THE PARIS EXPOSITION.

The Paris Exposition may be really said to open at the two Palaces of Fine Arts. The visitor passes along paths bounded by beautifully kept flower beds until the Avenue Nicholas II. is reached. This broad avenue leads from the Champs Elysées to the Alexander III. Bridge, and serves to separate the two Palaces of Fine Arts. These buildings are of particular importance, owing to the fact that they are permanent structures being built with special reference to solidity and they are, of course, entirely fireproof. After the Exposition shall have closed its gates, they will be used for the annual saloons and other exhibitions. The old Palace of Industry was moved to make way for the larger palaces. Both of the edifices bear the name of their architects, the larger of the two being known as the Palace Deglane and the smaller as the Palace Girault, and their style is that of Louis XVI. The Grand Palace is most imposing with its big colonades and pediments in the middle profusely decorated with sculptured figures and groups. The large number of columns in the porch and the façade balances the somewhat exuberant ornamental detail. The glass roof which covers the great courtyard can hardly be seen from the avenue and, therefore, it does not produce the discordant note which it might be expected to do. The grand entrance hall is 660 feet long and 180 feet wide. Beyond this vestibule is the annex or prolongation of the hall, which is reached by an ornamental staircase of wrought iron. On the first floor are various galleries arranged as places of general reunion, and surrounding the exterior of this hall is another gallery 1,100 feet long and 40 feet wide, and above the whole edifice rises the dome 141 feet high. At the summit of the staircase is a grand concert hall capable of seating 1,500 persons. The two lateral façades are curved, producing an effect which is not liked by all architects. The shape of the annex is also unfortunate, as its axis follows the Avenue d'Antin; this last section being designed by M. Thomas. It contains a large hall, surmounted by a low dome and is devoted to sculpture. The posterior façades are decorated with massive plaques made at Sevres. The space in this vast building is divided between France and foreign nations, and the decennial exhibition of French works of arts occupies by far the largest space. Each country has been given a free hand to decorate its own sections as it pleases. The rooms, owing to an ingenious method of slanting the glass roof, have an equal light distributed on each wall, and their different dimensions are equally suitable for works made for close inspection as for those that are most striking at a distance. Some of the rooms are vast in size, where canvases 50 feet in height may easily be shown.

The small Palace of Fine Arts is devoted to a retrospective exposition of French art, and it consists of a vast number of objects illustrating art in France, from the earliest ages to the present time, including ivories, bronzes and iron work. Here are ceramics, woven stuffs, leather, jewelry, glass and mosaic, coins, manuscripts and printing. A suite of rooms furnished in various styles succeed each other and are well worth studying. The Centennial Exhibition of paintings are really a second part of the retrospective exhibition, and are housed in the large palace.

The means of getting around the Exposition are, on the whole, not of the best, for there is no way of going from the Palaces of Fine Arts to the Invalides section, or the other sections, without walking or taking a wheel chair. Between the Invalides section and the Palaces of the Nations and the Champ de Mars section there are, however, two excellent means of transportation—the moving sidewalk and the electric railway. The moving sidewalk consists of a fixed platform, and two moving platforms working at different speeds. The movable platforms move at the rate of 2¼ and 4½ miles an hour respectively, present the appearance of endless ribbons each independent of the others, and are constructed with a short truck without wheels, supported by the two trucks, which are supplied with four wheels. Under each truck is fixed a kind of rail, the ends of which are joined to those of the next truck. The wheels of the trucks run on rails secured by plates secured to wooden sleepers. Each truck carries a motor. Hand rails are placed at regular intervals to assist passengers in crossing from one platform to another. The length of the platform is 11,054 feet. It is connected with the ground by footways and certain passages leading direct to the first floor of the pavilion. There are eleven stations and the fare is ten cents per trip, not exceeding one complete circuit. One of our engravings shows the moving platform at the rear of the Italian Pavilion. It is also shown in our second engraving, although the electric railway is the principal feature of the picture.

The electric railway is intended to enable visitors to move in an opposite direction to the sliding platform, three cars capable of conveying about two hundred persons forming the train, and electricity is delivered to the motors by means of a third-rail. The trains follow each other at intervals of two minutes. The circuit is completed in about twelve minutes, including stoppages. The trains follow almost the same route as the moving platform, generally passing under its supporting pillars, and forms a complete circle. In order to avoid interfering with traffic in streets and avenues it runs at times through tunnels and again over a viaduct. There are five stations, one of which is shown in our engraving. This is the station at the Palace of Electricity, situated on the Avenue de la Bourdonnais. It shows the enormous span of the old Building of Mechanics of the Exposition of 1889, which is now used as the Electricity Building. In the background will be seen one of two the great monumental chimneys which may be regarded as, perhaps, the most successful attempt ever made to render so prosaic a construction as a chimney into a thing of beauty.

We have already given some illustrations on other occasions of the Street of Nations on the banks of the Seine, between the Invalides and the Champ de Mars section, and we now illustrate five more of them. Beginning at the left we have the Pavilion of Great Britain, which is on the plan of a typical English country house, being copied from Kingston House at Bradford-on-Avon, built in the seventeenth century. It is of red brick with large mullioned windows, and has been decorated by a London firm. A long gallery on the upper floor is hung with fine examples of pictures of the English school. In a basement is a very complete exhibition of English fire engines and appliances.

The Belgian Pavilion is much more imposing and its exterior is built in the Flemish style, reproducing the best portions of the same of the celebrated town halls and municipal buildings of Belgium. The central tower is an exact reproduction of the Hôtel de Ville at Andenarde. The building contains various exhibits and reception rooms. The Norwegian Pavilion is built in the style of the châlets in Christiania and is entirely of Norwegian wood, and is painted red. The ground floor contains a valuable collection of fishes and fishing appliances. The upper floors contain picture galleries and exhibition rooms.

The German Pavilion is a very gay affair, suggesting the building exhibited at Chicago in 1893. It has been aptly described as a "synthesis of ancient and modern German architecture." There is a reminiscence of Nuremberg, and the Rhenish towns, and of Berlin and Munich. The façades are all different and the building is crowned with gables, tourelles and clock towers. The building contains an important exhibit of German books and in the basement is a "rathskeller."

The Spanish Pavilion is a pleasing representation of the Castilian Palaces in the days of Spanish grandeur. It is square, with a tower at each angle. There is a valuable collection of armor, known as that of Charles V., exhibited in the building. Farther on down the Seine are the Greek Palaces, Swedish Pavilion, Palace of Servia, Palaces of Roumania, Bulgaria, Finland, Luxemburg, Persia, Peru, Portugal, and Denmark.

The Murray High-Speed Page-Printing Telegraph.

Mr. Donald Murray, an Australian inventor, has recently sold to the Postal Telegraph Company his patents for the United States for a new device for the mechanical transmission of telegraphic messages. It is expected that the system will come into general use within the next few years.

Mr. Murray's invention consists in combining a recording instrument having a series of movable character levers, an electromagnetic perforating instrument, and a tape or strip of suitable material, like paper, which passes through the paper and recording instruments in succession. With the Morse telegraph key, about fifty words can be transmitted a minute, and using the Phillips code as many as sixty-five or seventy words can be sent a minute. Of course, the trouble has been the physical limitations of the human operator, and Mr. Murray does away with this difficulty by automatic transmission. By his system a message is produced on a narrow paper ribbon by means of perforations which correspond with the Morse alphabet. A line of circular feeding holes keep the tape in alignment and also serve to feed it. The tape is run through a perforating machine manipulated by keys like a typewriter, making the necessary transmitting holes. The tape containing the message thus indicated is then put into a Wheatstone transmitter, which is driven by a small electric motor, which is kept running at a uniform rate by an electric vibrator. A receiving instrument at a second station records the electrical impulses determined by the perforated tape in the sending instrument, and on a tape similar to that used at the sending station. This reproduces the perforations representing the letters of the message. The receiving tape is then put into a most ingenious instrument, which is connected with an ordinary typewriter. The tape runs over a small wheel provided with metal points, which serve to feed the tape by the line of feeding perforations. Five rods press against the tape and serve to control the operations of the levers, which in turn control the type keys. As the tape passes these points, some of them slip into the perforations representing each letter. The points which do not enter the tape perforations release the particular key in the typewriter, which will print the proper letter. The typewriter can be operated by a crank or by a motor, and the message is clearly printed on a telegraph blank, the type bars working at a rate exceeding that of manual operation. By the new system a message can be divided between several operators at the perforating machine, and the several strips of perforated tape are then run into the Wheatstone transmitter in their proper order, so that a message of nine hundred words can be transmitted over the wire in eight minutes as against half an hour. A speed of a hundred and fourteen words per minute, over a distance of 388 miles, has been attained with this instrument. With Mr. Murray's system, the tape which has been perforated at the receiving station can be put directly on to an attachment applied to a linotype machine. The message contained in the perforated tape, instead of being typewritten, can then be actually converted into type by means of the linotype mechanism. News copy transmitted may be typewritten in the newspaper office by the automatic machine and this may be then used as a guide by the linotype operator, and excisions, corrections, or additions may be made without interrupting the automatic operation of the linotype machine, except when the matter is changed.

Automobile News.

A large department store in New York city has what is termed an "Automobile Annex," where vehicles are shown, and an Otto gas engine belted to a dynamo serves to charge vehicles which may be brought to the annex for that purpose.

M. Pierre Baudin, Minister of Public Works, is preparing a list of all the paved roads which are now impracticable for the bicycle or automobile, within a radius of 40 miles around Paris. According to the indications thus furnished, which are to be checked up on the spot, he is to commence a series of improvements in the roads, beginning with those which seem to be the most urgent or offering more interest for touring or circulation.

The De Dion Company, of Paris, has recently built its first electric automobile, and it appears that the results of the test have been quite satisfactory. The same company is furnishing the tests of a new racing quadricycle on the petroleum system; it is very light, although possessing a motor of about 12 horse power, which gives it a great speed. The works at Puteaux, on the Seine, manufacture, besides moto-cycles, launches operated by petroleum motors, a steam omnibus of a new type, etc.

The municipal authorities of Riegelsburg, near Saarbruck, Alsace, propose to establish an automobile service between the town and the center of Saint-Jean-Saarbruck, a distance of six miles, and have advertised for offers of eight place vehicles; these are to be hired at first for six months, and may then be purchased if found suitable; offers are to be addressed to the burgomaster of the town. At Charlottenburg, near Berlin, an electric omnibus is now in circulation, which can transport seventeen persons, eight in the interior and nine on top. The electrical energy is furnished by two batteries of accumulators weighing 1,100 pounds. The omnibus makes a course of 30 miles without recharging.

Consul-General Guenther writes from Frankfort, May 25, 1900: The Automobile Company of Speyer, organized last year with a capital of $24,000, has five automobiles in use, representing an investment of about $14,500. They are propelled by a benzine motor in front of the vehicle of 10 horse power, and were built by the Daimler Automobile Company, of Cannstadt. Each coach is capable of carrying twenty-eight passengers, and the company has a contract with the Post Office Department to carry the mails (which include packages, etc., usually sent by express in the United States) to Dudenhofen, Geinsheim, Honhofen, Harthausen, Mechtersheim, Otterstadt, and Waldsee—two to ten miles away. In the five months since starting, more than 40,000 passengers have been carried.

The Belgian Moto-Club is now definitely organized, and has appointed a committee to enter into relations with the Moto-Club of France, especially with regard to the adoption of regulations. Persons desiring to join the club should address M. G. Jacobs, Hotel Métropole, Place de Brouckère, Brussels. At the same time, the Belgian Automobile League is being formed; it is especially a touring organization, having for its object custom-house reforms, improvement of roads, and the establishment of supply stations containing petroleum and of charging posts for electrical vehicles; it will also organize tests and races, and found a training school for conductors of automobiles. The Automobile Club of Belgium is organizing a series of touring races which will cover the entire country; it will be carried out somewhat on the same lines as the tour of England, and will last from ten to twelve days, during which time all the important localities of Belgium will be visited, and automobile expositions of short duration will be held.

Science Notes.

The City of Newark, N. J., is planning a State Industrial Exposition to be held in their city in 1902.

This has been a record-breaking year for the California orange crop. The yield will, it is thought, be about 4,500,000 boxes, or 14,500 carloads. The total investment in California orange groves now amounts to $44,000,000.

Dr. J. H. Breasted, Professor of Egyptology in the University of Chicago, has just been appointed by the Emperor of Germany to superintend the publication of his new Egyptian dictionary. This lexicon will enable students of Egyptology to study the hieroglyphics in the museums throughout the world. This is an excellent compliment to an American scholar.

M. Tissot has succeeded in increasing considerably the sensitiveness of the coherers which he is using in his experiments in wireless telegraphy; the coherer is placed in a magnetic field, whose lines of force are parallel to the axis of the tube. Filings of steel or nickel oxide are used. The system of aerial telegraphy which he now uses enables him to receive signals from the cruiser "Massena" at a distance of 20 miles, with a mast of only 90 feet.

Mr. Albert Wilde, of the Royal Society of Great Britain, has been presented with the Society of Arts Albert Medal. This is a most highly prized trophy, and is awarded for momentous discoveries in science. In the present case it was awarded to Mr. Wilde "for the discovery and practical demonstration of the indefinite increase of the magnetic and electric forces from quantities indefinitely small." The modern dynamo is based upon this principle, and it is adopted in all modern dynamos.

The Peary supply ship "Windward" sailed on July 20 from St. Johns, Newfoundland and her return will be watched for with great anxiety, as she will be the bearer of news of Peary's success or failure. The "Windward" carries a crew of thirteen, and Mrs. Peary, and her little daughter also go to join Lieut. Peary. The boat is loaded to its utmost capacity with coal, even the decks carrying it. The objective point of the "Windward" is Etah, this being the center of the region where are located the Arctic Highlanders, a tribe of Esquimaux who live farther north than any other human beings.

The printing of books with Braille type for the benefit of the blind has made immense progress in England within the last few years. The Central Lending Library, of Birmingham, has no less than five hundred books printed with Braille type. This extensive library comprises the works of such favorite authors as Shakespeare, Browning, Sir Walter Scott, Tennyson, and Ruskin. The Plymouth Public Library has also a similar collection of about two hundred and fifty volumes, and numerous other libraries throughout the country possess similar collections for the entertainment of those deprived of their sight.

The engineer in charge of the improvement of the Yellowstone Park denies that the geysers are approaching extinction. An article to this effect appeared in a French paper and was widely copied throughout the United States. It tends to create an impression that the Yellowstone wonderland, as far as regards the hot springs and geysers, is practically a thing of the past. This is an excellent example of how a scientific observer may draw a wrong conclusion, if he has not studied the subject sufficiently. The names given to such natural objects as geysers are very apt to be misnomers. The geyser action on the shore of Yellowstone Lake is more vigorous than it was ten years ago.

The Council of the American Chemical Society has passed resolutions favoring the creation of a Bureau of Chemistry. The laws of the various States controlling food adulteration are largely ineffective, because of the interference of interstate commerce laws, and can be made effective only through national legislation. Bills are now pending which propose to establish in the United States Department of Agriculture a Bureau of Chemistry, the Director of which shall, under the direction of the Secretary of Agriculture, be charged with the chemical investigation of the foods produced and consumed throughout the country. The American Chemical Society desire to urge the enactment of the bill into a law.

Prof. G. J. Peirce contests the current view that the connection of the fungus (hyphal) and the algal (gonid) elements in lichens is one of commensalism. The hyphæ and the gonids are in the most intimate contact with one another; the hyphæ develop branches which may merely clasp the gonidial cells, or may penetrate them in the form of haustoria. This clasping or penetration stimulates the gonids to internal cell-divisions. The haustoria consume the protoplasmic contents of the gonidial cells which they have entered, leaving only the empty cell walls. The fungus is fed by the alga, and there is no evidence that the gonids develop more luxuriantly in connection with the hyphæ than they would elsewhere.—Proceedings of California Academy of Science.

Engineering Notes.

A mail train on the New York Central Railroad recently made the run from Rochester to Syracuse, eighty-one miles, in eighty minutes.

The underground railways of London carry only nineteen per cent of the passenger traffic; eighty-one per cent is carried by omnibuses and street cars.

A German method of constructing large balance wheels for high peripheral speeds consists in making the rim by winding a rectangular-section steel wire on a cast-iron spool.

The Southern Railroad Company of Italy is going to have built 18 locomotives, 121 passenger cars, 32 baggage cars, and 1,000 freight cars. Foreign concerns will be allowed to compete.

On June 30, 1900, there were 72 warships under construction in the United Kingdom, 54 being for the British Government. Sixteen of the vessels are being built in Royal Dockyards and the remaining 56 in private yards.

It is considered very doubtful if the Pennsylvania Railroad will adopt nickel steel rails for the points of severe service. At the famous Horseshoe Curve the nickel steel rails have been replaced by those of the ordinary steel type, for it was found that the rails diminished the tractive power of the engines on account of their hardness.

Mr. William H. Young, of Troy, N. Y., has been the treasurer of the Rensselaer Polytechnic Institute for half a century, being nominated to that position on February 5, 1850, vice Day O. Kellogg, resigned. During Mr. Young's administration more than 1,000 students have been graduated and more than $2,000,000 have passed through his hands. He is now in his eighty-third year and his connection with the affairs of Troy's great engineering school will always be remembered as one of the most remarkable terms of office in any institution's history.

A curious railway accident occurred in India lately. While a train was in Ruxaul Station a terrific storm commenced, and, although the brake was applied in the van and on the engine, the force of the wind was such that the train was driven along the line. The engine dashed through the buffer stop at the end of the line, and traveled along about six lengths of rail laid end to end without fish-plate fastenings. After leaving these rails the engine plowed along the embankment, and then came fortunately to a standstill, no great damage having been done.

In a paper on "Fly-wheel Explosions" read before the American Association for the Advancement of Science, the author, Mr. C. H. Manning, gave some figures relating to wood-rimmed wheel for this purpose. He stated that for the same weight, pine wood has a much greater tensile strength than cast iron, and is, therefore, much safer for a fly-wheel. An experience of ten years with many such fly-wheels has satisfied him that for engines running at a speed of 100 revolutions per minute or less, a properly constructed wood-rimmed fly-wheel is much the safer. Some twenty wheels, ranging from 20 feet to 30 feet in diameter, and from 30 inches to 120 inches on the face, have been built, and in no case have they given any trouble.

One of the greatest difficulties to be contended with in the practical applications of liquid air is that of keeping it for a length of time. According to Mr. Carl Linde, small quantities may be preserved in well-exhausted and silvered double-walled glass vessels for a relatively long time. One liter of liquid air requires for its evaporation in such a vessel about fourteen days. The ordinary sheet-iron vessels used industrially, holding about fifty liters, and covered with felt or wool, allow about two liters to evaporate hourly. Experiments are being made with a view of building large double-walled and silvered sheet-iron holders, and we may expect that holders will be constructed in which the evaporation will be not more than one per cent per hour.

The New York Fire Department now has 12 engines with rubber-tired wheels, and one of the fire trucks has also been equipped with rubber-tires as an experiment; the truck with its crew weighs about six tons. In 1897 the first engine was provided with rubber-tires. They were made of a uniform size on all four wheels, the rubber being about 3½ inches across the base within the channel of the steel tire by which it was held. The tires are now made 3½ inches on the front wheels and 4 inches on the rear wheels, which carry two-thirds of the weight of the apparatus. The additional cost of the engine equipped with rubber-tire wheels is $400 to $450. There is less wear and tear on the apparatus, and the engines are more perfectly under control. With them there is no difficulty in leaving the railroad tracks, as the driver knows that the rear wheels will not slide on the rails, but will follow the front wheels. There is less danger of collision. Many fire engines and hose wagons have been provided with rubber-tires in the boroughs of Brooklyn and Queens.

Electrical Notes.

It is proposed to establish communication between Zanzibar and Pemba by wireless telegraphy.

Electricity is to be used to convey passengers to the top of the Washington Monument, Washington, D. C.

An ostrich in the Cincinnati Zoological Gardens is undergoing treatment by electricity for paralysis. Under this treatment the bird has been able to swing first one leg and then the other.

Two more vessels of the British Navy, the "Diadem" and the "Furious," have been equipped with Marconi's wireless telegraphic apparatus. The receiving coil is suspended to a gaff attached to the mainmast, above the semaphore, which is the highest point on board. The apparatus is fitted to work up to a distance of 20 miles.

Small spiders play havoc with the telegraph wires in the Argentine Republic. The long cobwebs settle on the wires, and as soon as dew or rain falls they are rendered to some extent a conductor, and the effect is practically to stop the operation of some of the lines. The Government has determined to connect Buenos Ayres and Rosario by an underground cable 150 miles long to obviate this difficulty.

It has been suggested that the electric heaters of trolley cars be connected to the controller on the platform, so that when the highest speed is required the heaters will be cut out. They require some little time to cool off, so that the heating effect will be sufficient. This will reduce the demand for current by the heaters when full speed is necessary. It requires quite a percentage of the total output of the generating plant in the winter to heat the cars.

Madras is the only city in India where electricity is used as the power for street service. The tramways of Bombay are run by horse power and the streets are lighted by gas. Electricity is used only in a limited way. India would seem to afford an excellent opportunity for trade in electrical machinery and appliances. An American company is trying to get the privilege of converting the Bombay tramways into an electrically operated system.

The electric fan bids fair to supersede the punkah coolies of India. The regular price for four coolies to divide up the twenty-four hours is six cents each. With electrical fans the work can be done for one-third of the cost, and considerable inconvenience may be avoided. A writer in The Electrical World states that the day shifts of coolies do quite reliable work, but the night gang is not so satisfactory. Their duty is to pull the punkah over the bed, getting rid of mosquitoes and vermin, but the coolies attempt to get as much sleep as possible, and it is rather difficult to create activity among them. The electric fan, on the contrary, would give a reliable all-night service.

The electrical industry has been greatly developed in Germany within the past few years. In 1894 there were but 169 electric stations in the entire country, these including all kinds for the production and distribution of current for lighting and power; not more than 42,000 kilowatts were developed, the power which was supplied to fixed motors reaching only 6,000 horse power. The current was never supplied from a station for traction purposes exclusively, and accumulators were hardly ever used in connection with lighting, power, or traction. In 1899 the number of stations of all kinds reached 578, or more than triple that of 1894; the total power is increased to 224,000 kilowatts. Of this the fixed motors take 69,000 kilowatts, showing the progress made in the distribution of power. For traction purposes, 53,000 kilowatts are supplied. The use of accumulators has become general, those used in power or lighting plants representing more than 13,000 kilowatts, and this figure is greatly exceeded in traction work.

The principle of the dry battery has been successfully applied to accumulators in Germany, and the new type presents many advantages over the old form, especially for automobiles and train lighting, owing to the suppression of odors and splashing of the liquid. The plates of the battery are first connected, then put in place in the cell, and surrounded with a gelatinous mixture; they are then "formed" by the passage of current. A new method of connecting the plates is used, by which they are joined to a laminated ribbon of lead by a nut of hard lead; this arrangement is cheap and is said to be durable. The gases given off by the plates infiltrate into the upper layer of the gelatinous mass, where they are condensed and retained. The acid does not evaporate and need only be renewed at long intervals; the mass keeps the plate apart and prevents particles from falling off, and thus the plates are maintained in good condition, as has been shown by the tests made on the Berlin-Charlottenburg railway, which used them for heavy currents without being obliged to renew the plates. Two types of this accumulator are made at present, the first for the lighting of vehicles, ignition of petroleum motors, etc., and a heavier type such as has been used on the Berlin road. The latter has given satisfaction and 40 new batteries are to be used on that line.