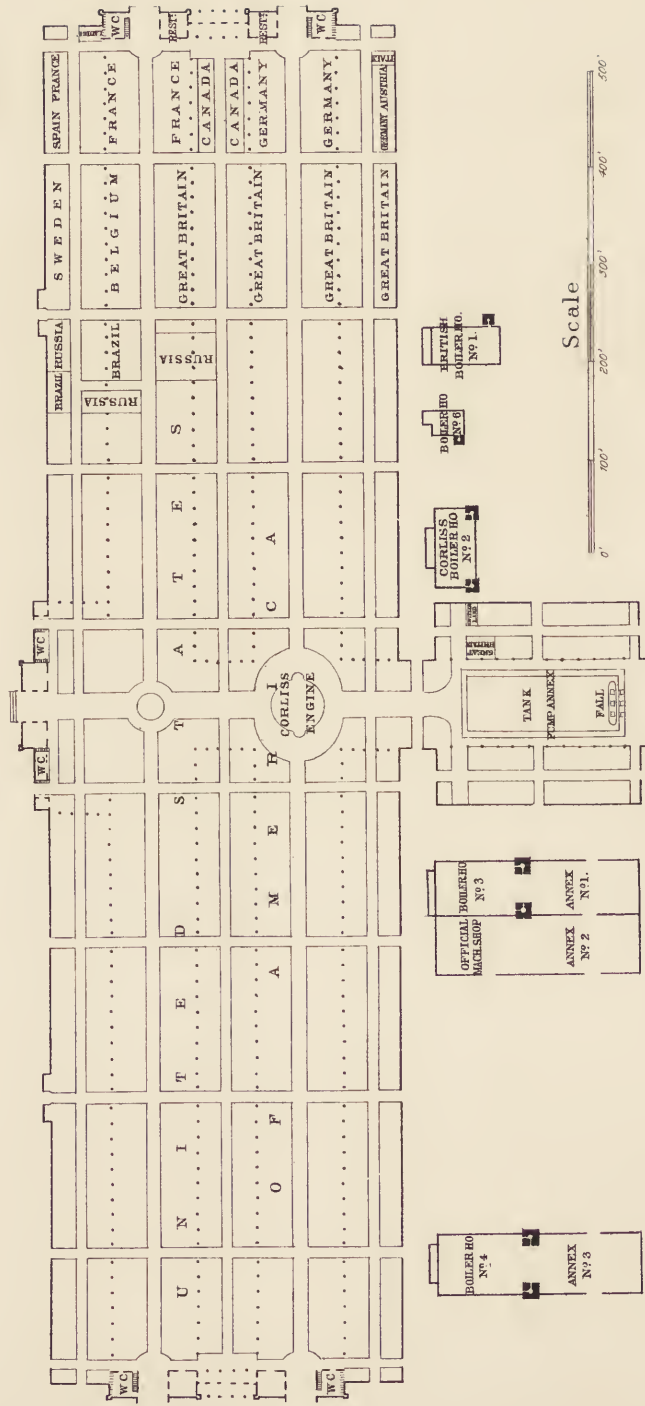
Contract made, January 27, 1875.

Building finished, October 1, 1875.

Cost, \$542,300.



PLATE G.



GROUNDPLAN OF MACHINERY BUILDING.

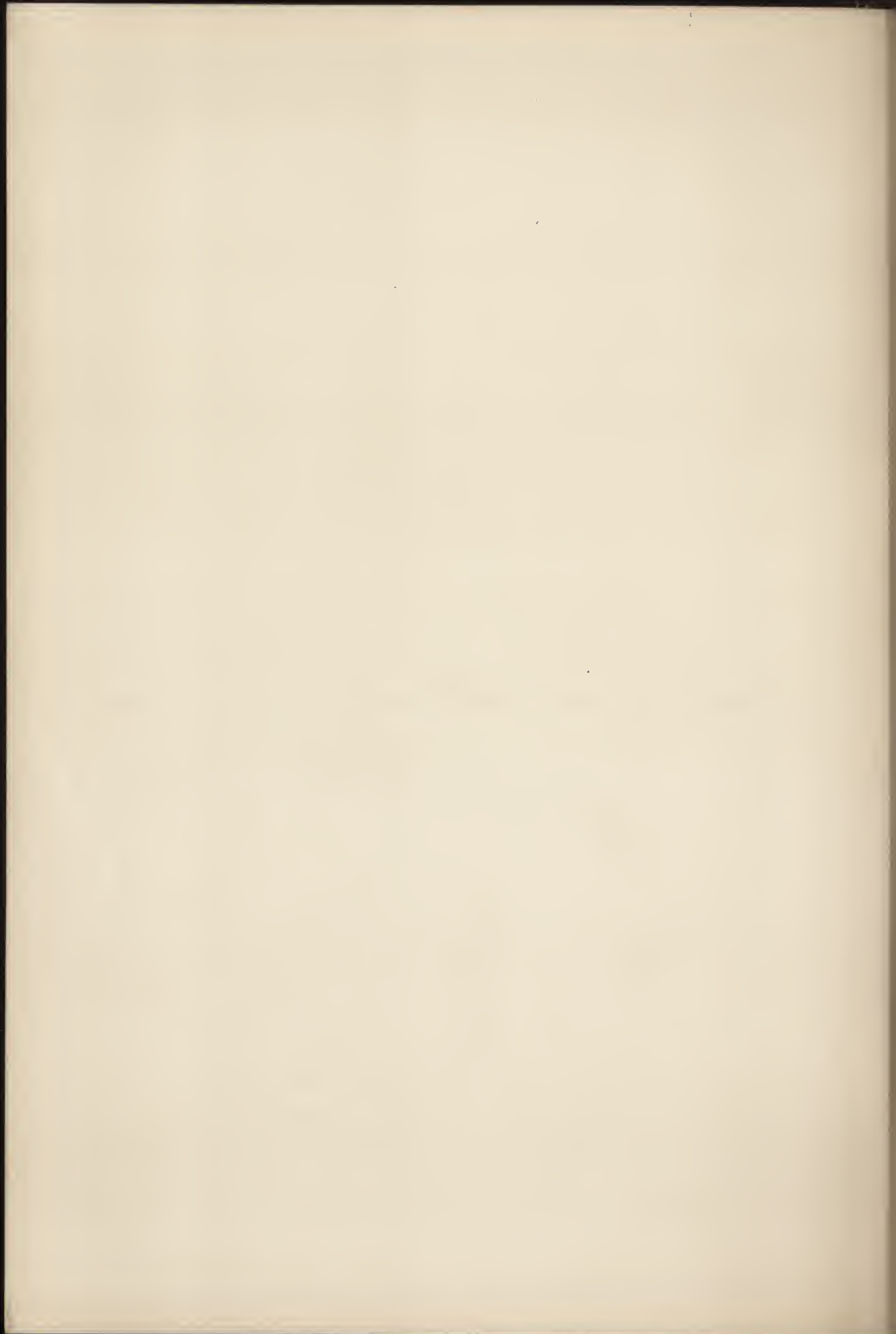








MACHINERY BUILDING.





## THE MACHINERY BUILDING.

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MACHINERY HALL was built entirely at the cost of the City of Philadelphia, whose Councils appropriated (April 2, 1874) the sum of eight hundred thousand dollars for the purpose. The cost of the building proper, however,—exclusive of its annexes, boilers, equipment, etc.,—was kept down to five hundred and forty-two thousand three hundred and six dollars, and the amount thus saved was applied to the construction of the Horticultural Hall. The Machinery Hall stood directly west of the Main Building, separated from it by a plaza five hundred and forty-two feet wide; and as the north fronts of the two were on the same line, and their height and construction similar, they appeared from many points of view to constitute a single enormous structure, their entire frontage upon the Avenue of the Republic being three thousand eight hundred and twenty-four feet, or nearly three-quarters of a mile.

The Machinery Building covered an area of three hundred and sixty by fourteen hundred and two feet, with projections beyond these dimensions for doors and portals on the east, west, and north sides, and also an annex on the south side of two hundred and eight by two hundred and ten feet, connected with the main hall by a passage-way ninety feet in width. These measurements are all to centre lines of outer columns. The boiler-houses were located south of the main hall, east

and west of the southern annex, being, on the east side, the British boiler-house, or No. 1, and the Corliss boiler-house, or No. 2; and on the west side, the machine-shop and boiler-house No. 3, in one building, and boiler-house No. 4.

The width of Machinery Hall was fixed by the maximum distance it was judged desirable to convey steam from the various boiler-houses. In designing the building, a certain amount of low roof was desired, with stiffened tie-beams for shafting, while the remainder could be made higher, improving the effect, and giving facilities for light and ventilation. The cross-section was therefore planned in five spaces, the central and two outer sections being sixty feet each in width, with a height from floor to tie-beam in clear of twenty feet, and to ridge of thirty-three feet; and the two intermediate spans ninety feet each, with a height to square of forty feet, and to ridge of fifty-eight feet seven inches. These avenues extend the whole length of the building, and the exterior finish at the east and west ends is designed to harmonize with their cross-section, low towers or belfries, having a height to the apex of the roof of eighty-one feet, being placed at the ends of the ninety feet spans. The southern annex is formed with a centre span of ninety feet, and two side spans of sixty feet each, the heights and outlines corresponding with those of the main avenues. The centre span of ninety feet continues on across the main portion of the building, intersecting the longitudinal avenues of ninety feet, and forming a transept, at the northern end of which the face of the building is finished with a tower and wings similar to those at the east and west ends. The projections at the three principal entrances on the north, east, and west provide offices, retiring-rooms, and restaurants on



the lower floor, and offices and galleries of observation on the upper floors. The governing dimension or unit of space for the building is sixteen feet. The entire floor-area of the Machinery main hall and its annex amounts to five hundred and eighty-eight thousand four hundred and forty square feet, and the gallery and office floors in the upper stories increase this to fourteen acres

The annex, which was designed especially for the exhibition of hydraulic machinery in motion, contained in the centre an open tank, sixty by one hundred and fifty-six feet area, with a depth of ten feet, and had its top level with the floor. This was filled with water, and at its south end was a water-fall running into it, thirty-five feet high and forty feet wide, supplied from the tank by pumps on exhibition. Canals or ducts were provided under the floor at the sides, connected with the tank, for convenience in testing pumps, and a pit was arranged at the south end of the tank for trials of turbine-wheels.

The foundations of the building are of good rubble masonry laid to a depth of at least four feet, and all the exterior walls are of Trenton brownstone, extending to a height of five feet above the floor, with a base course of granite. All doors are provided with heavy stone sills, and the interior columns have foundation piers, finished off with a granite cap-stone. The tank in the annex was built with stone side walls, extending to a depth of one foot below the bottom of the excavation for the tank, lined inside with nine inches of brickwork laid in cement, and the bottom of the tank was covered with a heavy layer of cement concrete.

The framework of the building is constructed entirely in solid timber, excepting only certain members of the roof-trusses,

more particularly the tension members, which are of wrought-iron. All columns, caps, sills, principal rafters, cornices, sash, scroll-work, ties, braces, etc., are of white pine. The purlins, framing of louvre ventilators, and roof sheathing are of spruce. The main flooring is of yellow pine one and one-half inches thick, dressed on the upper side, and laid closely on sills in the same manner as in the Main Building. The upper floors are laid with one and one-quarter inch yellow pine, on three by twelve inch floor-joist, placed sixteen inches to centres. Five stairways are introduced, leading to the upper floors at the ends of the building and on the north side, and the main entrances, stairways, and retiring-rooms are ceiled with seven-eighths of an inch ceiling-boards.

The outer masonry walls are covered on top by a timber sill, and into it are mortised the main posts, with the horizontal cap-plates on top. The system of forming the interior columns consists in having a solid square timber in the centre, surrounded by four pieces, one on each face, the whole well bolted together, and acting as one column. At the level of the low roof stiffening trusses are framed in from column to column, and above these, up to the roof of the ninety feet span, intermediate framing is introduced, the same as in the outer walls, filled in with glass sash, a lower part fixed, and an upper part movable for ventilation.

The roofs are framed with a slope of twenty-two and a half degrees, those of sixty-six feet span having timber principals and ties, vertical tie-rods of wrought-iron, and inclined timber-braces. The spans of ninety feet have timber principal rafters, the remainder of the trussing being of wrought-iron, constructed on the French triangular system. Cast-iron head, heel, and

angle blocks are used, and cast-iron stiffening braces or brackets are introduced to connect the upright columns to the roof-trusses and to the longitudinal stiffening trusses. All roofs have louvre ventilators in continuous lengths, provided with sash on the sides, swinging on centres, and operated from the floor below with cords. The system of ventilation is exceedingly perfect, giving a pleasant temperature within the building during the hottest weather.

The entrance and exit doors, of which there are a large number on the sides and at the ends of the structure, are double, sliding sideways, being hung by sheaves on a sliding rail at the top, and furnish a clear opening of eleven feet two inches.

All the iron used in the building is specified of the best quality, that in tension members to be double rolled and to have an ultimate strength of fifty-five thousand pounds per square inch. Ornamental wrought-iron gates are provided at the east, west, and north fronts.

The entire roof of the building and of the louvre ventilators is covered with first quality roofing-tin, all necessary gutters being provided and properly connected by tin conductors to a terra-cotta pipe system of drainage, discharging the water to the main sewers.

Gas is supplied for policing purposes only, the total number of lights supplied being five thousand, and the amount of gas-pipe of the various sizes used, over sixteen thousand lineal feet.

The water service system consists of three main lines with the necessary branches, of cast-iron ball-and-socket pipes, the amount used being over ten thousand lineal feet. A special ten-inch pipe ran from the bottom of the lake north of the

Machinery Hall, to supply the boilers for the fourteen hundred horse-power Corliss engine that occupied the centre of the building.

The fire-plugs are of the Philadelphia fire-gauge size, thirty-four on the exterior of the building and forty-eight in the interior.

All necessary lavatories and retiring-rooms were provided to fully meet the requirements.

The building is painted on the exterior with three coats of white lead in oil, of a pearl tint, relieved by different shades and by dark maroon color on the chamfers. The interior is very plainly painted, as would become a building devoted to the purposes for which this is, the sides and columns of light shades of umber and white lead, and the roof calsimined in two coats of light pearl color, the iron-work, rods, struts, etc., being painted dark blue. The effect, although not by any means elaborate, is remarkably good, and has been much admired.

Four principal boiler-houses, operated in connection with the Machinery Hall, were situated on the south side, and separated from it by a railroad track, by means of which the requisite supplies of fuel could be brought in during the Exhibition. Two of these boiler-houses were east and two west of the hydraulic annex. They were all of the same character of construction as adopted in the Machinery Hall, differing of course somewhat in the details, especially in the substructure, sunken areas being required for placing the boilers and for fuel, but they presented the same exterior appearance, the walls of stone for a height of five feet and above that of open framework filled in with glass; timber roofs covered with tin, and crowned



with louvre ventilators, the side sash swinging on centres, the same as in the other buildings. They were each provided with a vault, with inclined shute extending out under the railroad track to facilitate putting in coal from drop-bottom cars. Over the coal-vault at the entrance door was a platform level with the exterior surface of the ground, extending into the building, and protected by an iron railing on the sides, so that visitors could have access for the purpose of viewing the operations of the boilers.

Beginning near the eastern end of the Machinery Hall and going west, the first building, or No. 1, was the British boiler-house, covering an area of thirty-six by seventy-three and a half feet. It had one wrought-iron chimney, with stone and brick base, extending a total height from bottom of flue to top of pipe of ninety-two feet. The building contained three of Galloway's patent boilers.

Next in order was No. 2, or the boiler-house for the central Corliss engine, which was of the same character as the preceding, covering an area of forty-one feet eight inches by eighty feet; but it had two ornamental octagonal brick chimneys, each ninety-one feet eight inches in height above the surface of the ground. Arranged around three sides of the interior, the fourth side, next to Machinery Hall, being the entrance to the visitors' platform, were twenty Corliss upright boilers, of seventy horse-power each, connecting with the chimneys by horizontal flues lined with fire-brick. These boilers had a connection with the engine by means of a wrought-iron double-riveted pipe passing under ground, eighteen inches in diameter and three hundred and twenty feet long.

Building No. 3 was a boiler-house and machine-shop com-

bined, a portion of the building also being used for exhibition purposes. It covered an entire area of one hundred and twenty by two hundred and eight feet, being divided longitudinally into two buildings of sixty feet width each, and had two chimneys of wrought-iron pipe, precisely the same as the one attached to the British boiler-house. The eastern half of the building contained in front a boiler-room, sixty by eighty-nine feet, the floor being sunk ten feet below the surface of the exterior ground, and an exhibition-room in the rear of sixty by one hundred and nineteen feet. The western half contained in the front a machine-shop, thirty by eighty feet; a blacksmith-shop, thirty by thirty-two feet; a store-room; a plumber-shop, thirty by thirty-two feet; and a carpenter-shop, thirty by thirty-two feet with an engine-room of sixteen by thirty feet attached. In the rear it contained an exhibition space of sixty by ninety-six feet.

Boiler-house No. 4 covered an area of sixty feet in width by two hundred and eight feet in length, the front portion, sixty by ninety-six feet, being excavated to a depth of ten feet, and used for boilers, and the rear, of sixty by one hundred and twelve feet, used for exhibition space. There were two iron chimneys, with brick and stone bases, the same as on the previous building.

In addition to these buildings described as connected with the Machinery Hall, there were two other boiler-houses, considerably smaller in size. Boiler-house No. 5 was connected with a saw-mill, a frame building west of Machinery Hall, open on the sides, and covering an area of eighty by two hundred and seventy-six feet. The boiler-house was thirty by forty-eight feet, and had a wrought-iron chimney four feet in diameter, on a brick base, and sixty feet high.

Boiler-house No. 6 was connected with the Shoe and Leather Building. It furnished the entire steam for this building, and covered an area of twenty-six by thirty-two feet, and had a wrought-iron stack with brick base.

Beyond the western end of Machinery Hall were numerous annexes and special exhibits which properly pertained to the Department of Machinery, but were excluded by considerations of space, though installed under its supervision. These are shown upon Plate B. Among these annexes, the Shoe and Leather Building,—at the southeast corner of the Hall,—from its size and the importance of the exhibits it contained, reached almost the dignity of one of the principal buildings. It was three hundred and fourteen by one hundred and sixty feet in size, and was arranged as shown in the following ground-plan :



SHOE AND LEATHER BUILDING. GROUND-PLAN.

The central feature of the Machinery Hall—perhaps the one in the whole Exhibition which elicited most admiration—was the great Corliss engine, which, during the entire Exhibi-

tion, and without a moment's derangement, drove thirteen acres of machinery.\*

The nations which exhibited in the Machinery Hall were as follows:

United States,	Sweden,
Great Britain,	Italy,
Jamaica,	Tunis,
Canada,	Japan,
Tasmania,	Brazil,
France,	Argentine Republic,
Germany,	Chili,
Austria,	Spain,
Switzerland,	Portugal,
Netherlands,	Turkey,
Belgium,	Russia.
Denmark,	

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\* A description of this engine and its appliances will be found in the *Report of the Chief of the Bureau of Machinery* (included in the Director-General's Report), page 166; also in the *Report of the Judges of Awards for Group XX. (Motors, Hydraulic and Pneumatic Apparatus)*, page 97. The latter is accompanied by a perspective view of the engine.



AGRICULTURAL HALL.

*Chief of the Bureau of Agriculture, BURNET LANDRETH.*

*Architect, JAMES H. WINDRIM.*

*Contractor, PHILIP QUIGLEY.*

Contract made, July 26, 1875.

Building finished, April, 1876.

Cost, \$260,000.









311



AGRICULTURAL HALL.





## AGRICULTURAL HALL.

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THE Agricultural Hall, erected by the Board of Finance at a cost of two hundred and sixty thousand and forty-five dollars, was the northernmost of the principal Exhibition buildings,—*i.e.*, the most distant from the main entrances. It, with its several annexes, contained the exhibits referred to the Department of Agriculture, excepting the displays of live-stock and the tests of agricultural machinery, which were held without the grounds. It stood north of the Horticultural Hall and east of Belmont Avenue, by which visitors could reach it on foot; it was also accessible by the narrow-gauge railroad, which completely encircled it, while those approaching it from the south—that is, from the direction of Horticultural Hall—could pass over Belmont Ravine by means of the “Safety Elevated Railway,” which is shown in the foreground of Plate J, and proved a highly novel and attractive feature, much utilized by visitors.

The originality of the construction of the Agricultural Building was much admired, its interior effect being that of a cathedral ten acres in extent, though its materials were of the simplest, while its light and ventilation were perfect. Its extreme dimensions were eight hundred and twenty feet in depth by five hundred and forty feet in width, and consisted of a nave eight hundred and twenty feet in length by one hundred feet



in width, crossed by three transepts, each five hundred and forty feet in length, the central transept being of the same height and width as the nave, the other two each eighty feet in width. The intersection of the nave and central transept was surmounted by a dome forty feet in diameter and one hundred and eighty feet in height above the floor. The nave and transepts were constructed with curved Howe trusses, springing from the ground and forming Gothic arches, so that the roof and its supports were combined in a single construction. The trusses were set uniformly twenty feet between centres, their depths being four feet six inches for the one hundred feet spans, and three feet nine inches for the eighty feet spans. At the intersection of the nave and central transept the diagonal trusses were coupled, separated eight feet, and lattice-braced together as one truss; they were ten feet in width at the foot, converging to six feet at the top, where they were united by straight truss sections supporting the dome. The intersections of the lesser transepts with the nave were similar in construction, though proportionately smaller trusses were employed. The areas intervening between the nave and transept sections, forming four courts, and the four spaces on the exterior corners, were covered by a simple shed roof, carried on posts twenty feet between centres, and enclosed by sash on their outer lines. The building was lighted by a combined skylight and ventilator upon the roofs of the trussed sections, and by elevated lantern lights upon the shed sections. A complete system of drainage was provided by sewers, and for the water-supply within and without the building. The materials used in the construction were white pine timber for trusses, and hemlock for the general construction throughout. There was used in the building

2,111,560 feet BM. of lumber, 213,300 pounds of iron, 243,100 square feet of tin roofing, 410,000 square feet of felt roofing, 113,500 square feet of glass. The object of the design was to enclose the given amount of space in the most economical manner. This was accomplished by the adoption of the nave and transept construction, which was economical in itself, and afforded the resistance and solidity which enabled the sections attached to them to be the simplest shedding. Upon the exterior the ends of the nave and transepts were flanked with turret towers, containing stairs to approach the galleries of the nave and central transepts and the dressing-rooms, and forming at their tops ventilating turrets. The flat surfaces of the fronts were paralleled, and the openings in them were each filled with jig-sawed tracery in Gothic outlines.

The steam-power required in the Agricultural Building was furnished by two boilers situated in an annex two hundred feet to the eastward, which supplied two engines of eighty and one hundred and twenty horse-power respectively. These drove shafting in the eastern front of the building, where was grouped such agricultural machinery as required to be shown in motion. The power was distributed from the four main lines of shafting to the various spaces of exhibitors at their own expense. The engines were stopped but twice during the running time of the six months,—once for fifteen minutes, and again for thirty minutes, because of the derangement of the belts by damp weather.

The exhibiting space afforded in the building, after deduction of the passage-ways and aisles, was two hundred and fifty thousand two hundred and ninety-four square feet. Of this, ninety-two thousand three hundred and seventy-two square

feet (nearly four acres) were allotted to foreign countries, as follows :

	Sq. Feet.		Sq. Feet.
Canada . . . . .	10,387	Portugal . . . . .	6,182
England . . . . .	12,224	Germany . . . . .	4,873
Brazil . . . . .	4,668	Austria . . . . .	2,392
Denmark . . . . .	806	Norway . . . . .	3,090
Italy . . . . .	4,280	Spain . . . . .	6,061
Russia . . . . .	6,893	Japan . . . . .	1,665
Liberia . . . . .	1,536	Sweden . . . . .	2,603
Venezuela . . . . .	1,220	Netherlands . . . . .	4,276
France . . . . .	15,743	Argentine Republic . . . . .	3,468

These exhibits were placed in the southern portion of the building, as shown in Plate B.

American exhibitors, for the most part, installed their products individually, yet there were displays from the following States collected by the "State Boards of Centennial Managers," which were termed "collective exhibits:"

	Sq. Feet.		Sq. Feet.
Connecticut . . . . .	480	Nebraska . . . . .	705
Delaware . . . . .	286	New Hampshire . . . . .	360
Illinois . . . . .	501	New Jersey . . . . .	912
Indiana . . . . .	501	Ohio . . . . .	350
Iowa . . . . .	1,566	Oregon . . . . .	591
Massachusetts . . . . .	760	Washington Territory . . . . .	288
Michigan . . . . .	1,235	Wisconsin . . . . .	480
Missouri . . . . .	501		

The live-stock exhibitions could not, from sanitary considerations, be held within the Park limits; but a space of twenty-

two acres was provided for them some five hundred yards' distance from the main entrance to the Exhibition. Here were shown, in succession, horses, mules, asses, horned cattle, sheep, swine, goats, and dogs: poultry was exhibited within the grounds of the Agricultural Department.

The tests of harvesting machinery and tillage implements were made upon fields in the vicinity of the city, and accessible by railroad.

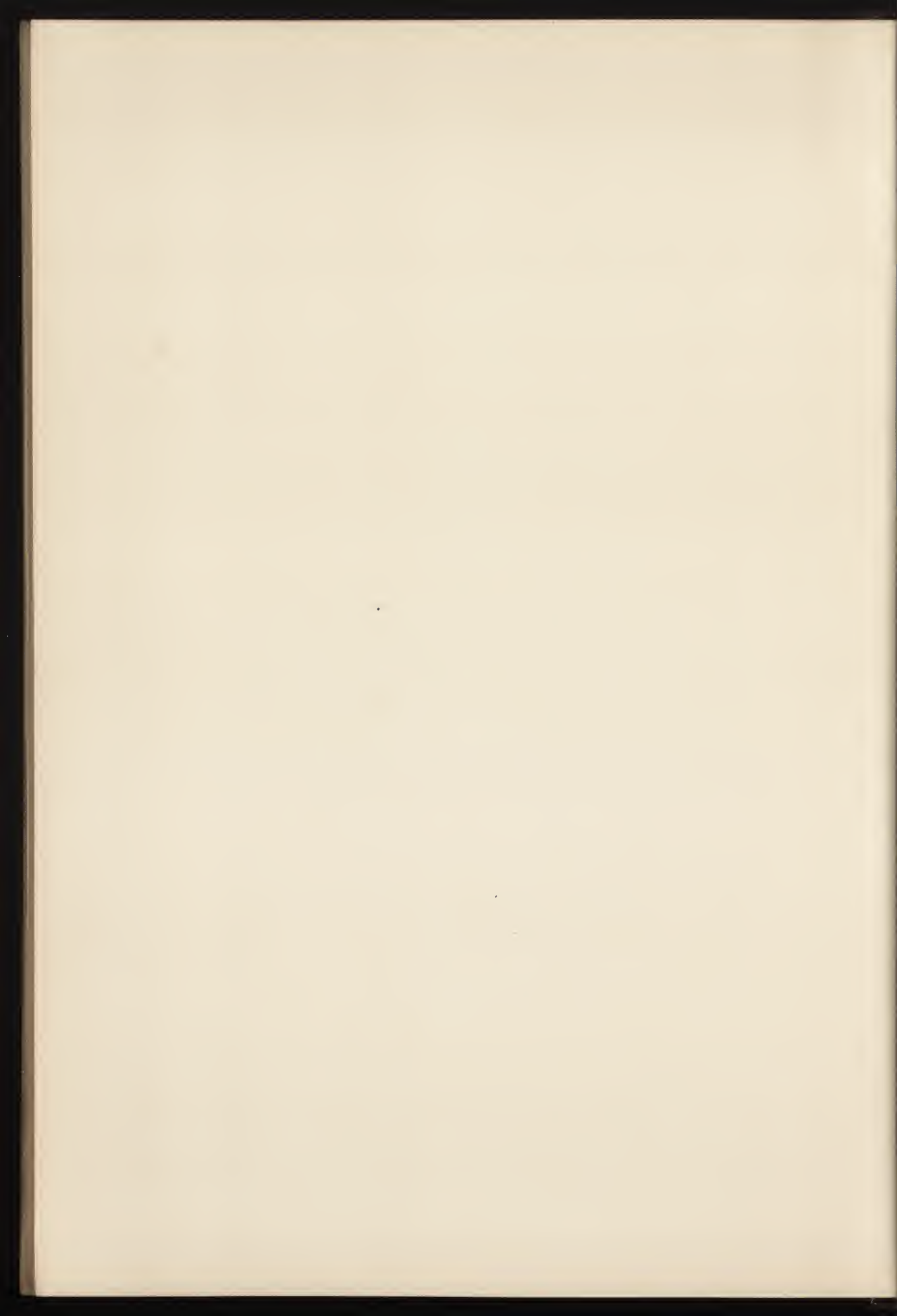
The various annexes of the Agricultural Department—excepting those without the grounds—are indicated in Plate B.

Other data as to this department are given in the following table:

SPACE OCCUPIED.

	By Foreign Exhibitors. <i>Sq. Feet.</i>	By Collective State Exhibits. <i>Sq. Feet.</i>	By Home Exhibitors. Individual. <i>Sq. Feet.</i>	Total. <i>Sq. Feet.</i>
Agricultural Hall . . .	92,372	9,506	148,416	250,294
Pomological Building . . .	2,064	.....	11,208	13,272
Wagon Building . . .	.....	.....	10,955	10,955
Boiler-House . . .	.....	.....	344	344
Brewers' Hall . . .	.....	.....	23,552	23,552
Dairy Building . . .	1,680	.....	4,928	6,608
Agricultural Grounds . . .	.....	.....	3,051	3,051
Live-Stock Grounds . . .	24,570	.....	50,750	75,320
Poultry and Birds . . .	1,860	.....	11,088	12,948
Aggregate . . .	120,686	9,506	253,204	383,396





HORTICULTURAL HALL.

*Chief of the Bureau of Horticulture*, CHARLES H. MILLER.

*Architect*, H. J. SCHWARZMANN.

*Contractor*, JOHN RICE.

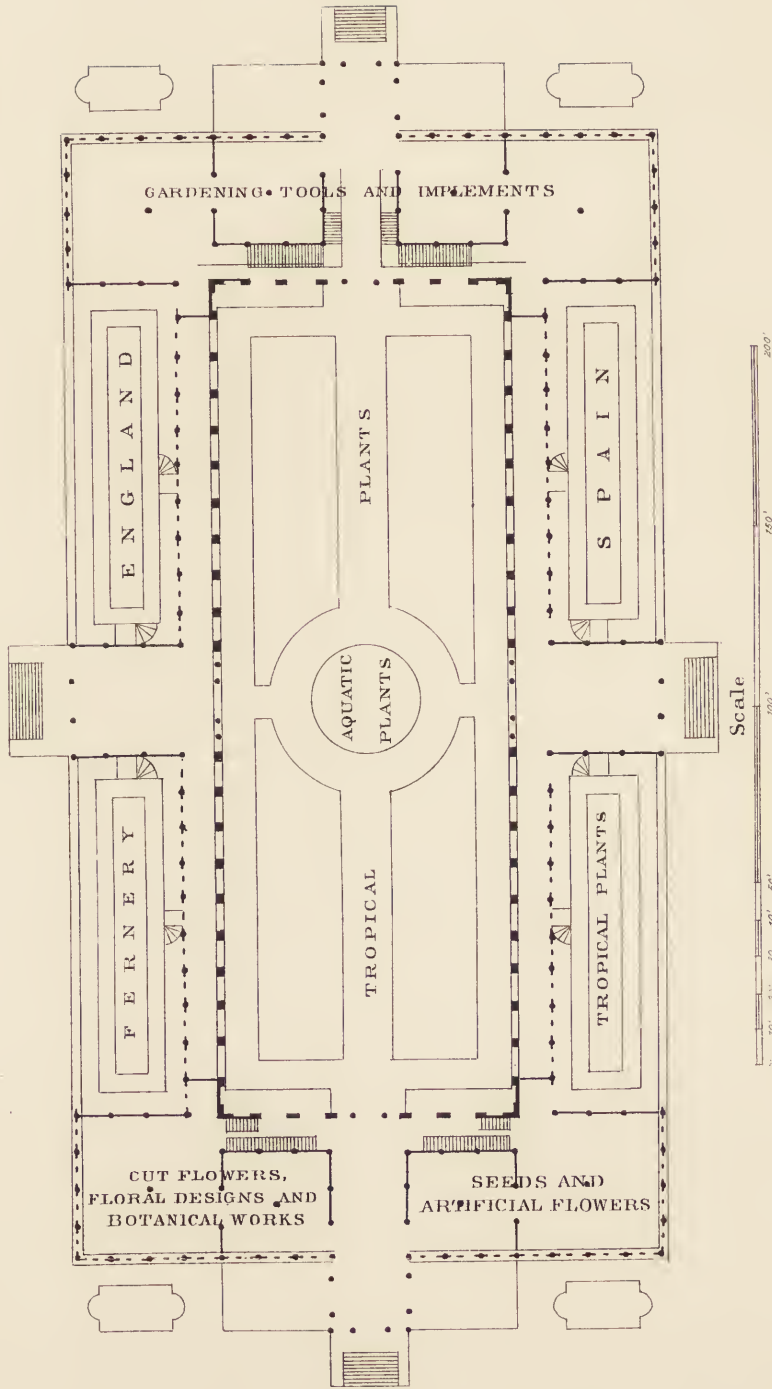
Contract made, June 3, 1875.

Building finished, April 1, 1876.

Cost, \$300,000.

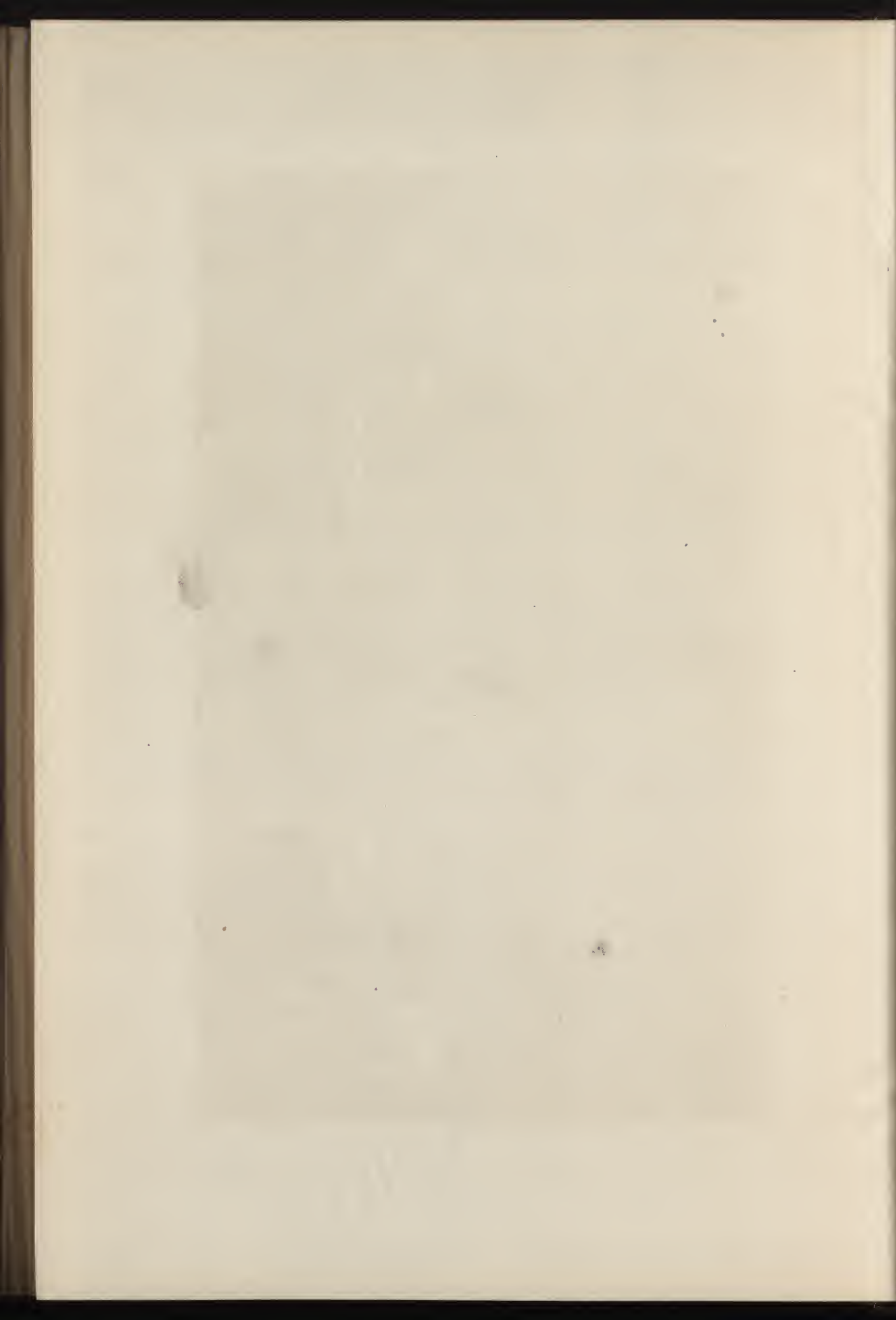




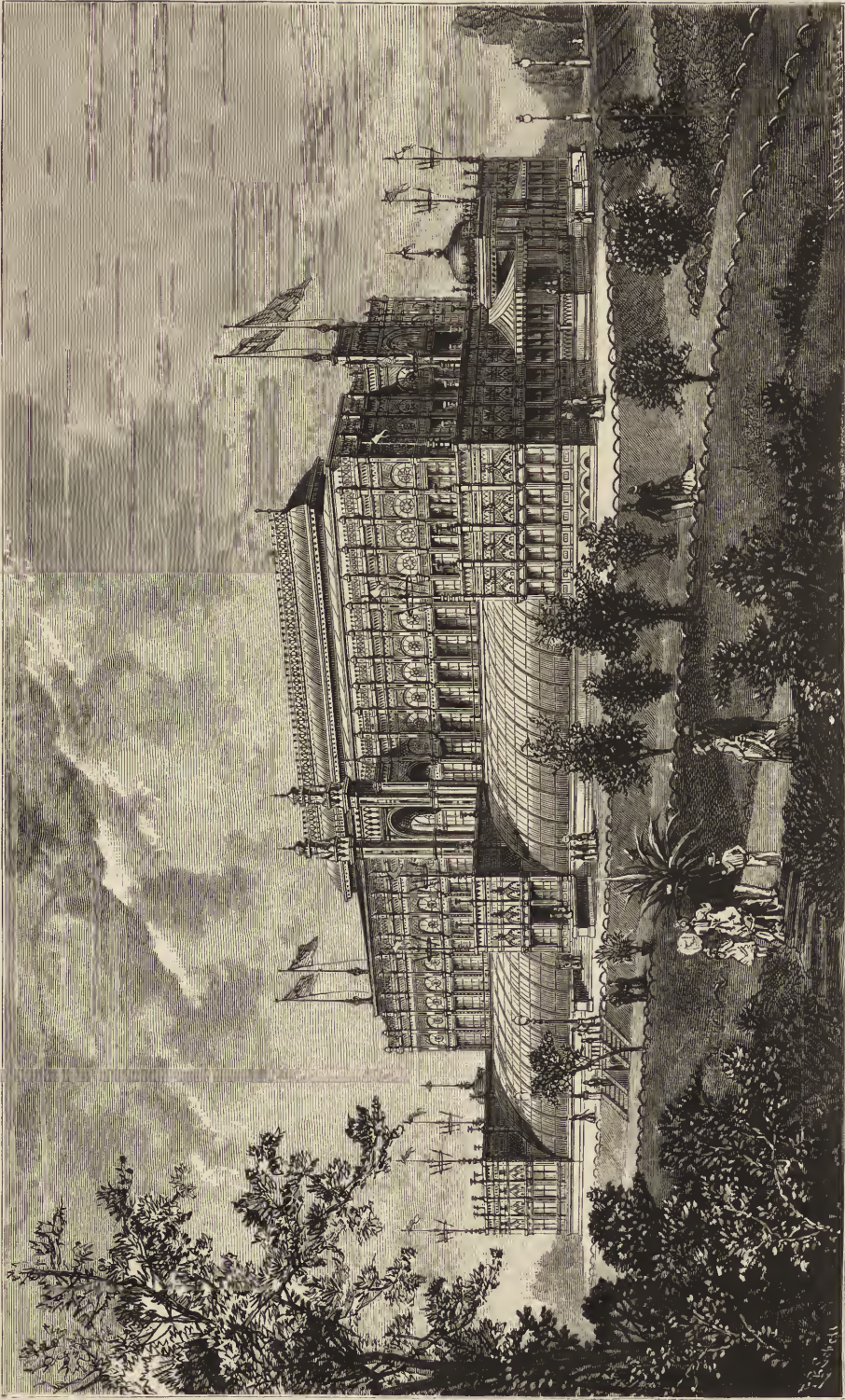


Scale  
0 20 40 60 80 100 140 160 200  
GROUND PLAN OF HORTICULTURAL HALL.

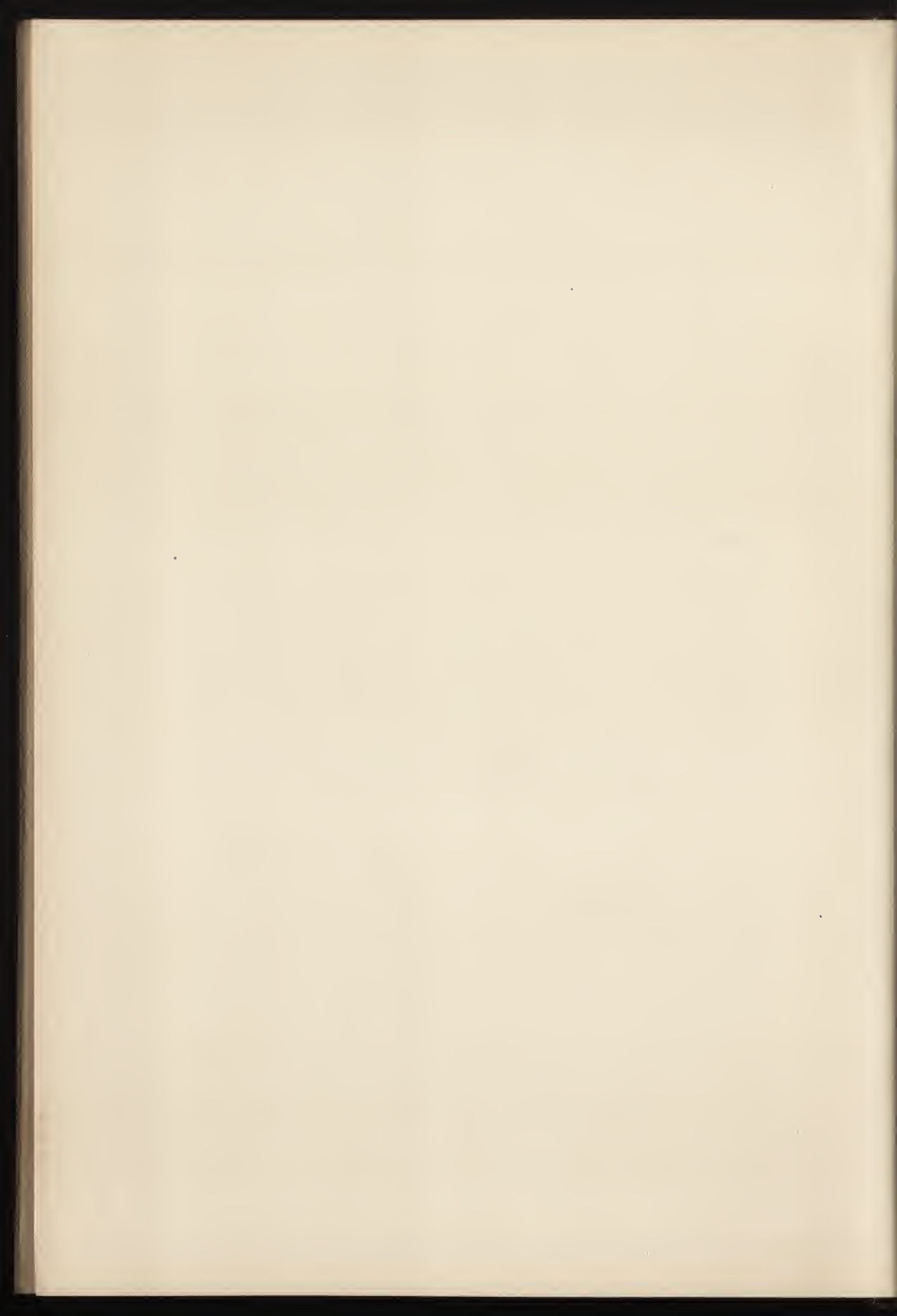








HORTICULTURAL HALL.





## HORTICULTURAL HALL.

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THE Horticultural Hall, or Conservatory, was erected, like the Machinery Building, by the City of Philadelphia, whose Councils appropriated (April 2, 1874) the sum of two hundred thousand dollars for the purpose.\* The building was designed to remain after the Exhibition as a permanent decoration of Fairmount Park, and its location was fixed with reference to that end.

The building stands upon Lansdowne Terrace, and has a commanding view of the Schuylkill River and the northwestern portion of the city. The design is in the Mauresque style of architecture, the principal materials being iron and glass. The length of the building is three hundred and eighty-three feet, width one hundred and ninety-three feet, and height to the top of the lantern seventy-two feet.

In the main hall is the large conservatory, two hundred and thirty feet by eighty, and fifty-five feet high, surmounted by a lantern one hundred and seventy feet long, twenty feet wide, and four feet high, for the purpose of light and ventilation. Running around the conservatory at the height of twenty feet

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\* The expense of building Machinery Hall was \$63,573.39 less than the original estimate (\$800,000); and this surplus was applied, under a subsequent ordinance of Councils (October 6, 1876), to the construction of the Horticultural Hall.

is a gallery five feet wide. On the north and south sides of the large conservatory, and connected with it, are four houses, viz., tropical, economical, intermediate, and green-house, for the cultivation and propagation of plants; each of which is one hundred by thirty feet, having curvilinear-shaped roofs. Dividing the houses on each side is a vestibule thirty feet square, forming the north and south side-entrances. At the centre of the east and west ends are similar vestibules, on either side of which were, during the Exhibition, the officers' rooms, reception-rooms, etc., etc. From the vestibules ornamental stairways lead to the internal galleries of the conservatory, as well as to the external galleries, which form a grand promenade over the roofs of the rooms on the ground-floor.

The heating of so large a building to the temperature necessary for the cultivation of tropical plants was an important consideration, and was provided for as follows: four large return-flue boilers are placed in the basement of the main hall, connected by a system of iron pipes of four-inch diameter, laid horizontally under the floor of the passage-ways. These pipes convey the water to and from the boilers. Thus, by a propulsion of heat, the water is kept in motion throughout the house, and, giving out heat, disseminates during the coldest weather a moist atmosphere in every part of the building equal to the genial temperature of the tropics.

The system adopted in the green-houses adjoining the main conservatory is similar to that in the hall, with the exception that four fire-box boilers are used, and that the pipes are laid above the floor, thus utilizing the heat to better advantage, and gaining increased temperature. By a convenient arrangement of the connecting-valves, either house can be heated

without the others, or one or all of the boilers can be used, and the whole system of pipes at pleasure,—or, should accident happen to any of the boilers, it can be shut off, and the others used to heat the whole system.

A temporary annex, north of the conservatory, accommodated several special floral displays, notably one of rhododendrons, which had never been approached in this country.

It was early determined to make the out-door features of the Horticultural Department more extended and elaborate than had been attempted at any previous International Exhibition; and this was both difficult and uncertain of success. The ground subsequently occupied by the gardens was in a rough and entirely uncultivated condition, and it seemed doubtful whether there was time to produce satisfactory results. It was necessary to create rapidly and by comparatively simple and limited means the horticultural effects which, in the end, made the gardens one of the most pleasing and popular attractions of the Exhibition. While it was impossible to derive much aid from garden architecture, or to obtain the beauties which can only be afforded by years of growth, yet the results attained were both effective and instructive. In addition to the great variety of plants placed on exhibition,—most of them specimens of the highest state of perfection to which the varied productions have been brought,—there was a liberal contribution, both by gift and by loan, of many curious and little-known trees, shrubs, vines, and flowers, coming from all parts of the world; more than eighteen hundred species having been shown.

Many of these were either presented by the exhibitors or purchased by the Park Commission, so that one of the out-

growths of the Exhibition is the creation of a botanic garden and arboretum, which may be studied by the general public and by specialists with reference both to ornamental and to economic plants, which are both classified and labelled; while the flower-beds afford universal gratification. By means of the propagation of rare and foreign plants, and the interchange of duplicates, the Horticultural Hall seems likely to add an extremely fine botanic collection to Fairmount Park, which should always afford pleasure to the public, and must prove of substantial scientific value, as well as a nursery from which plants hitherto unknown may be disseminated throughout the country.

The time allowed for preparing the horticultural display at the Exhibition was extremely short; but in one direction this may have been an advantage, since it served to show to many thousands of visitors by what simple devices of grouping and arrangement it is possible to produce harmonious and beautiful effects,—as by the carpet- and ribbon-bedding of plants in various patterns, and other forms and varieties of ornamental planting, all of which were easily comprehended and thoroughly appreciated by the visitors. Perhaps the very simplicity of arrangement added to the educational value; because it demonstrated that with comparatively few and easily-obtained plants very beautiful floral effects may be produced. Among the results of the Exhibition was the demonstration of the perfection, hitherto unrealized, to which the culture and modes of employing many useful and ornamental plants have been brought in this country. The specimens from abroad afforded many suggestions, from which both professional horticulturists and amateurs, and therefore the general public, will derive substantial benefit.



The exhibits in this Department came chiefly from the United States, Great Britain, and Canada. The participating nations were

United States,  
Great Britain,  
New Zealand,  
Jamaica,  
Canada,  
France,  
Argentine Republic,  
Spain,  
Germany,

Austria,  
Netherlands,  
Sweden,  
Italy,  
Luxemburg,  
Japan,  
Hawaii,  
Philippine Islands.



THE WOMEN'S PAVILION.

WOMEN'S CENTENNIAL EXECUTIVE COMMITTEE.

*President*, MRS. E. D. GILLESPIE, Philadelphia.

*Vice-President*, MRS. JOHN SANDERS, "

*Treasurer*, MRS. FRANK M. ETTING, "

*Secretary*, MRS. RICHARD P. WHITE, "

- |  |   |
|--|---|
| MRS. CRAWFORD ARNOLD, Philadelphia.        | MRS. W. O. ROCKWOOD, Indiana.             |
| " EMILY R. BUCKMAN, "                      | " GOVERNOR BEVERIDGE, Illinois.           |
| " JOHN BROCK, "                            | " W. S. RAND, Kentucky.                   |
| " THEODORE CUYLER, "                       | " F. W. CROWELL, Kansas.                  |
| " HENRY COHEN, "                           | " M. C. LUDELING, Louisiana.              |
| " A. H. FRANCISCUS, "                      | " WILLIAM GEORGE REED, Maryland.          |
| " JOHN W. FORNEY, "                        | " BION BRADBURY, Maine.                   |
| MISS ELIZABETH GRATZ, "                    | " JAMES T. FIELDS, Massachusetts.         |
| " McHENRY, "                               | " K. S. MINER, Mississippi.               |
| MRS. MATTHEW SIMPSON, "                    | " S. B. BOWEN, Montana.                   |
| " AUBREY H. SMITH, "                       | MISS ELIZABETH S. STEVENS, New Hampshire. |
| " HENRY C. TOWNSEND, "                     | MRS. W. L. DAYTON, New Jersey.            |
| " ROBERT K. WRIGHT, "                      | " GENERAL G. W. CULLUM, New York.         |
| " L. C. HUGHES, Arizona.                   | " J. M. HECK, North Carolina.             |
| " FRED'K MACCRELLISH, California.          | " EDWARD F. NOYES, Ohio.                  |
| " WORTHINGTON HOOKER, Connecticut.         | " F. W. GODDARD, Rhode Island.            |
| " M. E. P. BOULIGNY, District of Columbia. | " AARON V. BROWN, Tennessee.              |
| " J. M. WASHBURN, Dakota.                  | " M. J. YOUNG, Texas.                     |
| " ELLEN CALL LONG, Florida.                | MISS ELIZA R. SNOW, Utah.                 |
| " F. R. WEST, Iowa.                        | MRS. J. GREGORY SMITH, Vermont.           |
| " W. I. HILL, Idaho.                       | " C. J. FAULKNER, West Virginia.          |

MRS. J. B. THORP, Wisconsin.

HONORARY MEMBERS.

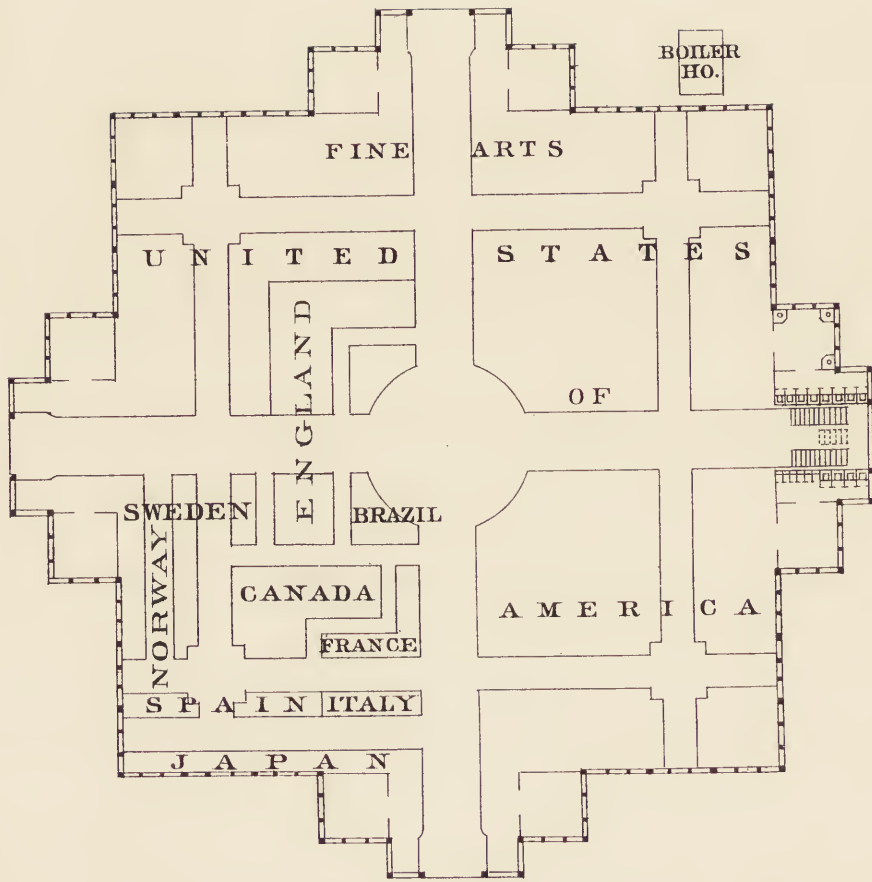
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|---------------------------------------|--------------------------------------|
| MRS. CHARLES J. STILLÉ, Philadelphia. | MRS. J. EDGAR THOMSON, Philadelphia. |
| " HULDAH JUSTICE, "                   | " S. A. IRWIN,                       |
| MISS GERRY, New Haven, Connecticut.   |                                      |

*Architect*, H. J. SCHWARZMANN.  
*Contractor*, LEVI KODER.

Contract made, September 1, 1875.      Building finished, February 12, 1876.      Cost, \$30,000.







Scale.



GROUND PLAN OF WOMEN'S PAVILION.



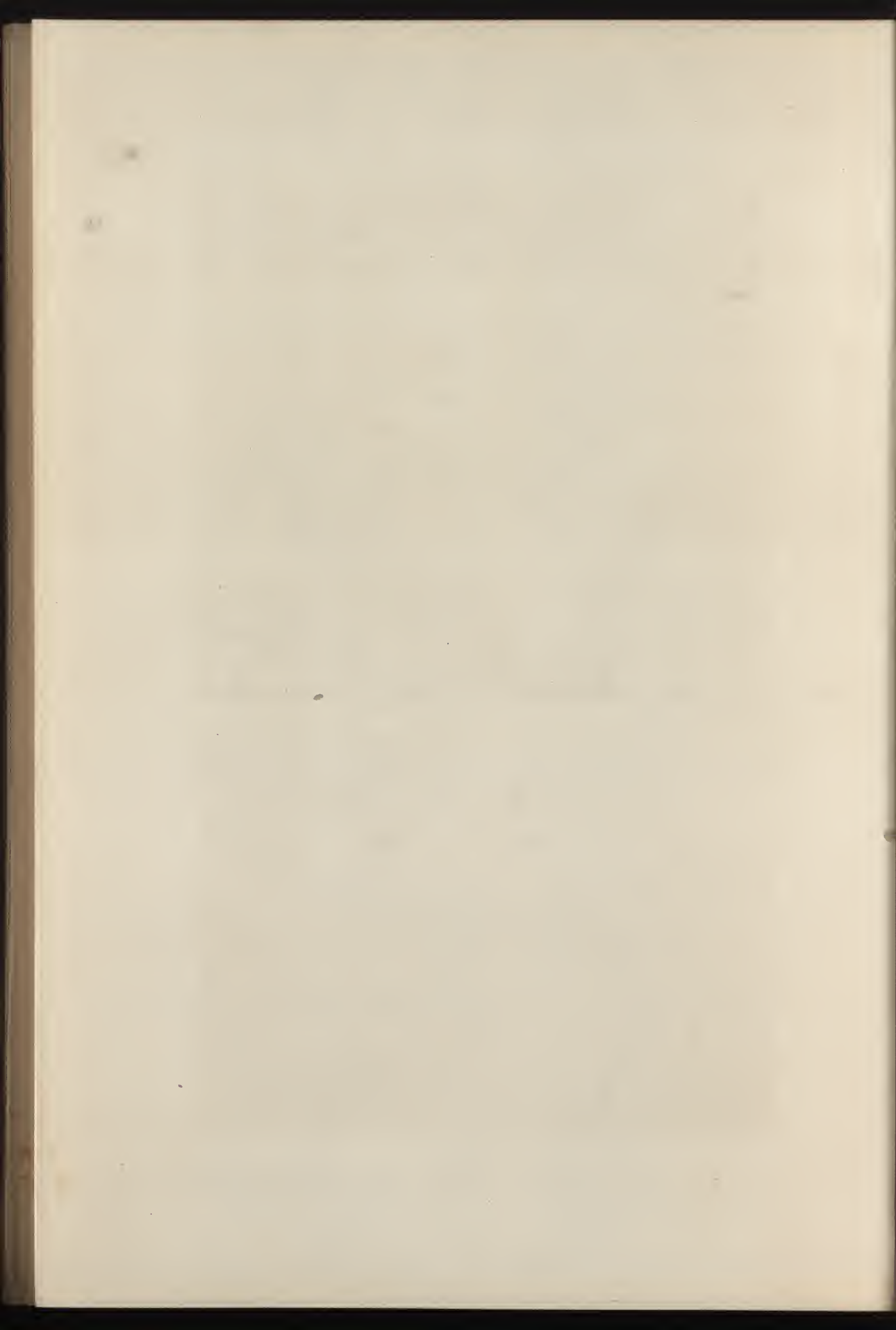




PLATE N.



WOMEN'S PAVILION.





## THE WOMEN'S PAVILION.

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EARLY in the preparations for the Exhibition—when the Citizens' Centennial Finance Committee, representing the different professions, trades, and industries, were canvassing the City of Philadelphia for subscriptions to the stock of the Centennial Board of Finance, preliminary to the organization of that body—there was formed an auxiliary committee of thirteen ladies, to labor for the same purpose among the women of Philadelphia and the country at large. This committee not only materially increased the funds of the Exhibition, but it added largely to the interest taken in it, by appointing chairmen in each of the wards of Philadelphia, as well as corresponding committees of the women of thirty-one of the States and Territories of the Union. In time, moreover, the committee received so many applications for exhibiting space from women that it was determined to provide a special structure for the display of women's work. The cost of this was provided by the Women's Executive Committee; and the management of the exhibits contained in it remained in their hands throughout the time of the Exhibition.

The building covered an area of thirty thousand square feet; it exhibited a nave and transept, each one hundred and ninety-two feet long and sixty-four feet wide, terminating in porches eight feet by thirty-two feet. Four pavilions, each forty-eight feet square, occupied the angles formed by the

nave and transept. The centre of the structure rose twenty-five feet above the exterior portions, and terminated with a cupola and lantern, ninety feet from the ground. The entire superstructure rested on the exterior walls and four interior supporting columns, so that its whole area was unobstructed by partitions. The material was of wood, roofed over by segmental trusses. It contained, in addition to space for exhibits, toilet- and reception-rooms. A school-house was built adjoining the Women's Pavilion, where a kindergarten was carried on at the charge of a few ladies who collected funds for the purpose.

Though the building was commodious and attractive it could not afford accommodations for all the desirable exhibits that were offered. One-fourth of its space had to be set aside for the exhibits sent by ladies from abroad, headed by Her Majesty the Queen of Great Britain and Ireland, and the princesses her daughters,—who contributed specimens of their needlework,—and by the Empress Augusta of Germany, who sent an album of photographs illustrating various charities under her care in the City of Berlin. One-third of the building, moreover, was devoted to women's works of art, though many of these were shown in the general Art Department of the Exhibition. Yet the Pavilion contained a large and suggestive collection from the following countries :

United States,	Netherlands,
Great Britain,	Denmark,
Jamaica,	Sweden,
Canada,	Italy,
Tasmania,	Tunis,
France,	Brazil.
Belgium,	

UNITED STATES GOVERNMENT BUILDING.

CONTRIBUTING DEPARTMENTS.

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WAR DEPARTMENT.  
NAVY DEPARTMENT.  
TREASURY DEPARTMENT.  
INTERIOR DEPARTMENT.

AGRICULTURAL DEPARTMENT.  
POST-OFFICE DEPARTMENT.  
SMITHSONIAN INSTITUTION.  
COMMISSION OF AMERICAN FOOD FISHES.

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BOARD ON BEHALF OF THE EXECUTIVE DEPARTMENTS.

*War Department*, COLONEL S. C. LYFORD (Chairman), Ordnance Department.  
*Treasury Department*, R. W. TAYLER, First Controller of the Treasury.  
*Navy Department*, REAR-ADMIRAL THORNTON A. JENKINS, U. S. Navy.  
*Interior Department*, JOHN EATON, Commissioner of Education.  
*Post-Office Department*, DR. CHARLES F. MACDONALD, Chief of Money Order Bureau.  
*Agricultural Department*, WILLIAM SAUNDERS, Superintendent of Propagating Gardens.  
*Smithsonian Institution*, PROF. S. F. BAIRD, Assistant Secretary of the Smithsonian Institution, and  
United States Fishery Commissioner.  
*Secretary of Board*, WILLIAM A. DECAINDRY.

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*Architect*, JAMES H. WINDRIM.

*Contractors*, AARON DOAN & CO.

Contract made, July 8, 1875.

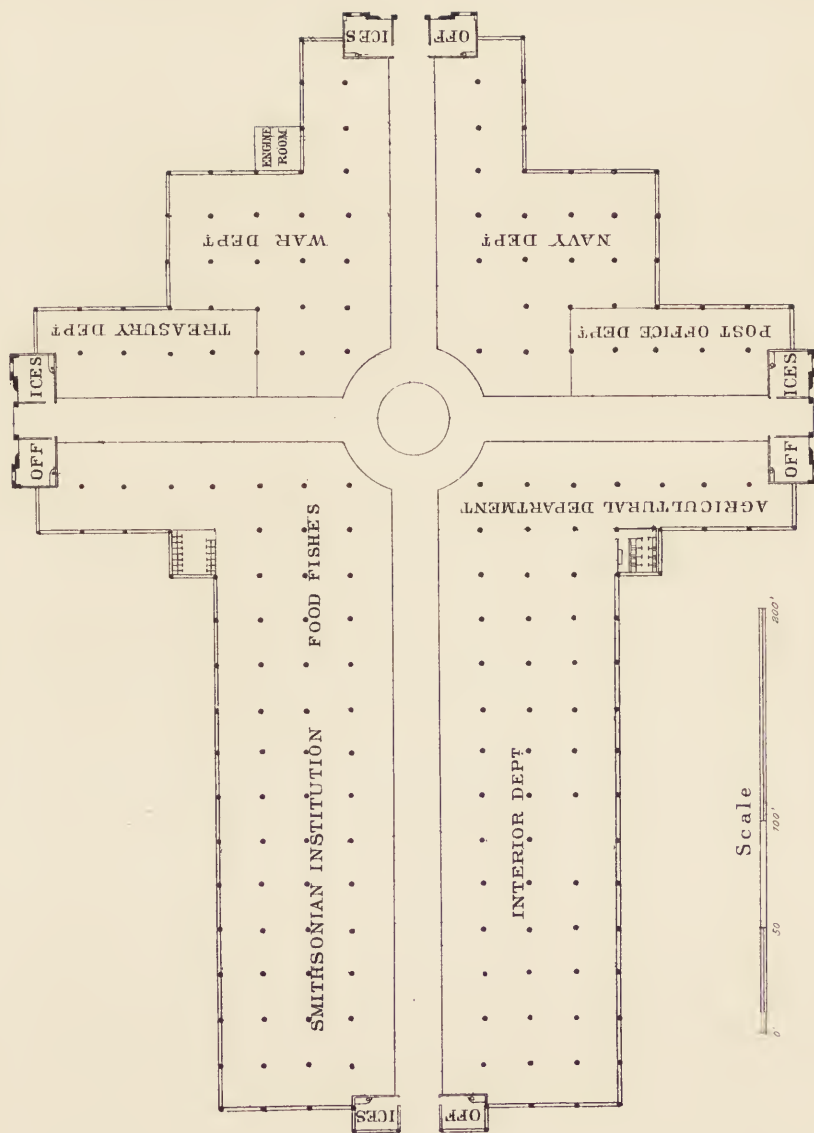
Building finished, February 2, 1876.

Cost, \$80,817.71.





PLATE O.



GROUNDPLAN OF U.S. GOVERNMENT BUILDING.









UNITED STATES GOVERNMENT BUILDING.





## UNITED STATES GOVERNMENT BUILDING.

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THE President of the United States, at the suggestion of the Director-General, issued an executive order (January 23, 1874) creating a Board to represent the Executive Departments of the general Government, and to prepare and present a distinct exhibition on its behalf. The terms of the President's order were as follows :

### EXECUTIVE ORDER BY THE PRESIDENT OF THE UNITED STATES.

Whereas it has been brought to the notice of the President of the United States that in the International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, to be held in the City of Philadelphia, in the year 1876, for the purpose of celebrating the one hundredth anniversary of the Independence of the United States, it is desirable that from the Executive Departments of the Government of the United States in which there may be articles suitable for the purpose intended, there should appear such articles and materials as will, when presented in a collective exhibition, illustrate the functions and administrative faculties of the Government in time of peace, and its resources as a war power, and thereby serve to demonstrate the nature of our institutions and their adaptation to the wants of the people. Now, for the purpose of securing a complete and harmonious arrangement of the articles and materials designed to be exhibited from the Executive Department of the Government, it is ordered that a Board, to be composed of one person to be named by the head of each of the Executive Departments which may have articles and materials to be exhibited, and also of one person to be named in behalf of the Smithsonian Institution, and one to be named in the behalf of the Department of Agriculture, be charged with the preparation, arrangement, and safe-keeping

of such articles and materials as the heads of the several Departments and the Commissioner of Agriculture and the Director of the Smithsonian Institution may respectively decide shall be embraced in the collection; that one of the persons thus named, to be designated by the President, shall be chairman of such Board, and that the Board appoint from their own number such other officers as they may think necessary, and that the said Board, when organized, shall be authorized, under the direction of the President, to confer with the executive officers of the Centennial Exhibition in relation to such matters connected with the subject as may pertain to the respective departments having articles and materials on exhibition, and that the names of the persons thus selected by the heads of the several Departments, the Commissioner of Agriculture, and the Director of the Smithsonian Institution, shall be submitted to the President for designation.

By order of the President.

(Signed)

HAMILTON FISH,

*Secretary of State.*

WASHINGTON, January 23, 1874.

The Board appointed in pursuance of this order consisted of an officer from each of the following Executive Departments, viz.: the War Department, the Navy Department, the Treasury Department, the Interior Department, the Post-Office Department, the Department of Agriculture, and one to represent the Smithsonian Institution and Commission of Food Fishes. Its earlier efforts were limited to the maturing of plans and the preparation of estimates, and these being submitted by the President to Congress at the ensuing session, that body in March, 1875, appropriated \$505,000 to carry out the plans of the Board, and in May, 1876, a further sum of \$73,500 was granted, making a total appropriation of \$578,500 for the purposes of the Governmental participation.

A site containing about seven acres, at the intersection of Belmont and Fountain Avenues, was devoted to the uses of the Board, and in July, 1875, ground was broken for the erection

of the Government Building. This building, which was of wood, was completed by the contractors by February 15, 1876, and was accepted by the Board March 1, 1876. Its ground-plan was in the form of a Greek cross, the structure consisting of a central nave and aisles one hundred feet in width by four hundred and eighty feet in depth, with a cross transept one hundred feet in width by three hundred and forty feet in depth; attached aisle-sections sixty feet by sixty feet, forty feet by two hundred and sixty feet, and twenty feet by twenty feet on each side of the centre, with office-sections upon the ends of the nave and transept, making a total floor area of one hundred and two thousand eight hundred and forty square feet. At the intersection of the nave and transept the building was surmounted by an octagonal dome, from which arose a flag-staff for the display of the national colors. The interior was rough-finished, but this was not apparent to the eye of the visitor except upon close inspection, owing to the judicious use and combination of colors with which the entire interior surfaces were ornamented. Fire-plugs in wells beneath the floor, having sections of hose constantly attached for instant use, together with fire-ladders on the exterior of the building and hose-carriage with additional hose at hand, afforded ample provision in case of fire. In addition, portable fire-extinguishers were distributed on brackets at convenient intervals throughout the building. Gas-fixtures were well provided for interior illumination, and closets and retiring-rooms contributed to the comfort and convenience of visitors. To the right and left of the main entrance the building was flanked by the light and heavy artillery of the United States land and naval services respectively.

In addition to the main structure, there were four other

buildings. Three were on the north,—one a laboratory of the Ordnance Department, another a model post-hospital of the Medical Department, both being under the War Department, and the third the fog-horn building of the Light-House Board, under the Treasury Department;—while the fourth was on the margin of the Lake south of Fountain Avenue for the Life-Saving Service, under the Treasury Department. A little west of the Government grounds was a small plot occupied by the out-door exhibit of the Signal Service, under the War Department; and on a large area in the extreme western limits of the Centennial grounds, at the foot of George's Hill, a company of United States Artillery was encamped throughout the period of the Exhibition for protective purposes. The corps of cadets from the West Point Military Academy was encamped on these grounds during ten days in the month of July, 1876, upon a visit to the Exhibition.

The displays by the several Departments were comprised in the following divisions and sub-divisions, viz.:

#### I. WAR DEPARTMENT.

- |                                |                                   |
|--------------------------------|-----------------------------------|
| 1. Ordnance Department.        | 4. Medical Department (in Annex). |
| 2. Quartermaster's Department. | 5. Signal Service.                |
| 3. Engineer Department.        |                                   |

#### II. NAVY DEPARTMENT.

- |                             |  |
|-----------------------------|--|
| 1. Naval Ordnance.          | 7. Provisions and Clothing.  |
| 2. Navigation.              | 8. Steam Machinery.  |
| 3. Equipment.               | 9. Nautical Instruments, Machines,<br>Specimens, Flags, Relics of Arctic<br>Explorations, etc. |
| 4. Yards and Docks.         |  |
| 5. Construction and Repair. |  |
| 6. Medicine and Surgery.    |  |



III. INTERIOR DEPARTMENT.

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Bureau of Education.</li> <li>2. Patent Office.</li> <li>3. Public Lands.</li> <li>4. Census Bureau.</li> </ul> | <ul style="list-style-type: none"> <li>5. Indian Bureau.</li> <li>6. Pension Office.</li> <li>7. Geological Surveys of the Territories.</li> </ul> |
|---|--|

IV. TREASURY DEPARTMENT.

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Coast Survey, and Bureau of Weights and Measures.</li> <li>2. Light-House Board.</li> <li>3. Internal Revenue Bureau.</li> </ul> | <ul style="list-style-type: none"> <li>4. Bureau of Engraving and Printing.</li> <li>5. Bureau of Supervising Architect of the Treasury Department.</li> <li>6. Life-Saving Service (in Annex).</li> </ul> |
|--|--|

V. POST-OFFICE DEPARTMENT.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. An operative post-office affording mail facilities to the entire Exhibition, with corps of clerks and carriers, mail-wagons, etc.</li> <li>2. Specimen railway postal-cars.</li> <li>3. Machinery for fabricating stamped envelopes (in operation).</li> </ul> | <ul style="list-style-type: none"> <li>4. Specimens of United States postage-stamps and stamped envelopes (historical), mail-bags and pouches, mail-locks, apparatus for receiving and delivering mail-bags under speed on railroads, etc.</li> </ul> |
|--|---|

VI. DEPARTMENT OF AGRICULTURE.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Chemical Section, exhibiting soils, marls, fertilizers, and agricultural products and their derivatives, such as foods, oils, fibres, etc.</li> <li>2. Natural History Section, exhibiting birds, insects, and other animals injurious or beneficial to the farmer; specimens of North American woods, with leaves and fruits, etc.</li> </ul> | <ul style="list-style-type: none"> <li>3. Statistical Section, exhibiting maps and charts of farm-lands and the distribution of the forests and of regions suitable for cultivation of various staples, together with general statistics of agriculture in this country.</li> </ul> |
|--|---|

## VII. SMITHSONIAN INSTITUTION.

- |  |   |
|--|---|
| <p>1. Series of all the publications of the Institution, with charts illustrating its system of international exchanges.</p> <p>2. The National Museum, comprising, first, the <i>Mineral Section</i>, illustrating the economical mineral wealth of the United States, in series of specimens of ores, sands, earths, clays, coal, petroleum, building stones, etc.; and, second, the <i>Ani-</i></p> | <p><i>mal Section</i>, containing representations of the animals of the United States of economical importance as furnishing food, ivory, bone, leather, glue, furs, bristles, etc.; the apparatus by which they are pursued and captured; the methods of their utilization for the wants of man; products of such utilization; methods by which they are protected and multiplied.</p> |
|--|---|

## VIII. FISH COMMISSION.

- |  |   |
|--|---|
| <p>1. A series of plaster or <i>papier-maché</i> models of the principal fishes and cretaceans of the United States, and photographs and drawings of the same.</p> | <p>2. Apparatus of pursuit and capture; also methods of fish-culture.</p> |
|--|---|

The floor-space occupied by the several Departments in the Government Building was as follows:

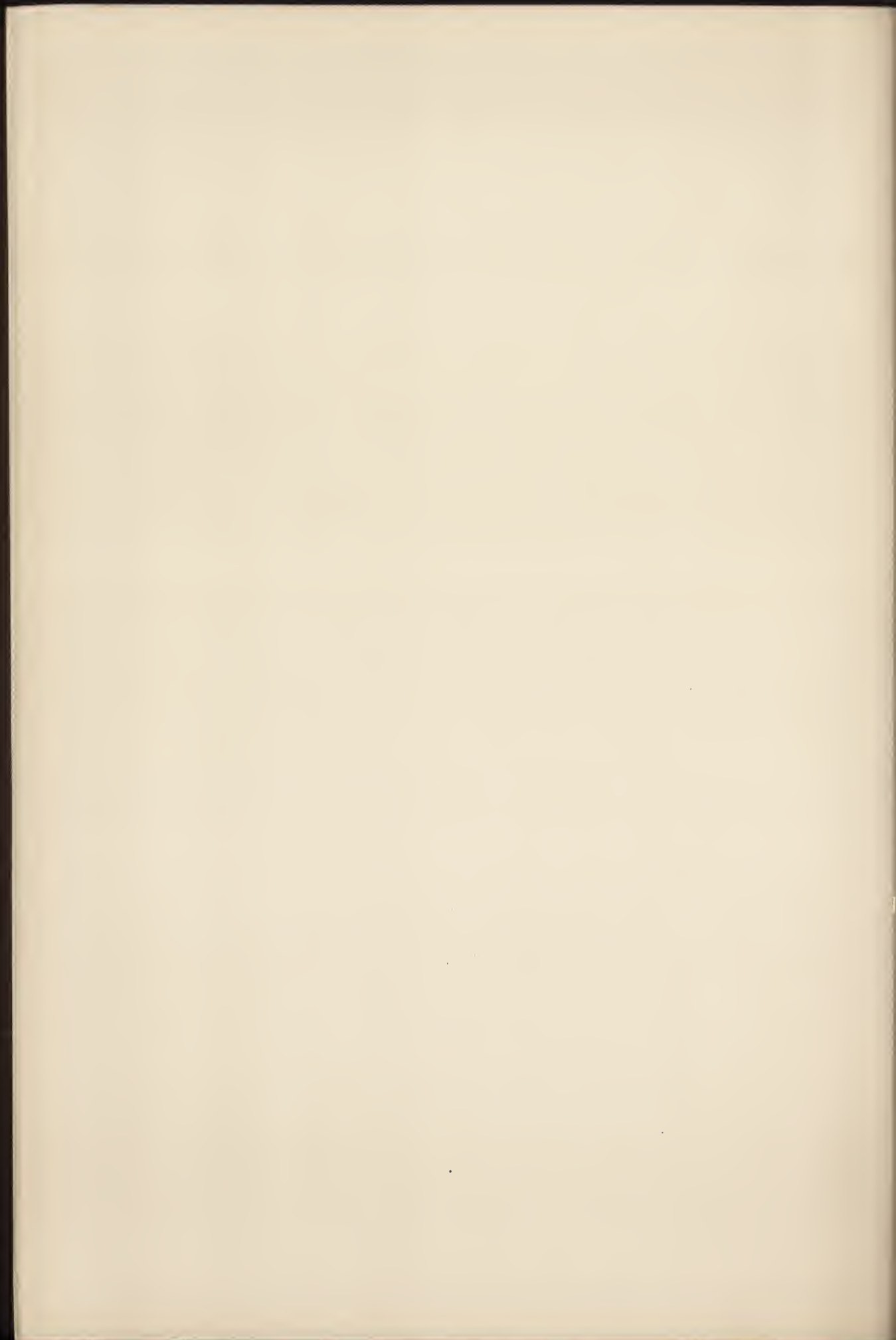
Sq. Feet.	Sq. Feet.
War Department . . . . . 11,200	Smithsonian Institution . . . . . 20,600
Navy Department . . . . . 10,400	Fish Commission . . . . . 6,000
Treasury Department . . . . . 3,000	Total . . . . . 81,600
Interior Department . . . . . 20,600	Aisles and passage-ways . . . . . 21,240
Post-Office Department . . . . . 3,800	Grand total . . . . . 102,840
Department of Agriculture . . . . . 6,000	

The contents of the building and its annexes attracted great attention from intelligent visitors from all parts of the world, and many critical reports have appeared at home and abroad

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in regard to this display. Among scientific people it was conceded to be one of the most instructive portions of the Centennial Exhibition.

A general report, covering the detailed reports of several of the Departments represented, has been made by the Chairman of the Board to the President of the United States, and by him transmitted to Congress.



THE JUDGES' HALL.



*Chief of Bureau of Awards, FRANCIS A. WALKER.*

*Secretary, W. J. CHEYNEY.*

*Architects, H. J. SCHWARZMANN, HUGH KAFKA.*

*Contractor, LEVI KODER.*

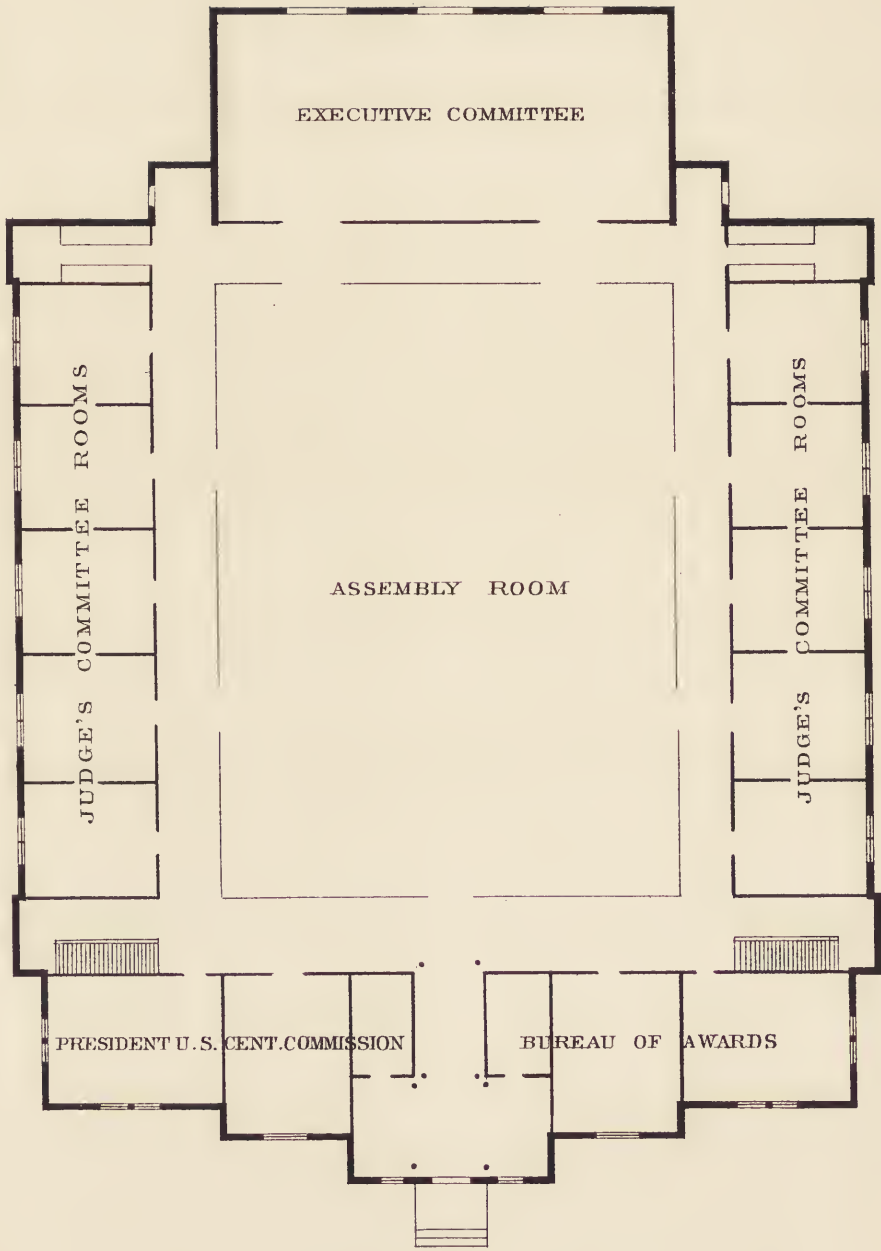
Contract made, November 10, 1875

Building finished, February 1, 1876.

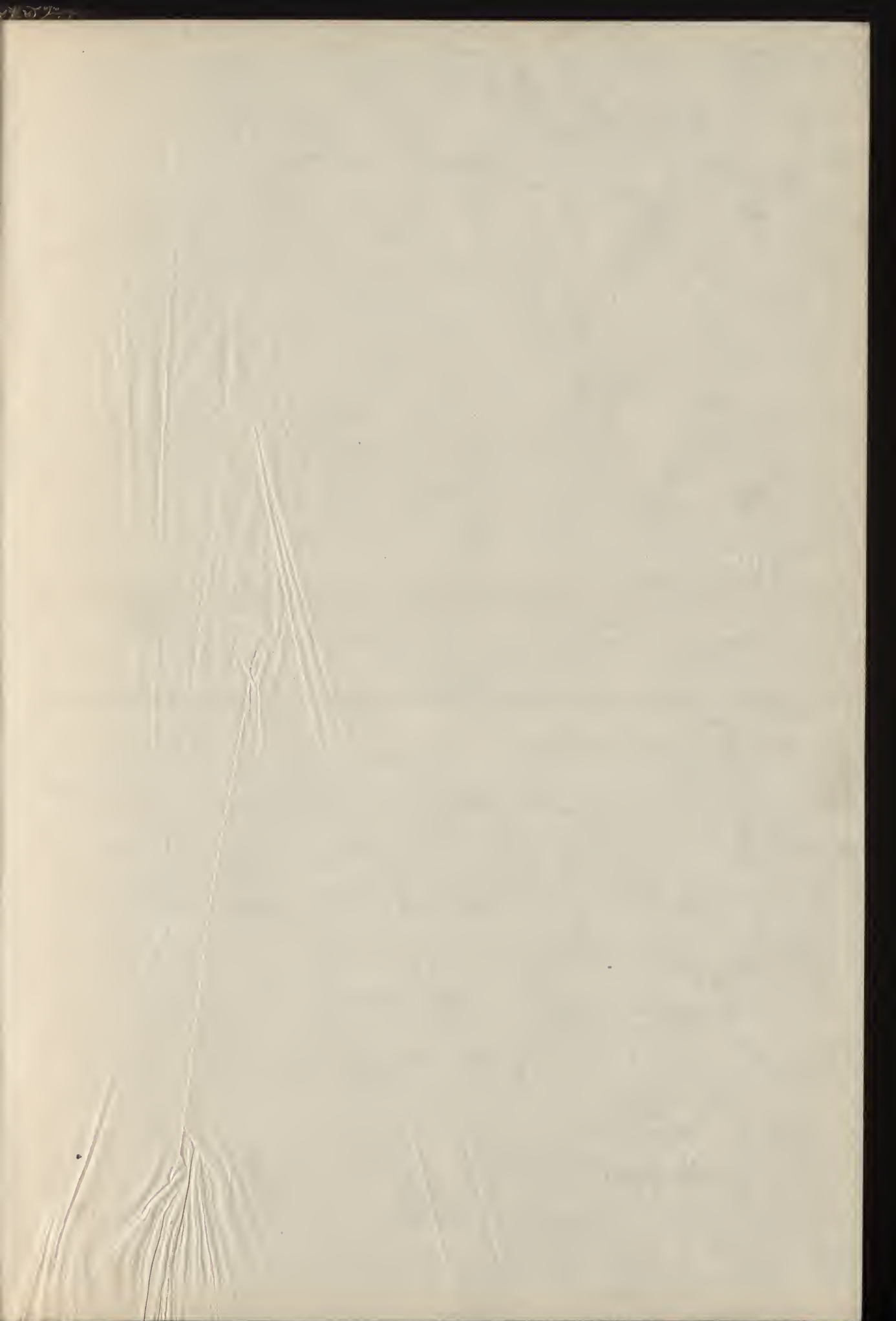
Cost, \$28,000.

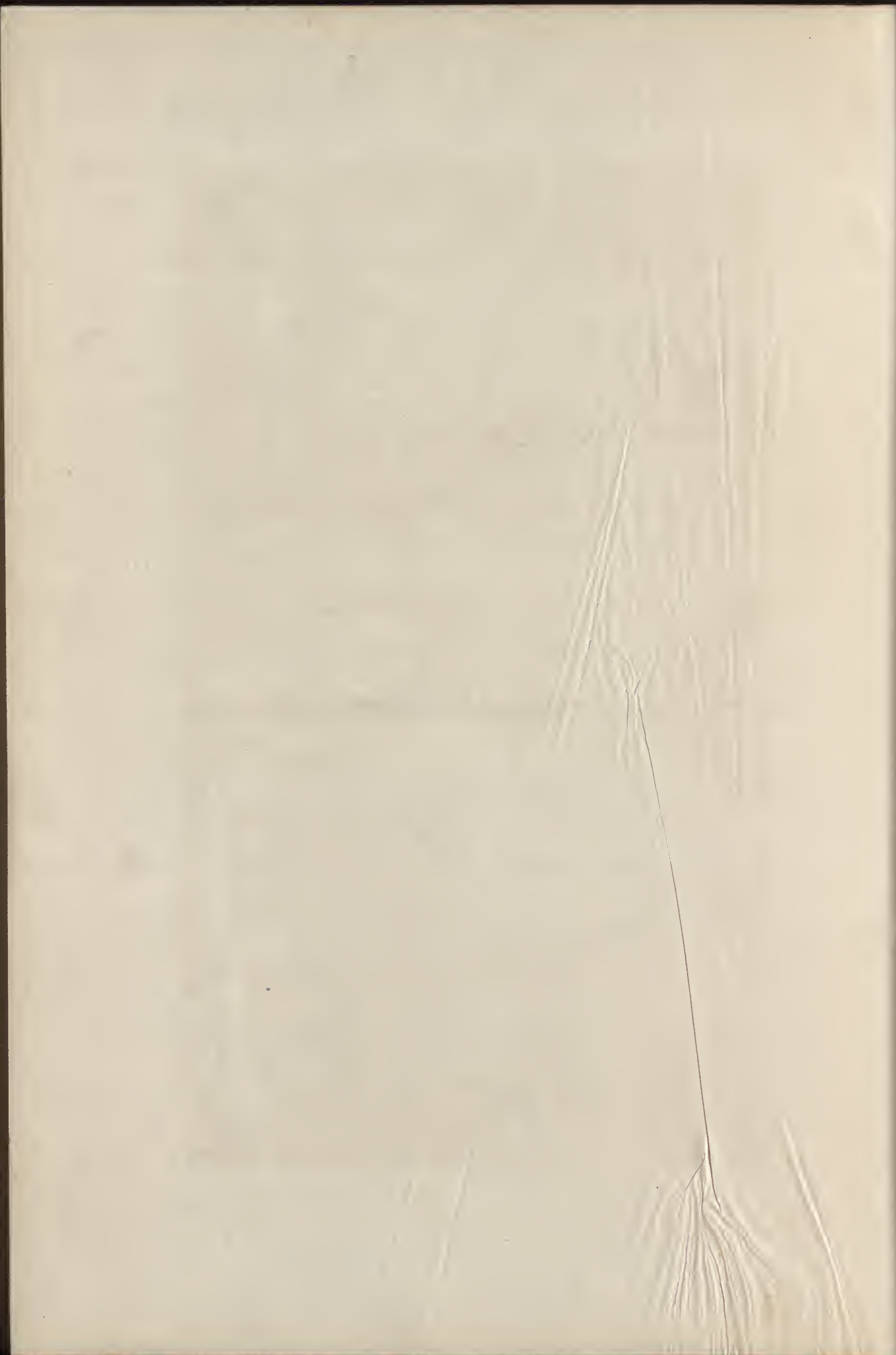


PLATE Q.



GROUND PLAN OF JUDGES' HALL.









JUDGES' HALL.



## THE JUDGES' HALL.

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THE system of awards to exhibitors which was adopted at the Exhibition required that each award should be accompanied by a written report signed by the Judge who had examined the exhibit. As there were 321 Judges and 13,104 awards, much clerical labor was involved, as well as the need of adequate committee-rooms. To afford these facilities, Judges' Hall was provided; but it was also adapted to other purposes. Its large central hall was designed for the holding of the public ceremonials of the Exhibition and for the accommodation of the numerous meetings of patriotic, scientific, industrial, and other associations which took place—at times almost daily—during the period of the Exhibition; it was, in short, a general assembly room, at the disposal of any proper applicants for its use. In case of need, its proportions were frequently enlarged by an ingenious arrangement which permitted the removal of the partitions separating it from the rear corridor and the Executive Committee chamber beyond. The Judges' Hall also contained, in addition to the offices of the Judges, several of those of the Centennial Commission and Board of Finance.

The building directly faced the central entrance to the Exhibition grounds, and marked the northern limit of the grand plaza, whose other boundaries were formed by the ends of



the Main and Machinery Buildings on the east and west, and the administrative offices on the south.

This building was one hundred and fifty-two feet long by one hundred and fifteen feet wide, with a porch six feet by nine feet. The hall devoted to the assembly of the Judges was sixty feet by eighty feet, and forty-three feet high. The hall in the rear was twenty-five feet by sixty feet, and twenty-five feet high. On the second floor was a hall twenty-two feet by sixty feet, where the members of the several committees could convene. Toilet-rooms, both for ladies and gentlemen, were conveniently located, and were furnished with all requisite accessories. The interior was elegantly paneled and decorated. The exterior walls were plastered in such a manner as to represent wood construction of modern architecture.

THE MINOR BUILDINGS.





## THE MINOR BUILDINGS AND ACCESSORIES.

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WHILE the principal buildings already described constituted the chief features of the Exhibition, much was added to its variety and attractions by the numerous lesser structures which were found on every hand throughout the grounds. Foreign, State, and Municipal Governments, as well as individual exhibitors, contributed to this important means of adornment. The position and relative size of all the buildings may be understood by reference to Plate B. They may be classified as follows:

### EXHIBITION BUILDINGS, OFFICIAL:

	No.	Acres covered.
Art Gallery . . . . .	1	1.500
Art Gallery Annex . . . . .	1	1.400
Agricultural Hall . . . . .	1	8.720
Boiler-Houses . . . . .	6	0.526
Butter and Cheese Exhibition Building . . . . .	1	0.182
Fire-Patrol Buildings . . . . .	2	0.196
Horticultural Hall . . . . .	1	1.250
Horticultural Hall Tent Annex . . . . .	1	0.162
Judges' Hall . . . . .	1	0.380
Main Building . . . . .	1	20.200
Main Building Carriage Annex . . . . .	1	1.950
Machinery Hall . . . . .	1	14.000
Medical Department . . . . .	1	0.042
Music Pavilion . . . . .	1	0.018

	No.	Acres covered.
Mineral Annexes Main Building . . . . .	2	0.495
Municipal Building . . . . .	1	0.090
Offices of Board of Finance and Centennial Commission . . . . .	2	0.740
Pomological Building . . . . .	1	0.832
Police Stations . . . . .	7	0.584
Police Reserve Station . . . . .	1	0.015
Photographic Hall . . . . .	1	0.440
Public Comfort Building (east and west ends) . . . . .	2	0.435
Shoe and Leather Building . . . . .	1	1.110
Soup-Houses or Eating Barracks . . . . .	4	0.320
Saw-Mill . . . . .	1	0.510
Women's Pavilion . . . . .	1	0.800
Wagon Building . . . . .	1	0.628
Total . . . . .	45	—

## CONCESSIONS :

American Restaurant . . . . .	1	0.500
Baggage-Room . . . . .	1	0.020
Becker's Restaurant (Annex to Southern Restaurant) . . . . .	1	0.074
Centennial National Bank . . . . .	1	0.068
Centennial Photographic Association . . . . .	1	0.270
Cigar-Stands . . . . .	8	0.054
Department of Public Comfort . . . . .	1	0.593
Elevated Railway . . . . .	1	0.900
Fruit-Stands . . . . .	3	0.053
George's Hill Restaurant and Additions . . . . .	1	0.345
German Restaurant (Lauber's) . . . . .	1	0.360
Hungarian Wine Pavilion . . . . .	1	0.017
Japanese Bazaar and Store-House . . . . .	2	0.061
Lafayette Restaurant . . . . .	1	0.240
Milk Dairies and Additions . . . . .	4	0.052
Narrow-Gauge Railroad Company's Offices and Engine-House . . . . .	1	0.107
Official Catalogue Buildings . . . . .	2	0.014

THE MINOR BUILDINGS.

145

	No.	Acres covered.
Office of Official Machine Shops . . . . .	1	0.014
Pop-Corn Stands . . . . .	2	0.074
Soda-Water Stands . . . . .	4	0.066
Southern Restaurant . . . . .	1	0.150
Trois Frères Provençaux (French Restaurant) . . . . .	1	0.270
Vienna Bakery . . . . .	1	0.322
Total . . . . .	41	

UNITED STATES GOVERNMENT BUILDINGS :

United States Government Exhibition Building . . . . .	1	2.330
“ “ “ Fog Signal . . . . .	1	0.014
“ “ “ Laboratory . . . . .	1	0.020
“ “ “ Light-House . . . . .	1	0.085
“ “ “ Post Hospital . . . . .	1	0.150
“ “ “ Signal Service . . . . .	1	0.012
“ “ “ Life-Saving Station . . . . .	1	0.023
Total . . . . .	7	

FOREIGN GOVERNMENT BUILDINGS :

Brazil . . . . .	1	0.083
Canadian Log House . . . . .	1	0.059
France . . . . .	3	0.115
German Empire . . . . .	1	0.064
Great Britain . . . . .	3	0.150
Japan . . . . .	1	0.054
Portugal . . . . .	1	0.029
Spain . . . . .	3	0.251
Sweden . . . . .	1	0.050
Total . . . . .	15	

PRIVATE EXHIBITION BUILDINGS :

American Fusee Company . . . . .	1	0.005
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	No.	Acres covered.
American Kindergarten . . . . .	1	0.014
Apiary . . . . .	1	0.003
Averill Paint Company . . . . .	1	0.032
Bankers' Building . . . . .	1	0.046
Bethlehem Bazaar . . . . .	1	0.003
Bible Society Pavilion . . . . .	1	0.016
Bosporus Kiosk Bazaar . . . . .	1	0.011
Boston <i>Advertiser</i> and <i>Herald</i> . . . . .	1	0.030
Brazilian Café . . . . .	1	0.017
Brewers' Hall and Ice-House . . . . .	2	0.590
Burial Casket Building . . . . .	1	0.018
Campbell Printing-Press Building . . . . .	1	0.256
Catholic Total Abstinence Beneficial Association Fountain	1	0.098
Chili Amalgamating Machinery and Boiler-House . . . . .	1	0.068
Cook's International Tourist Company . . . . .	1	0.060
Emile Ross's Saw-Mill and Boiler-House . . . . .	1	0.035
Empire Transportation Company . . . . .	1	0.097
Frank Leslie's Newspaper Pavilion . . . . .	1	0.021
Fröbel's Kindergarten . . . . .	1	0.014
Fuller, Warren, & Co. . . . .	1	0.060
Gillender & Sons' Glass-Works . . . . .	1	0.181
Glass Magazine (Klatschek, Thomas, & Stuart) . . . . .	1	0.028
Glass House, or French Violet Building . . . . .	1	0.005
Havana, Cuba, Horticultural Building . . . . .	1	0.007
Hayes's Perforated Sheet-Iron . . . . .	1	0.014
Hunters' Camp . . . . .	1	0.004
Jerusalem Bazaar . . . . .	1	0.002
Jerusalem, Palestine, Bazaar . . . . .	1	0.012
Liberty Stove-Works . . . . .	1	0.040
Loiseau Pressed Fuel Company . . . . .	1	0.010
Moorish Villa . . . . .	1	0.019
Meteorograph Building . . . . .	1	0.000
New England Granite Company . . . . .	1	0.014



	No.	Acres covered
New England Log House and Modern Kitchen . . . . .	1	0.030
New York Slate Roofing Company . . . . .	1	0.008
New York <i>Tribune</i> . . . . .	1	0.020
Nevada Quartz-Mill . . . . .	1	0.055
Office Elevated Railroad . . . . .	1	0.012
Ohio <i>Farmer</i> . . . . .	1	0.003
Oriental Bazaar . . . . .	1	0.013
Pacific Guano Company . . . . .	1	0.009
Pennsylvania Railroad Ticket Office . . . . .	1	0.068
Pennsylvania Educational Department . . . . .	1	0.296
Persian Bazaar . . . . .	1	0.014
Rowell's Newspaper Exhibition Building . . . . .	1	0.070
Sheet-Metal Pavilion . . . . .	1	0.023
Singer Manufacturing Company . . . . .	1	0.101
Sons of Temperance Fountain . . . . .	1	0.010
Sponge Exhibition Building . . . . .	1	0.004
Stand-pipe . . . . .	1	0.007
Tea and Coffee Press Building . . . . .	1	0.055
Tunisian Café and Bazaar . . . . .	2	0.033
Turkish Café . . . . .	1	0.097
Total . . . . .	56	

## PRIVATE EXHIBITS (Outside the Buildings):

Ames Foundry, Chicopee, Mass. . . . .	1	0.009
Automatic Railroad . . . . .	1	0.045
Blake's Patent Stone- and Ore-breaker . . . . .	1	0.014
Car-starter . . . . .	1	0.004
Excavator and Dredger . . . . .	1	0.003
Field's Flush Tank . . . . .	1	0.005
Fire-proof Ventilated Building . . . . .	1	0.002
Gas Machinery . . . . .	1	0.012
Gunpowder Pile-driver . . . . .	1	0.003
Hay-car . . . . .	1	0.138

	No.	Acres covered.
Hay-press . . . . .	1	0.021
Iron Fencing (Horticultural grounds) . . . . .	1	0.009
Jesse Starr & Sons' Iron-Works . . . . .	1	0.124
Locomotive "John Bull" and Cars . . . . .	1	0.019
Model of Paris (Colonel Liénard) . . . . .	1	0.023
Organ . . . . .	1	0.004
Pennsylvania Railroad Standard Tracks . . . . .	1	0.093
Pierce's Well Auger . . . . .	1	0.003
Pneumatic Tube . . . . .	1	0.096
Portable Travelling Crane . . . . .	1	0.012
Protective Fire Apparatus . . . . .	1	0.072
Scale . . . . .	1	0.002
Stone Entrance . . . . .	1	0.004
Swings . . . . .	2	0.003
Terra-cotta Pipes . . . . .	1	0.004
Union Soldier, Westerly Granite Company . . . . .	1	0.002
United States Hoisting Machinery . . . . .	1	0.069
Walker Tent Exhibits . . . . .	1	0.056
Warner & Co., Iron Pipes . . . . .	1	0.014
Water-proof Roofing . . . . .	1	0.008
Weimer's Machine-Works . . . . .	1	0.083
Wind-mills . . . . .	8	0.015
Young's Champion Saw-mill . . . . .	1	0.016
Total . . . . .	41	

## STATE BUILDINGS:

Arkansas . . . . .	1	0.138
California and Nevada . . . . .	1	0.114
Connecticut . . . . .	1	0.030
Delaware . . . . .	1	0.049
Illinois . . . . .	1	0.047
Indiana . . . . .	1	0.064

	No.	Acres covered.
Iowa . . . . .	1	0.043
Kansas and Colorado . . . . .	1	0.280
Maryland . . . . .	1	0.182
Massachusetts . . . . .	1	0.120
Michigan . . . . .	1	0.046
Mississippi . . . . .	1	0.032
Missouri . . . . .	1	0.066
New Hampshire . . . . .	1	0.057
New Jersey . . . . .	1	0.120
New York . . . . .	1	0.050
Ohio . . . . .	1	0.091
Pennsylvania . . . . .	1	0.169
Rhode Island . . . . .	1	0.022
Tennessee . . . . .	1	0.035
Vermont . . . . .	1	0.034
Virginia . . . . .	1	0.055
West Virginia . . . . .	1	0.101
Wisconsin . . . . .	1	0.046
Total . . . . .	24	

The character of these buildings may be summarized as follows:

	No.	Acres.
Exhibition buildings, official . . . . .	45	57.531
Concessions . . . . .	41	4.624
United States Government buildings . . . . .	7	2.634
Foreign Government buildings . . . . .	15	0.855
Private exhibition buildings . . . . .	56	2.765
Private exhibits (outside the buildings) . . . . .	41	0.977
State buildings . . . . .	24	1.991
Urinals . . . . .	15	0.075
Water-closets . . . . .	5	0.014
Totals . . . . .	249	71.466

During the period of the Exhibition there was sold upon the grounds an *Authorized Visitors' Guide to the Centennial Exhibition and Philadelphia* which included a complete guide to the buildings before mentioned. Each building bore at least one of its own national standards, beside a banner showing a letter that indicated its nationality, and a number fixing its quarter in the grounds with reference to the intersecting avenues. By this means, persons traversing the grounds had an unmistakable direction to every building they encountered.

Beside the foregoing list of buildings, the Chief Engineer's report also gives the following statistical tables, which may properly be grouped in this place:

	Acres.	
AREA OF CENTENNIAL GROUNDS . . . . .	284.49	
	Feet.	Miles.
LENGTH OF FENCE INCLOSING GROUNDS . . . . .	14,683	2.78
LENGTH OF AVENUES:		
*Avenue of the Republic . . . . .	5,225	
†Belmont Avenue . . . . .	2,625	
*State Avenue . . . . .	2,200	
*Fountain Avenue . . . . .	3,600	
*Agricultural Avenue . . . . .	2,085	
Total . . . . .	15,735	2.98
*LENGTH OF ROADS AND WALKS . . . . .	85,209	16.73
‡LENGTH OF RAILWAY TRACKS:		
Belmont Avenue, first track . . . . .	2,415	
“ “ second track . . . . .	1,520	
“ “ third track . . . . .	1,500	
* New.	† Old.	‡ Freight tracks.

	Feet.	Miles.
Extension to Agricultural Hall . . . . .	1,400	
“ “ Government Building . . . . .	480	
North side of Main Building, first track . . . . .	2,590	
“ “ “ “ “ second track . . . . .	1,980	
“ “ “ “ “ third track . . . . .	640	
South side of Machinery Hall, first track . . . . .	2,200	
“ “ “ “ “ second track . . . . .	1,200	
North Avenue of Machinery Hall . . . . .	1,580	
South “ “ “ “ . . . . .	1,100	
Total . . . . .	18,605	3.52
*LENGTH OF DRAIN-PIPES . . . . .	37,289	7.06
*LENGTH OF WATER-PIPES . . . . .	48,301	9.13
*LENGTH OF GAS-PIPES . . . . .	41,466	7.86
	Acres.	
AREA covered by avenues, roads, and walks . . . . .	49.32	
“ “ “ buildings . . . . .	70.08	
“ “ “ lakes . . . . .	4.05	
“ “ “ narrow-gauge railroad . . . . .	8.08	
“ “ “ lawns . . . . .	152.96	
Total . . . . .	284.49	
	Feet.	
LENGTH OF NARROW-GAUGE RAILROAD . . . . .	29,000	5.48
		Acres.
*NUMBER OF URINALS ON THE GROUNDS . . . . .	15	0.075
*NUMBER OF WATER-CLOSETS ON THE GROUNDS . . . . .	5	0.014

\* Outside the buildings.



*NUMBER of gas-lamps . . . . .	276
* " " oil-lamps . . . . .	208
* " " fountains . . . . .	13
* " " hydrants . . . . .	29
" " pumps . . . . .	1
" " springs . . . . .	14
" " bridges (King's iron bridges) . . . . .	2
 LANSDOWNE BRIDGE . . . . .	 1
 BRIDGE WEST OF MACHINERY HALL. . . . .	 1
 BELMONT BRIDGE . . . . .	 1
 FOOT-WALK BRIDGES . . . . .	 11
 MONUMENTS :	
†Elias Howe . . . . .	1
Bishop Allen . . . . .	1
Columbus . . . . .	1
†Washington . . . . .	1
†Religious Liberty . . . . .	1
 NUMBER OF TREES AND SHRUBS TRANSPLANTED . . . . .	 20,000
 NUMBER OF ENTRANCE STILES :	
Money entrances . . . . .	74
Exhibitors' entrances . . . . .	15
Complimentary and exhibitors . . . . .	10
Complimentary . . . . .	5
Special . . . . .	2
Exchange offices . . . . .	12
Gates . . . . .	4

\* Outside the buildings.

† Exhibit.

	No.	Feet.
Wagon gates . . . . .	12	
Exits . . . . .	42	
Railway gate . . . . .	1	
Temporary gates . . . . .	2	

AVERAGE NUMBER OF MEN EMPLOYED ON THE GROUNDS PER

DAY . . . . .	600
Largest number at one time . . . . .	1,100
Number retained for maintenance during the Exhibition	225

MAIN BUILDING :

Fire-plugs outside the building . . . . .	36	
Hydrant valve-plugs inside the building . . . . .	77	
Stop-valves . . . . .	11	
Blow-off valves . . . . .	4	
8-inch water-pipe . . . . .		940
6-inch " " . . . . .		5,554
4-inch " " . . . . .		5,840

MACHINERY HALL :

Fire-plugs outside the building . . . . .	32	
Hydrant valve-plugs inside the building . . . . .	49	
10-inch water-pipe . . . . .		325
8-inch " " . . . . .		1,550
6-inch " " . . . . .		5,080
4-inch " " . . . . .		2,220

BOILER-HOUSE No. 1, 4-inch pipe . . . . .		90
" " No. 2, " " . . . . .		90
" " No. 3, " " . . . . .		270
Hydrant valve-plug . . . . .	1	

MACHINE-SHOP, } ANNEX NO. 2, } 6-inch pipe . . . . .		270
Hydrant valve-plugs . . . . .	2	

	No.	Feet.
BOILER-HOUSE No. 4, } 4-inch pipe . . . . .		27c
ANNEX No. 3, }		
Hydrant . . . . .	1	
Valve-plug . . . . .	1	
UNITED STATES GOVERNMENT BUILDING :		
Fire-plugs outside the building . . . . .	7	
Hydrant valve-plugs inside the building . . . . .	16	
10-inch water-pipe . . . . .		80
8-inch " " . . . . .		290
6-inch " " . . . . .		1,590
4-inch " " . . . . .		325
3-inch " " . . . . .		40
PRINCIPAL ANNEX TO MAIN BUILDING :		
Fire-plugs outside the building . . . . .	4	
4-inch water-pipe . . . . .		130
3-inch " " . . . . .		610
SHOE AND LEATHER BUILDING :		
Hydrant valve-plugs inside the building . . . . .	3	
Water-pipe . . . . .		620
ART GALLERY :		
Fire-plugs outside the building . . . . .	2	
Hydrant valve-plugs inside the building . . . . .	4	
4-inch pipe . . . . .		220
3-inch " . . . . .		660
2-inch " . . . . .		340
ANNEX TO ART GALLERY :		
Fire-plugs outside the building . . . . .	4	
Hydrant valve-plugs inside the building . . . . .	2	
4-inch water-pipe . . . . .		310

	No.	Feet.
3-inch water-pipe . . . . .		370
2-inch " " . . . . .		40
HORTICULTURAL HALL :		
Fire-plugs outside the building . . . . .	4	
Hydrant valve-plugs inside the building . . . . .	8	
3-inch water-pipe . . . . .		670
2-inch " " . . . . .		360
AGRICULTURAL HALL :		
Fire-plugs outside the building . . . . .	14	
Hydrant valve-plugs inside the building . . . . .	18	
6-inch water-pipe . . . . .		3,550
BREWERS' HALL :		
Fire-plugs outside the building . . . . .	2	
Hydrant valve-plugs inside the building . . . . .	2	
Water-pipe . . . . .		450
		Acres.
GAS DEPARTMENT . . . . .	1	0.003
WATER DEPARTMENT . . . . .	1	0.003

At the close of the Exhibition, the Governments of Great Britain, Germany, and Japan, and the States of Ohio and Pennsylvania, presented to the Commissioners of Fairmount Park the buildings which they had severally erected, in token of the pleasant associations with the Centennial Celebration. These, together with the Main and Machinery Buildings and the Memorial and Horticultural Halls, remain as lasting memorials of the International Exhibition of 1876.







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