

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metal would store the rays in great amounts, giving them off again for more than twenty-four hours after it had been withdrawn from the source.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 inexplorable. 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. Grandier, 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 Oberhammer, 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, Geographical 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.