

fect mechanism of the steam engine, dynamo builders have been building machines which do not require such high rates of speed as were formerly demanded, both because of improved design and construction as well as because of the increase in size.

The electric generating plants at the World's Columbian Exposition fully demonstrate the latest practice in this country in direct connecting. Six of the Westinghouse alternating current dynamos, each with a normal capacity of ten thousand incandescent lamps, will be direct-connected to Westinghouse compound engines of one thousand horse power each. Near by, in the power plant in the Palace of Mechanic Arts, the General Electric Company exhibits a vertical triple expansion engine direct-connected to two Edison multipolar power generators of five hundred horse power each. These two plants, each of which is of unusual capacity, demonstrate the adaptability of direct connection with vertical types of engines, while in the power house of the Intramural Railway is a direct-connected plant in which the engine is of the horizontal type. The engine in this case is a two thousand horse power cross compound Allis engine of the Corliss type, and the armature of a fifteen hundred kilowatt Thomson-Houston multipolar railway generator is built up on its shaft. With the claims for economy that are made for direct-connected plants, it would be instructive if these three installations were so arranged that they could be tested under different steam pressures, so as to ascertain the point of their highest economic working efficiency.

There are other direct-connected sets at the Exposition besides these mentioned. They are exhibits and not part of any plants in actual operation, but they all go to show that the plant designed and exhibited by Mr. Edison fifteen years ago was on the correct principle.

#### THE POST OFFICE OF THE COLUMBIAN EXPOSITION.

The model post office established in the World's Columbian Exposition grounds by the United States Post Office Department is now in full working order, and has been used since the middle of April. This office is a branch of the Chicago post office, but is known as the World's Fair Station, and all visitors at the Exposition who have no definite knowledge in advance as to what their address will be in Chicago may have their mail sent to this station by addressing it "World's Fair Station, Chicago." This office is situated in the southwestern corner of the United States Government building, and its general arrangement is in all respects highly convenient. At the extreme left is the private office of the superintendent of the station, then in consecutive order are windows as follows: Two "Carriers' Delivery" windows, two "General Delivery" windows, one "Registered Letters" window, one "Money Orders" window, one "Stamps Wholesale" window, one "Stamps Retail" window, and at the right hand corner an "Inquiry" window. Between the carriers' windows and the general delivery windows are about one hundred lock boxes which will be rented, but there are no call boxes. Near the right hand end are four slips for mailing letters, one each marked "North," "South," "East" and "West." Besides these there are slips marked "Packages," "Papers," "City" and "Foreign."

This office has about twenty-five postmen in the delivery service, and there are four deliveries of mail a day, mail being delivered at all the State buildings and foreign buildings as well as at the Exposition buildings. By this arrangement visitors from any particular State can, if they so choose, have their mail delivered at their State building, provided their State has a building. The service of this office, including the mail delivery, belongs equally to Midway Plaisance as to the Exposition grounds proper.

At the right of this post office is a model postal car with all its equipment complete. A full working model of this car, one-sixth in size, is also exhibited. In this connection the Post Office Department makes a complete exhibit of the various ways of carrying mails in addition to this postal car. There is a mail carrier on horseback with his equipment, a sled to which three dogs are harnessed, showing the manner in which mail is carried in the winter in extreme cold regions. There is also the Indian mail carrier on snow shoes, a "special delivery" boy on a bicycle, a fine model of the steamship City of Paris, also a model of the side wheel steamer Southern, of New York, the first steamer that ever carried the United States mails. There are also two wax figures of postmen in full uniform, together with a full and complete display of mail bags and pouches of all kinds, etc.

**FOR BROWNING BLUE PRINTS.**—Dissolve piece of caustic potash as big as a soup bean in 5 ounces of water. Place print in this solution, and it will fade to orange yellow. When all blue prints have disappeared, wash print thoroughly in clear water. Then dissolve a partly heaped teaspoonful of tannic acid in 8 ounces of water. Put the yellow prints in this bath, when they will turn to a brown that can be allowed to assume a tone of any required depth. Then wash well and dry.



#### THE OPENING ON MAY 1.

The World's Columbian Exposition was formally opened at noon on Monday, May 1.

From the day work was begun on the Exposition, the amount of energy expended has been almost limitless, and as the opening day drew near month by month, this amount of energy increased proportionately. The greatest amount of work was accomplished during the month of April, and especially during the last week or ten days, when from 15,000 to 17,000 men were employed, and work went on unceasingly. Exhibitors were given up to late Sunday night, the 30th day of April, in which to finish their work, or, if not finished, to have it reach as near as possible the point of completion. Meantime, while exhibitors were putting the finishing touches on their exhibits, from 4,000 to 5,000 men were cleaning up the grounds and buildings. These men worked through the night and up almost to the hour that the procession escorting the guests of the day entered the Exposition grounds, and they accomplished their work so that when the Exposition was formally opened to the world, it was ready for the inspection of visitors.

The ceremonies attending the opening began on Saturday, April 29, when the Duke of Veragua reached Chicago and was escorted to his hotel. An hour later President Cleveland with his cabinet and other government officials arrived and was escorted to the hotel by State and national troops, and a little later the Liberty bell, which received such ovations all along the route from Philadelphia, was escorted through the streets of Chicago to the Exposition grounds, received almost as great an ovation as was accorded the President and the descendant of Columbus. Thousands of strangers were in the city, and the streets were crowded from the station to the Exposition grounds, eight miles away. Public and private buildings were freely decorated, and, in spite of the gloomy weather, the ovation was a royal one.

Sunday, the 30th of April, was one of the most uncomfortable days that has been experienced in Chicago this spring. The atmosphere was chilly and a driving rain continued from early in the morning until after noon. Monday morning of the opening day, May 1, was somewhat brighter, and, although it was by no means pleasant, the sun made several brief appearances. The preceding week had been one of almost continuous heavy rains, and, as a consequence, the Exposition grounds and some of the streets were in bad condition. Many of the walks and promenades in the northern half of the Exposition grounds had had the finishing touches put upon them and had been rolled and swept until they were as hard and clean as an asphalt pavement. The highways of the southern end of the grounds—and it is here that the crowds largely center—had not been fully completed. Most of them had reached the point where only the top dressing and a little more rolling was required to complete them when the rains came and, lasting so many days, prevented the completion of the work.

The hour for opening the gates of the Exposition to the visitor is eight o'clock, but long before that hour on the opening day visitors poured in at all of the gates, and the stream increased in volume up to the time of the arrival of the procession. This procession consisted of a platoon of mounted park policemen, a detachment of city policemen, mounted, Company B Seventh United States Cavalry, the Chicago Hussars, mounted, Troop A Illinois National Guard, and a large number of carriages containing the officials of the Exposition, with the presidential and ducal parties, foreign representatives, city and State officials, ladies of the several parties, etc. This procession proceeded up Michigan Avenue, out the Boulevard, and entered the Exposition grounds by passing through Midway Plaisance. People crowded the streets along the entire route of the procession. In the Midway Plaisance the people in the several foreign villages turned out *en masse* to extend their welcome to the President. Turks, Moors, Egyptians, Singalese, Algerians, Japanese, Javanese, and the other foreigners extended their greetings to the President each in their own peculiar manner. Passing through the Plaisance into the Exposition grounds proper, the procession wended its way through throngs of people to the Administration building. Here the military companies formed an open passageway, through which the carriages passed as they drove up to the building, and the invited guests alighted.

The ceremonies attending the formal opening of the Exposition began promptly at half past eleven. The special platform constructed for the occasion on the east front of the Administration building provided sufficient seating capacity for the two thousand or more invited guests, the orchestra, the large chorus, and others. Exposition officials estimated that at least 150,000 people could be comfortably crowded into the Grand Plaza in front of the platform. Long before President Cleveland made his appearance on the stand all available space, not only in front but on each side of the Administration building and the great open areas in front of the Manufactures and Liberal Arts building and the Agricultural building, was crowded to the utmost, and thousands of people filled the grounds even as far east as in front of the Peristyle. The sight from the platform was magnificent. A large sounding board had been constructed directly back of the orchestra and chorus, and its efficiency was complete, thus adding much to the perfectness of the ceremonies.

After the President and other guests were seated, the ceremonies opened by the orchestra rendering the "Columbian March and Hymn." Dr. Milburn, chaplain of Congress, offered prayer, Miss Jessie Couthouli recited the "Prophecy," a poem written for the occasion by W. D. Croffut. Following the rendering of the overture, "Rienzi," by the orchestra, Director-General Davis of the Exposition delivered a short address, reviewing concisely the work and purpose of the Exposition. Concluding this address, the Director-General turned to President Cleveland, who returned the salute of the Director-General. As the President rose to his feet he was greeted by an outburst of cheering from the immense crowds in front of him, aggregating perhaps 300,000 people. Cheer after cheer arose, echoing from the Administration building across the basin to the Peristyle and back again. The President presented the purposes of the Exposition, asking for no allowance on the score of the youth of the nation, then declared the Exposition opened, and, touching the electric key, turned on the steam to the great 2,000 horse power engine of the power plant in the Palace of Mechanic Arts.

As President Cleveland touched the key and declared the Exposition opened, the sight and the sound following was most memorable. On every building throughout the grounds, and especially on those adjoining the basin and canals, the hundreds of flagstaves had been arranged with their flags tightly furled but ready to be flung to the breeze at an instant's notice. Immediately in front of the grand stand were three poles, each eighty feet high, and on top of each was a golden model of the Santa Maria. At the signal, flags were unfurled from these poles and the halliards controlling the flags on every one of the other flag poles were loosened as if by one movement, and the flags of every country exhibiting at the Exposition, the Exposition colors, and an immense amount of bunting of bright and harmonious colors were flung to the breeze. At the same instant two electric fountains situated on either side of the McMonnies fountain, and immediately in front of the grand stand, sent great streams of water fifty to seventy-five feet in the air, and the great golden Statue of the Republic mounted immediately in front of the Columbus entrance to the Peristyle was unveiled. The man-of-war Michigan which lay immediately off the Exposition pier fired twenty-one guns as a Presidential salute. The steam launches in the basin blew their whistles, and at the same time whistles from steamers lying at the pier and the great steam whistles and gongs on the power plant of the Exposition joined in the din. The orchestra and the chorus closed the formal exercises with the tune "America," and at the second verse the whole concourse of people, guests and visitors joined in the singing.

President Cleveland and the other invited guests retired to the Administration building, where a lunch was served. While they were preparing for the lunch a band of several American Indians that had been stoically watching the exercises was led into the rotunda under the vast dome of the building, and at a given signal they sounded the Indian war whoop which startled the foreign guests. After a short rest following the lunch, the President, the Duke and a few more of the more prominent guests were escorted about the grounds and through the several buildings, riding part of the way in carriages and the rest of the way in electric launches on the waterways. Quite a little reception was held in the Manufactures and Liberal Arts building, where the President and the official representatives of all the exhibiting nations and colonies who were present were formally introduced. President Cleveland and party left the grounds at half past five for Washington.

It is hardly to be expected that such an enormous undertaking as this Exposition has been could be wholly complete in every respect on the opening day. Nevertheless visitors have no reason to be disappointed or critical, for on the opening day there were more exhibits to be seen and studied than any human being

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## THE OPENING ON MAY 1.

(Continued from page 291.)

could comprehend or appreciate in several weeks of time.

**Brief History.**—A brief review of the history of the Exposition, its conception and consummation, will give some idea of the immense amount of work that has been accomplished. The act of Congress under which the Exposition was organized bears date of April 25, 1890. Several months following were consumed in discussing and arranging the organization of the World's Columbian Exposition Corporation, which was organized under the State laws of Illinois. Then came the question of selecting a site, and when Jackson Park was finally decided upon, it was necessary to do an immense amount of preliminary work before the foundation of a single building could be laid. Up to this time Jackson Park was a large tract of wild land with a few drives and walks in it, but mostly a swamp which at certain periods of the year was inundated by Lake Michigan. This tract comprises about 700 acres and was put into the hands of landscape engineers who, after an immense amount of dredging and leveling, evolved the present grounds. Ground was first broken July 2, 1891. Since then about 400 separate and distinct buildings have been erected, exclusive of booths, pavilions and other such buildings for concessionaires. All but about 50 of these are Exposition buildings, and it is estimated that the entire 400 buildings give 200 acres of floor space. It will thus be seen that in less than 21 months all these buildings have been designed and constructed, and many of them filled with exhibits. These buildings vary in size from small structures of one or two little rooms to the great Manufactures and Liberal Arts building, which is about a third of a mile long and a quarter of a mile wide. Throughout the buildings there are over 30,000 exhibits, representing 50 countries and 37 colonies. Seventeen foreign nations have constructed buildings, and there are nearly forty State buildings erected by the different States of the United States. The buildings, as a rule, are of a cream white tone, and with a few exceptions color effects are given by the use of bunting, of which over 100,000 yards have been used for furnishing flags and colors for the Exposition buildings alone.

**The Attendance on the First Day.**—The estimated attendance on the opening day shows that over a quarter of a million people were inside the Exposition grounds, of which 150,000 paid admission fees, and the fact that this vast multitude was handled on the opening day without excessive crowding or jamming proves that the transportation facilities are equal to almost any probable demands that may be made upon them.

**Opening of the Woman's Building.**—Next to the opening of the Exposition itself, the most interesting exercises were the dedication of the Woman's building, which took place two hours after President Cleveland had declared the Exposition open. The exercises were held in the Hall of Honor in the Woman's building, and a large number of distinguished women from various foreign countries and various parts of the United States were present. The exercises consisted of music, prayer, the reading of an ode written by Miss Flora Wilkinson. Mrs. Potter Palmer, President of the Board of Lady Managers, gave an address explaining what had been accomplished. A jubilate, written especially for the occasion by Mrs. H. H. A. Beach, of Boston, was sung, and several of the ladies on the platform, especially those representing foreign countries, made addresses. The event of the exercises was the driving of the golden nail by Mrs. Palmer. This was the last nail driven, and was the formal act of declaring the building complete.

The Michigan, Massachusetts, New York, Missouri, Swedish and many other buildings were formally opened for the entertainment of visitors.

Early in the evening, before the time for closing the grounds to visitors arrived, the electric lighting equipment of the Administration building was tested, and every lamp, both arc and incandescent, was used. The effect was in every way perfect.

In every way the opening of the Exposition was remarkably auspicious. The Exposition buildings themselves, with the exception of one or two of the minor buildings, were complete, and the work of installing exhibits was in a very forward state. Outside of the Palace of Mechanic Arts fully eighty per cent, if not more, of the exhibits were ready for the inspection of visitors Monday noon.

**The Stage Coaches.**—A new method of transportation to the Exposition grounds from the heart of Chicago was inaugurated only a few days before the Exposition opened. This is a line of coaches which will be in many respects a reproduction of the balmy days of stage coaching in the far West. The coaches will have a seating capacity for perhaps twenty-four people on top and sixteen inside, the coaches being modeled after a style of coaches used at the Paris Exposition. The horses are of American breed, having come from the West, and most of them being stage coach horses. The drivers are experts from the West

who are in the habit of driving something after the manner of Horace Greeley's stage coaching in Nevada, but whatever the speed may be the riding will be comfortable, as the coaches will start from the center of the city and go to the Exposition grounds over the boulevard system of the city. The ride will consume about an hour. There will probably be six horses attached to each coach.

**Drilling the Ticket Takers.**—The men having charge of handling tickets at the sixteen or more entrances to the Exposition grounds were put through a course of training for several days before the Exposition was formally opened, and it was rather an amusing sight to see the rows of dummy visitors going in and out of the several gates in order that the training should be a literal reproduction of the conditions soon to come. Nearly five hundred ticket sellers were engaged. These men were divided up into sections, as there will be three shifts of men to work during the hours which the Exposition is open, each shift working six hours at the gate and having an allowance of one hour for squaring accounts. Each ticket seller is under bond for the satisfactory performance of his duties. The gates are open to the public at eight o'clock in the morning, and visitors are supposed to be out of the grounds by half past six in the evening, and when there are evening sessions from eight until half past ten. The Exposition management has aimed to give ample facilities at the several gates for selling tickets as rapidly as visitors can be admitted to the grounds, but it is urged that visitors take advantage of the many ticket stations away from the grounds, at the railroad stations, hotels and elsewhere, so that there shall be as little delay as possible in securing admittance.

Several hundreds of aquatic birds of many varieties have been put into the lagoon. One wing of each bird is crippled, so that none of the birds can fly. Most of these birds are those that are native to the Chicago climate. Their presence adds much to the picturesqueness and life of the scene surrounding the lagoon. What adds still more naturalness to these banks is the fact that thousands of plants indigenous to the swamps and waterways of Illinois have been transplanted to these waters, and especially to the shores of the Wooded Island. The size and vigor of these plants gave every appearance to the island last fall of their having always been there, while the fact is nearly every individual one had been transplanted within twelve months. This fringe of green will give enough natural tangle to the shore of the island to obliterate every appearance of being artificial. Besides the Wooded Island there is the Hunter's Island, which immediately joins it on the south, and several other very small patches of green forming miniature islands, and these also have been transformed into a mass of green. The Wooded Island comprises about sixteen acres. Quite a little is cut off from the northern end, having been assigned to Japan for its floricultural exhibit, and also for the site of the Hooden, which is Japan's gift to the Park Commissioners of Chicago. But nearly ten acres of the area of the island are devoted to flowers. By far the most noticeable display will be the rose beds, which in themselves cover considerably over an acre. Most of the work on these beds was completed last fall. Thousands of full grown plants of the hardier types were set out, and these seem to have wintered with practically no loss by winter killing. Every variety of hardy roses is included in this display. Other roses in great variety, which could not live through the winter if exposed, were kept in the Horticultural building and were transplanted in time for the opening of the Exposition. At the southern end of the island is a splendid display of rhododendrons, and there are also scattered about the island, as well as throughout the grounds, clusters of the more well known shrubs, such as lilacs and azaleas. There are something like 25,000 or 30,000 hardy plants in the rose garden, and more than half as many of the tender kinds, which were wintered in the Horticultural building. In the center of the garden is a pavilion of considerable size, which will be a mass of green by June 1, because of the innumerable vines that climb over it. Many nurserymen throughout the country have contributed generously ornamental and flower shrubs. England has also made a fine display of typical English plants and the Germans have brought some of the favorite German plants. There have been planted on the Wooded Island and throughout the grounds over 12,000 trees, 5,000 shrubs, 15,000 miscellaneous plants, nearly as many aquatic and semi-aquatic plants, and several thousands each of fern roots, climbing vines, ornamental grasses, etc.

The idea of having two model American locomotives of the latest and most powerful type mounted on pedestals in front of the Railway Terminal Station was abandoned at the last minute. The effect was not quite so satisfactory as it was thought it would be, and one locomotive, which had already been put in place, was removed to the Transportation building.

The monster Krupp gun, which has been so fully illustrated and described in these columns, reached

the Exposition grounds without mishap, and was mounted in place a week before the Exposition was opened. Nothing in the grounds in the shape of an exhibit has attracted much more attention, and the German workmen and Columbian guards at the Krupp building had their hands full in keeping people from crowding inside the structure. This was specially true at the noon half hour, when large squads of workmen, from all corners of the grounds, made a line for the Krupp building. The monster is so surrounded by smaller guns, castings, and other exhibits, that a picture of it as it now stands is rather unsatisfactory. As it rests on its carriage, the gun is pointing directly out over the lake. Cartridges which are used in firing are near by, and the apparatus used in handling the gun is shown, thus making the exhibit very complete.

## LOCOMOTIVES OF 1831 AND 1893.

Among the exhibits at the Chicago World's Fair, in which are shown contrasts between past and present, none will more strikingly illustrate the progress made in the last sixty years than the exhibit of the New York Central and Hudson River Railroad, consisting of a reproduction of the De Witt Clinton locomotive, which was the first engine to draw a train in the State of New York, and the sixty-two ton passenger locomotive 999, of the New York Central and Hudson River Railroad, just turned out of the New York Central shops at West Albany.

The De Witt Clinton was built in New York City in 1831, at the West Point foundry, located at the foot of Beach Street. The engine had four drive wheels, 4 feet 6 inches in diameter; the cylinders, two in number, were 5½ inches in diameter by 16 inch stroke. The boiler had 30 copper tubes, 2½ inches in diameter; the engine weighed about 6 tons, and was provided with a tender carrying fuel and water. On the tender there was a seat for the conductor. The engine had a boiler feed pump driven from the crosshead, and also a hand feed pump. This engine drew a train of three coaches, made in the style of the old-fashioned stage coaches. Trial trips were made on the Mohawk and Hudson Railroad at various times from July 2 to August 9, 1831, when the first regular excursion trip was made. The passengers on this occasion were Erastus Corning, Mr. Lansing, Ex-Governor Yates, J. J. Boyd, Esq., Thurlow Weed, Esq., Mr. Van Zant, Billy Winne, penny postman, John Townsend, Esq., Major Meigs, Old Hays, high constable of New York, Mr. Dudley, Joseph Alexander, of the Commercial Bank, Lewis Benedict, Esq., and J. J. De Graft. David Matthews was engineer and John T. Clark was conductor. The signal for starting was given by blowing a tin horn. The fuel used on this trip was dry pitch pine, coal having proved unsatisfactory, and as there was no spark arrester on the stack, the smoke and sparks were freely poured on the passengers in the coaches. They raised their umbrellas to protect themselves, but the covers were soon burned off, and the passengers busied themselves in putting out in each other's clothes the fires started by the hot cinders. When stop was made at a water station, the slack between the coaches, which produced disagreeable jerks, was partly remedied by wedging rails from a neighboring fence between the cars and tying them fast. On arriving at Schenectady refreshments were served, after which the party returned to Albany, and thus was completed the first regular trip of a locomotive and train in New York State. The coaches which made up the train were built by James Gould, of Albany. The upper view in our engraving is taken from an old sketch, supposed to have been made on the occasion of this excursion. It graphically represents the effect of the first view of a locomotive and train.

The lower view in the illustration represents the De Witt Clinton as it stood in the New York Central passenger station alongside of engine 999, which represents the accumulation of knowledge, skill, and experience of over sixty years in locomotive engineering and building. Engine 999 is the latest and probably the finest locomotive in this country. It was designed by Mr. William Buchanan, superintendent of motive power of the New York Central and Hudson River Railroad, and was built at the shops of the company, at West Albany. The cylinders are 19 inches in diameter by 24 inches stroke. The drivers, of which there are four, are 7 feet 2 inches in diameter, and the tires are 3½ inches thick and 5¼ inches wide, secured to the cast iron centers by Mansell retaining rings. The truck wheels, which are 40 inches in diameter, are also provided with steel tires and Mansell retaining rings. The total wheel base is 23 feet 11 inches. The weight on the four driving wheels, loaded, is 84,000 pounds, and on the engine truck 40,000 pounds, making a total of 124,000 pounds. The boiler is of the wagon-top style, and the firebox is of the Buchanan type, with a water arch. It is 108 inches long and 40½ inches wide. The total heating surface is 1,930 square feet, with a grate surface of 307 square feet. The height of the engine at the center of the boiler is 8 feet 11½ inches above the rail.

The boiler is designed to carry 190 pounds working pressure to the square inch. The tender has a coal