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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

FOUR LEADING FOREIGN EXHIBITS AT THE WORLD'S FAIR.

In any comparison, no matter upon what it may be based of the display made by the various nations at the St. Louis Exposition, the magnificent exhibit made by Germany easily takes the place of honor. At the same time, when we remember that the effort of Japan was made under the shadow of an ominous war-cloud, that foretold for that gallant nation a life-and-death struggle, there will be many to whom it will seem that the scarcely less varied and voluminous exhibit of that wonderful race is entitled to equal if not greater consideration. The world has heard very much of late years about the remarkable advance that Germany has made in practically every branch of the arts and sciences. To-day we have the record of that advancement spread out before us at St. Louis, in concrete form. The display is arranged on an orderly plan so well conceived and carried out that not only is the greatness of Germany thrust upon one at the very first glance, but the story is told in marvelous detail and with most fascinating and picturesque effect throughout all the great buildings of the Exposition.

Germany.

It is not too much to say that to the Emperor William himself is to be attributed, more than to any other agency, both the breadth and detail of this exhibit. The Germans themselves readily and affectionately admit this. In the first place it was he who conceived the happy idea of placing the executive offices of the German Commission in a large separate building, which should be an exact reproduction to scale of a considerable portion of the Royal Castle of Charlottenberg. Had Germany done nothing more than this, she would have been well represented; for the castle itself is filled with some rare and characteristic specimens of German art, and is enriched by much of the actual furniture and furnishings brought over from the royal residence for exhibition in this building. A distinct advance has been made over previous expositions by placing the architectural features (in the way of inclosures and inside pavilions for the aggregate exhibits in separate buildings) in the hands of an architectural commission, and the work that they have done is not only highly meritorious and becoming, but it bears the broad stamp of modern German art and serves at once to collect and unify in the eye and mind of the visitor the various separated elements in the German display. Another striking feature, resulting from the orderly and discriminating plan on which the exhibit has been laid out, is that there is a most refreshing absence of the ordinary and commonplace—what might be called the stock or shop-window order of display. Everything is of the very best and most distinctive. Moreover the exhibits have been chosen with a view to illustrating those particular phases of German industrial and artistic development which are most characteristic of the Germany of to-day. This is true of the superb exhibit of German arts and crafts in the Varied Industries Building; of the extraordinary rich and elaborate scientific and technical apparatus in the Educational Building; of the large collection of apparatus for the testing of foods and for laboratory research in the Agricultural Building; and of the more limited display in the Machinery and Transportation Buildings. Any thoughtful student of what Germany has done at St. Louis will, after making the tour of her exhibits, be well able to understand the secret of the marvelous growth that that country has made during the past three decades in the worlds of art, industry, and commerce.

Japan.

Next in order of merit comes the extensive display made by that other great industrial country—Japan. It is rendered the more remarkable by the fact that it was cheerfully undertaken and carried through, first under the shadow, and now under the actual stress, of one of the greatest wars in history. The commercial and industrial rise and progress of Japan, like that of Germany, is a story that loses none of its interest in the telling. What the student has learned from government statistics, from magazine and newspaper literature, and from books of travel devoted especially to the theme, he may here behold spread out before him in picturesque profusion, both in the charming Japanese garden where the Commission makes its home, and in the many acres of space which Japan requested, and promptly filled up with the products of the Island Empire. That Oriental Garden with its picturesque pavilions, its tiny lakes and waterfalls, its grottoes, its miniature trees and characteristic shrubberies, its quaint statuary, to say nothing of its tea houses where the westerner may drink Japanese tea handed to him by Japanese girls in their picturesque attire, was bound to become one of the choicest and most popular resorts of the fair. Here one may meet the chief commissioner, who with characteristic Japanese courtesy will give a brief summary of what Japan has aimed to do in bringing over 500 native Japanese to care for and exploit the $1,500,000 worth of display which tells of Japanese industrial life and commercial greatness.

And, by the way, there is a remarkable parallel in many respects between the two great nations that have given such distinction to the St. Louis Fair. The Japanese exhibit, like that of Germany, is distinguished by its comprehensive and orderly arrangement. Come upon it when you may, it is surrounded by distinctive Japanese architecture, not indeed so distinctive or elaborately carried out as that of Germany, but still sufficiently defined to render a Japanese exhibit recognizable at first sight. Then, moreover, the exhibits are arranged evidently with a view to producing a definite educational result upon the visitor. In whatever department of industry one may happen to find himself, the exhibit almost invariably commences with the raw material and carries the interested observer up through the successive stages until the finished product is reached.

It is impossible to go into details; but mention should be made of the exhibit in the Agricultural Building, which is devoted chiefly to the great tea industry of Japan; also of the very extensive display in the Transportation Building, showing the remarkable development in the past three decades that Japan has made of postal, railway, telegraph, and steamship enterprises. Here one may see a huge relief map, 100 feet in length by 50 in width, showing the whole Japanese empire, including Formosa, and indicating by various colored lines every mile of railroad track, and telegraph or telephone wires, and the routes traversed by the great steamship companies. In the Varied Industries Building is a bewildering display of all that is rich, rare, grotesque, or beautiful in Japanese art. Bronzes, porcelains, silk embroideries, richly-chased and engraved silver and gold work, characteristic carving on wood and ivory, enamel work on silver, gold, and bronze, and a thousand dainty objects of the kind that are dear to the heart of the connoisseur. Lastly, there is the instructive display in the Palace of Manufactures, where one may learn everything about the manufacture of silk goods in the Island Empire, from the hatching of the silkworm eggs up to the weaving of the silk into the finished fabric; while adjoining it is a splendid display of Japanese matting, 600 rolls in all, which by the way is only one-fifth of the 3,000 rolls that Japan brought over but had not room to display. The educational display also of Japan, though not by any means so large as that of Germany, is equally illustrative of the very up-to-date methods of the Japanese educational system. Here one may see the work turned out by the Imperial School of Art at Tokyo, or he may study samples wrought by tiny fingers in the Japanese kindergarten schools; while near by are some delicate instruments for measuring seismic disturbances, that are reminiscent of that great scourge of Japan—the earthquake.

Great Britain.

If much of the success of the German exhibition is due to Emperor William it must also be admitted that the very fine effort made by Great Britain at the fair is largely indebted for its success to King Edward, who devoted much personal attention to the subject and secured the appointment of the Prince of Wales as Chief of the British Commission. Great Britain is one of the foreign nations that have expended much of their appropriation upon the pavilion which forms the headquarters of the commission. It was determined in making choice of the type of architecture to be followed that the Royal Palace of Kensington would be very representative of English domestic building at one of its happiest periods, and that the structure would serve as a tribute to the memory of that great architect, Sir Christopher Wren, to whom Great Britain is indebted for her great national cathedral in London. The Orangery, which is 170 feet long, has a long line of roof broken only by three brick parapets or pediments. Built of red brick with white stone relief, with its surrounding gardens illustrating the Dutch gardening which was brought in by William, Prince of Orange, the building admirably portrays one of the best schools of architecture of a people who have ever been famous for the comfort and quiet dignity of their domestic homes.

The interior of the building is in part a reproduction of the furnishings and fittings of that day, and it contains several rooms that are illustrative of the best interior art with some of the leading firms in Great Britain. The British exhibit, although by no means so large as the two already mentioned, is nevertheless very extensive, and is indeed the finest ever made by that country at an international fair. The portion of it that perhaps is attracting most popular attention is the superb exhibition of the Queen's Jubilee presents, shown in one of the stone buildings of Washington University, which latter forms the home of the exposition administration. As befits the greatest maritime nation in the world, a large section of the Transportation Building is devoted to a display made by many of the leading British steamship and railway companies. The models of steamships are particularly fine, notably the historical group shown by the Cunard Steamship Company, in which is to be found a superb model of the 800-foot, 25-knot turbine steamers that are now under construction for that company. In the southwest corner of the Varied Industries is to be found a collection of British exhibits, every one of them of a very high order, showing the best work of Great Britain in various arts and crafts, and notably in that of interior decoration, in which she has won for herself such a well-earned repute. Large space has been taken up in both the Agricultural Building and the Liberal Arts with characteristic display; but it is in the Fine Arts Building that she has made her supreme effort; and here we find a rich collection of the very best work of the modern English school. In closing our notice mention should be made of a small building in the southeast corner of the grounds devoted to the exhibition of low-temperature experiments; in connection with which lectures are given bi-weekly and practical demonstrations made of the remarkable results that have been obtained in this field by the physicist during the past few years.

France.

France easily holds her place in all those lines of competition with the other nations of the earth at the World's Fair in which she has made exhibits, and in cases where special effort has been made the nation is rightly entitled to hold first place. Although her display is not comparable in size and variety with that of some of the nations, it is, as far as it goes, exceedingly fine and is surely entitled to take rank with that of Great Britain. Her greatest effort, however, has been expended upon the handsome pavilions and extensive and beautiful gardens which surround it. Copied after the Grand Trianon at Versailles the structure embodies all the beauty of French architecture in the Renaissance.

The pavilion is a reproduction of a chateau which was built by Louis XIV. for Madame Maintenon. All the government factories aided in furnishing and decorating the building, which, both within and without, is in itself an extensive exhibit of the best in French art and architecture. France is represented more or less in every section of the grounds, but her finest exhibits are the automobiles of which she shows some 40 or 50 of her very latest types in the Transportation Building; her superb line of costumes, high-priced gowns, furs, toilet articles of dainty design and exquisite finish; and last and perhaps finest of all, her rich and varied display in the Fine Arts Building. In the heavy engineering trades France has not done as much as in former national expositions; but what she has shown bears the characteristic excellence of material and beauty of finish to which we have become accustomed. A large vertical triple-expansion high-speed engine of 1,500 horse-power in the Machinery Building, and a handsome De Glehn express compound locomotive in the Transportation Building bear testimony to the skill of the mechanical engineer; but one could wish that France had done more in these lines where she has won such world-wide reputation.

THE PENETRATING POWER OF "N_1-RAYS."

Prof. Blondlot recently drew attention to a novel kind of N-rays, diminishing, instead of augmenting, the phosphorescence of calcium sulphide. These rays, called by him "N_1-rays," are given off from a Nernst lamp simultaneously with the N-rays, and are also produced by stretching out a copper, silver, or platinum wire.

In a memoir recently presented to the French Academy of Sciences, Mr. Julien Meyer describes some experiments with these N_1-rays, produced by an extended glass or copper wire or else by a closed glass tube in the interior of which the pressure is diminished. The glass of the tube, on account of the strain resulting from the difference in pressure, was in fact found to be a powerful source of N_1-rays. The brilliancy of a screen covered with sulphide spots and introduced into a glass bulb resting on the plate of an air pump would diminish when the machine was

started, but would recover its initial value as the air was allowed to re-enter. If the sulphide screen be placed outside of the bulb, the phosphorescence would likewise diminish from the very first stroke of the piston. An incandescent lamp bulb, not traversed by any current, a hydrogen Geissler tube, a Crookes' tube, were all found to be sources of N_1-rays without being actuated by a Ruhmkorff coil.

While the N_1-rays from a Nernst lamp are arrested by an oxidized lead plate or by a sheet of moistened paper, those issuing from the sources named are gifted with a high penetrating power; in fact, the action of incandescent lamp bulbs on the screen is not appreciably diminished if between the bulb and the screen there be inserted a board 10 centimeters in thickness or a sheet of oxidized lead one millimeter in thickness and folded round itself so as to be traversed eight times, or else a glass vessel filled with pure water. Pasteboard, paraffin, aluminium, zinc, iron, copper, silver, gold, mercury, and the hand are also transparent to these radiations. The only opaque bodies found were platinum of a thickness of 1 millimeter and opalescent glass 3 millimeters in thickness.

While examining the refraction of the rays by means of an aluminium lens, the author stated that this metal would store the rays in great amounts, giving them off again for more than twenty-four hours after it had been withdrawn from the source. A similar power, though of smaller intensity, was found in the case of ordinary glass; while lead, copper, and pure water did not show it.

Salt water and a solution of sodium hyposulphite in water, on being submitted to the action of a source of N_1-rays, would become active themselves, acting as sources for a very long time.

When the hand is held for some time at a small distance from a source of N_1-rays or touching the latter, the hand would diminish itself the phosphorescence of the screen, this property being kept for some minutes.

N_1-rays as given off from the above sources are refracted by glass, copper, and aluminium prisms and diffracted by a grating.

THE POSITION OF THE RANGE FINDER ON A WARSHIP.

The British Admiralty has suspended the practice of fitting the position of the range finder on an electric-light platform placed on the foremast of a warship. It is imperative, to facilitate the firing of the guns, that the means of ascertaining and transmitting the range from the vessel to the antagonist be communicated to the gun crew with complete security, from a perfectly reliable observing position. The decision of the Naval Department is due to the result of the engagement between the Russian warship "Variag" and the Japanese fleet. In this conflict the men operating this vital department were rendered *hors de combat* early in the engagement, with the result that the gun crews on the "Variag" labored under great disadvantages. From this it is conclusively demonstrated that any observation post placed in the fighting tops is impracticable. The Japanese themselves have also recognized this crucial point, and in their new vessels that are in course of construction in England, special armored observation towers are to be erected at various advantageous positions on the ships for the installation of the range-finding apparatus. In the case of the British Naval Department no decision has been arrived at, though the matter is under discussion and investigation.

RENARD'S NEW BOILER FOR AIRSHIPS.

It is reported that Col. Renard, the well-known director of the government aerostatic park near Paris, has succeeded in constructing a new type of extra light boiler. He expects that it will go far toward solving many important problems, both in aerial navigation and the marine. In 1894 he commenced to study a light form of boiler which could be applied to aerial navigation, and built a first specimen of 80 horse-power which weighed no more than 1.50 kilogrammes (3.36 pounds) per horse-power. Encouraged by this success, he commenced to design a high-power boiler of the same type which should give 1,000 or 1,200 horse-power, in view of using it for the marine. The problem was not an easy one, as it was required to obtain a rapid vaporization and high production while keeping down the weight or the space occupied, and remaining within the limits of 2 kilogrammes per horse-power, or one-fourth of the weight of the lightest boilers known. Some time ago Col. Renard brought out the first boiler of 300 horse-power in which he claims to have realized all the above conditions. It consumes but 0.434 kilos per horse-power-hour, while the best European boilers take 0.700. It heats very rapidly, and at the end of 7 minutes the pressure is sufficient for working; in 15 minutes it is brought up to the normal rate. He uses liquid fuel, heavy oil, which is inexplosible. The apparatus is also completely smoke-consuming. Such a smokeless boiler, rendering a warship invisible at a distance, will be greatly appreciated in the marine. The steam which is produced is absolutely dry. Another remarkable quality of the new boiler is the absence of external radiation. It does not give off any perceptible heat in the boiler room. It is extinguished in half a minute, cooling down at once. According to the latest reports, the French government is convinced of the advantages which can be obtained from such a boiler in the marine, and is about to test it upon two vessels of the fleet. In the case of torpedo boats, allowing the same speed as before, the radius of action would be increased from 175 to 683 miles. Or with the same radius the speed increases from 31 to 35 knots. For a warship of modern type (keeping a speed of 10 knots) the radius of action would be increased from 9,000 to 24,300 miles, nearly tripling the distance and allowing the vessel to make a complete passage around the globe without taking on combustible. The details of the system are of course kept secret for the present.

A NEW CUNARDER.

The new twin-screw liner for the Cunard transatlantic intermediate service has been launched on the Clyde, from the shipyard of Messrs. John Brown & Co., Ltd. Mrs. Choate, the wife of the United States ambassador to Great Britain, performed the launching ceremony. This vessel, which is named the "Caronia," is the largest which has been built in a Clyde yard. It is 678 feet in length, beam 72 feet, depth to shelter deck 52 feet, and displacement 21,000 tons. It is fitted with ordinary reciprocating engines developing 21,000 horse-power and capable of attaining a speed of 18 knots. The vessel will have accommodation for 300 first-class, 350 second-class, 1,000 third-class, and 1,000 steerage passengers, while the crew complement will number 450. This vessel is a remarkable example of rapid construction. The keel was only laid in September last, and the steelwork is now practically completed, while the woodwork is far advanced. The sister ship "Carmania," is also in course of erection at the same shipyard. This vessel is to be fitted with the Parsons turbines and it is with these two vessels that the Cunard company intend to obtain comparative data concerning the advantages and merits of the two systems of propulsion for Atlantic liners.

THE NATIONAL GEOGRAPHIC CONGRESS.

The National Geographic Congress which will be held in this country in September promises to bring together an unusually large assembly of an international character, for the committee of arrangements have received information that many of the most noted savants of Europe will be present and take part in the various sessions. The congress will be the seventh which has thus far been held, the last meeting at Berlin in 1899. While it will be convoked in Washington, meetings will be held not only in that city, but in Philadelphia, New York, Chicago, and St. Louis, in connection with field sessions on the Hudson River and at Niagara Falls. From the present indications nearly, if not actually a thousand scientists will attend, and the committee in charge has the promise of a wide variety of papers on various subjects by authorities whose reputation is international.

Under the subject of physiography will be discussed meteorology by such authorities as Prof. R. DeC. Ward, Cambridge, Mass.; Prof. R. F. Stupart, Ottawa; Dr. W. Meinardus, Berlin; Dr. K. Kassner, Prussian Meteorological Institute; Henryk Arctowski, Brussels, Belgium. Oceanography will be treated by Prof. R. A. Harris, Washington; Prof. Knipowitsch, St. Petersburg; Sir John Murray, Edinburgh; Prof. J. J. Rein, Bonn; Prof. E. Witte, Brieg, Germany; Prof. J. Thoulet, Nancy, France. Among those who will discuss volcanoes are Dr. Hovey and Prof. Heilprin, of this country, and Paul de la Blache, of Paris. The writers on earthquakes will include Count de Montessus de Ballore, Abbeville, France; Prof. E. Rudolph, Strassburg, Germany; Prof. A. Schmidt, Stuttgart, Germany; Prof. de Kovesligethy, Budapest, Hungary. Those on glaciers will include G. Vaux, Jr., Philadelphia, Pa.; Dr. Axel Hamburg, Stockholm, Sweden; Henry Arctowski, Brussels, Belgium. Other divisions will include mathematical geography and the economic features of geography, while it will be treated also from the historical and educational point of view.

In addition to the authorities referred to, others who will participate are as follows: Dr. Oskar Drude, Dresden; G. Grandidier, Paris; Prof. F. Starr, Chicago; Prof. W. J. McGee, Washington; A. Chevalier, Paris; C. Rabot, Paris; Mrs. Fanny Bullock Workman, Worcester; Robert T. Hill, Washington; D. C. Gilman, Washington; Henry Gannett, Washington; A. de Claparede, Geneva, Switzerland; Dr. A. Funke, Berlin; C. Gauthiot, Paris; Sir H. H. Johnston, London; Prof. E. T. Gautier, Algiers; Georges Blondel, Paris; Prof. Guido Cora, Rome; Gilbert H. Grosvenor, Washington; Dr. Eugen Oberhummer, Vienna.

The congress will convene formally in Washington on September 8, in Philadelphia on September 12, and in New York the following day. From New York the party will go to Niagara Falls, where a general field meeting will be held in charge of geographers familiar with the region. The members will assemble in Chicago on September 17 and in St. Louis on September 19, the congress formally closing on September 22. The programme, however, includes a southwestern tour from St. Louis, which will include the Grand Canyon of the Colorado and a portion of Mexico.

The hosts of the congress will be the various societies interested in geography in the United States. These include the National Geographic Society, American Geographical Society, Geographical Society of Philadelphia, Geographic Society of Chicago, Geographical Society of Baltimore, Geographical Society of the Pacific, Geographical Society of California, Peary Arctic Club, Appalachian Mountain Club, American Alpine Club, Mazamas, Sierra Club, and Harvard Travelers' Club.

THE AUTOMOBILE TOUR TO THE WORLD'S FAIR.

The St. Louis tour has progressed finely during the past two weeks, and the participants make up in enthusiasm what they lack in numbers. Sixteen machines started from New York on Monday, July 25. One of these—a Yale touring car equipped with solid tires—broke its transmission gear and dropped out during the second day's run, the accident being caused by the carelessness of a repair man who left a small tool in the transmission gear case when overhauling the car before its start. This car was repaired and rejoined the others at Toledo. Its performance will be watched with interest, as it is the only car equipped with solid tires. The place of the Yale car was filled the third day by J. H. Waters' 24-horse-power Panhard, which made the entire 150-mile run from New York to Albany on July 26 in 12 hours, 35 minutes. This and the two 40-horse-power Mercedes cars of Harlan W. Whipple and James L. Breese, which joined the tour at Albany and Buffalo respectively, were the only foreign cars entered. Their performance over American roads has been very creditable, although Mr. Whipple's Mercedes seems to have had a considerable number of breakdowns to its mechanism. Eleven cars reached Albany from Boston and other eastern points, and, in all, twenty-four started for and reached Utica the third day. There had been considerable rain and the roads were execrable. There were several skidding accidents, but Harold Pope's Pope-Hartford car was the only one to be damaged. This machine bent its front axle by skidding into a gutter. A 3,600-pound Peerless machine skidded off the road, but, with the aid of horses and tackle, it was finally got on again. A protest was made to the county authorities about the condition of the road, to the effect that "throughout the civilized world there does not exist a road in such wretched condition that connects so many important cities and towns." From Utica on, the roads were fair, although heavy in many places on account of rain. Buffalo was reached Saturday, July 30, and was left Monday. The second week the tourists finished at Chicago. The principal events of this week were a night run from Erie to Cleveland, participated in by five White steam touring cars and one Royal; a 121-mile run over bad clay roads from Cleveland to Toledo in one day; and the entrance into Chicago under escort of numerous automobilists of that city, on Saturday. Ten machines joined the tour at Cleveland, making thirty-four in all. The only accidents recorded were the overturning of a runabout by slewing in deep sand and the running into of an express train by the huge 70-horse-power Peerless car at a dangerous grade crossing. Although both car and train were damaged, no one was seriously hurt. The puncturing and giving out of tires, especially on the heavy cars, has been one of the most troublesome features of the tour. One touring car had four inner tubes burst in a single day. The almost universal use of double-tube tires renders repairs on the road a comparatively easy matter, however. The combination runabout and light touring car has shown itself just as reliable and as capable as has the powerful touring car, with the additional advantage of less tire trouble.

The two-cycle Elmore tonneau in the present tour had just finished a trip to St. Louis before starting out this time, while F. A. La Roche, in a Darracq touring car, succeeded in beating the world's record non-stop run, by traveling to St. Louis and back as far as Columbus without once stopping his engine. He hopes to create a record of 3,000 miles, the old one being 2,017.

It is not yet half a century since Col. Drake discovered petroleum on the waters of Oil Creek, near Titusville, Pa. The total production of crude petroleum from 1859 to 1902—forty-three years—has been no less than 1,165,280,727 barrels. Of this output, Pennsylvania and New York contributed 53.9 per cent; Ohio, 24.3 per cent; West Virginia, 11.3 per cent; Indiana, 3.9 per cent; California, 3.6 per cent; Texas, 2.1 per cent, leaving 9 per cent to be supplied by Kansas, Colorado, Louisiana, Illinois, Missouri, Indian Territory, Wyoming, Michigan, and Oklahoma.