

ENGINEERING.

The first National Conservation Congress of the United States will be held on August 26th, 27th, and 28th at the Alaska-Yukon-Pacific Exposition. Invitations have been sent to ten thousand prominent men in the States where conservation is receiving official attention. The Seattle congress will perfect a permanent organization, and will select representatives to attend the World's Conservation Congress at The Hague.

The squadron which Germany will send to the Hudson-Fulton Celebration will consist of Germany's latest armored cruiser, the 11,600-ton 22.5-knot "Gneisenau"; the protected cruisers "Hertha" and "Victoria Louise" of 5,660 tons and 19 knots speed; the "Bremen," 3,250 tons and 23.3 knots, and the "Dresden," one of the new 3,600-ton fast scouts of which Germany is building so many, of 24.5 knots speed.

With the old Metropolitan line, 71 miles in length, and the Metropolitan District line, 28 miles in length, included, the network of London's subways and tubes has a total length of over 145 miles. London was the first city to inaugurate subway travel. The Metropolitan line, which for many decades was operated by steam, was put in operation over half a century ago.

In his testimony before the House Committee, Rear Admiral Mason recently estimated the life of an 8-inch gun at 200 rounds. As first constructed, the 12-inch gun began to deteriorate by erosion at 80 rounds; but by reducing the velocity and using a broader copper rifling band, its life has been extended to about 150 rounds. After 150 rounds it would be necessary to reline the gun at a cost of \$12,000, which is about one-fourth the first cost of the gun.

As one outcome of the experiments and conferences that have been held during the past three years between railway men and rail makers, it was determined to seek the co-operation of the Bureau of Standards of the Department of Commerce and Labor. Director Stratton has entered into hearty co-operation, and experiments looking to the improvement of steel rails will henceforth be made under the joint auspices of the maintenance of way engineers, the managers of the rail mills, and the experts of the Bureau of Standards.

The navy collier "Nero," which went ashore on Bren-ton's Reef on July 2nd, during a dense fog, was successfully floated by the Arbuckle compressed-air method. The deck was made airtight, and by means of powerful compressors the water was gradually expelled from the hull through the rents in the bottom. When the ship had been sufficiently lightened, she was pulled from the rocks by the united efforts of tugs and salvage vessels.

There is now nearing completion a six-foot steel main, which is being built to supplement the masonry conduit which carries the Brooklyn water supply from Nassau County. It is twenty-three miles in length, and will cost over \$2,500,000. The present masonry conduit has a daily capacity of 120,000,000 gallons. The daily consumption of Brooklyn and Queens is 142,000,000 gallons, part of which is drawn from local artesian wells. The new steel main will have a capacity daily of 55,000,000 gallons.

That the illumination of New York city in connection with the Hudson-Fulton Celebration has been planned on a worthy scale is shown by the announcement that it will include 1,500,000 additional incandescent lights, 10,000 arc lights, and two batteries of searchlights, the total capacity of which independently of the city lights and private illumination will be 26,260,000 candle-power. A dramatic feature will be the lighting of twenty immense signal fires upon mountain peaks along the Hudson from New York city to Newburg.

Everyone who admires the stately trees of the old New England towns—and who does not?—will be gratified to know that tree planting is being carried on systematically on the Massachusetts roads. The report of Mr. E. W. Breed, forester of the State Highway Commission, shows that during the year ending November 30th, 1908, 1,184 new trees were planted and 744 old trees were replaced. During the preceding five years, 13,113 trees had been distributed among fifty-five towns. The cost in 1908 of new trees averaged \$1.29 each, and the average cost of maintenance was 20 cents per tree.

By the courtesy of the commandant of the Naval Training Station, the committee which have in charge the Portola Festival, commemorating the discovery of San Francisco Bay by Portola in 1769, have constructed on Yerba Buena Island, San Francisco Bay, what is probably the largest sign ever erected. The sign, which has been cut on the sloping hills of the island, is 1,300 feet long by 135 feet high. The words "Portola Festival, October 19th-23rd," are arranged in two lines, each letter of which occupies a space 45 feet by 45 feet, the outline of the letters being 8 feet in width. The work was done by digging trenches 8 inches in depth and filling them with lime, which shows up clear and white against the green of the hillside.

ELECTRICITY.

The eight-track swing bridges across the main channel of the Chicago drainage canal near 31st Street will be operated by electricity.

An interesting article in the August number of the Fine Arts Journal describes the artistic possibilities of electricity both for decorative lighting and more utilitarian purposes of facile hospitality, from electric toast racks to chafing dishes.

The electric railway up Mont Blanc is now open to the public as far as the Col de Voza, 5,495 feet high. The first train took nearly an hour to accomplish the journey of 4½ miles. There are no tunnels, and the steepest grade is 20 per cent, some magnificent views of Alpine scenery being obtainable from the cars.

The Boston & Maine Railroad has bought the hydro-electric power plant at Eastman Falls on the Pemigewasset River, and concessions for undeveloped water power in the same neighborhood. The company has large shops in the vicinity, and also operates trolley lines, for which this power will be available.

With very little ostentation, the Commercial Cable Company has recently completed what will probably be a very valuable improvement, landing at Manhattan Beach the shore end of a new cable from St. John's, Newfoundland. The new line is 1,300 miles long, and is spliced to the transatlantic line 270 miles east of St. John's. It is expected to greatly accelerate transmission of messages from New York and southern points to Europe.

Few people would imagine that an electrical instrument factory requires a staff of expert jewelers, but the cutting in special forms, polishing, setting, and mounting of diamonds, sapphires, and rubies forms an important part of the work of the General Electric Company's meter factory at Lynn, Mass. Details of the operations involved are described in an interesting article by J. G. Baker in the current Electrical Review.

The increasing use of electrical energy upon a large scale in industrial establishments renders necessary the adoption of numerous precautionary measures, and it is to the credit of the great industrial corporations of this country that they not only recognize this fact, but employ special officials to give effect to the safety regulations adopted. An admirable article on this subject by Mr. R. J. Young, safety inspector of the Illinois Steel Company, appears in the Electrical World of August 12th.

A fire alarm was recently sent to a station ten blocks from the scene of the fire by a route over 200 miles long. A car of coal caught fire at Edwardsville, Ill., the station of which has no telephone. The station agent called Decatur, 100 miles away, by telegraph, where the dispatcher called Poag, the nearest station to Edwardsville having a long-distance telephone. The Poag operator rang up the Edwardsville exchange, where the telephone operator rang the alarm in the fire station, and the engine was on its way only three minutes after the station agent reported the fire.

Rio de Janeiro is one of the first capital cities of the world to be adequately supplied with hydro-generated electric power. The current is transmitted at 88,000 volts from the generating station at a water power 51 miles away to a receiving station in the city, where it is stepped down by transformers to 6,300 volts, at which pressure it is supplied to the general feeders for lighting and power. The general distribution is by means of four-wire three-phase system, giving 120 volts to lamps, etc., between outside wires and neutral—the first time that this system has been tried upon so large a scale.

A patent was granted to Mr. J. H. Cuntz on July 13th for a method of making wireless signals selectively audible by means of acoustic attachments. A tuning fork is magnetically associated with a mechanical interrupter in the sending circuits, by means of which the high-frequency wireless telegraph current is interrupted throughout each signal at a rate corresponding to the pitch of the tuning fork. An identical tuning fork magnetically associated with the receiving circuit gives forth an audible sound when the wireless signals are interrupted at a rate corresponding to its pitch, signals being heard only when the forks at both stations have equal pitches.

The great silver-mining district of Cobalt has been turning its attention to generation of power by water on account of the high cost of power, due to the distance which fuel has to be conveyed. The average cost of power hitherto has been \$175 per horse-power year, some mines even paying as much as \$400. A grant of land has been made at the head of Lake Temiskaming on the Matakichewan River, about 25 miles from Cobalt, where there is a large water power available, and a big hydro-electric power plant is being erected. The current will be conveyed to the mines, and either electricity for other power purposes or compressed air from electrically-driven compressors will be sold to consumers.

SCIENCE.

The municipal council of St. Petersburg has decided to name the newly installed municipal laboratory after the celebrated Russian biologist Metchnikoff, who is at present connected with the Pasteur Institute of Paris. It will moreover found an annual prize of 1,000 rubles, this to be known as the Metchnikoff Prize, and it is to be awarded for the best work in biology.

In a recent lecture before the Society of Arts, Eyde gave some details concerning the present condition of the manufacture of artificial nitrates at Notodden, where large quantities of calcium nitrates are produced and sold in competition with nitrates from Chile. The annual production of nitrate of soda in Chile is 1,800,000 tons. In 1920 this may be expected to be increased to at least 2,500,000 tons. At the same epoch the Norwegian production will amount to about 300,000 tons, or only 12 per cent of the Chilean. Meanwhile, of course, other factories may be established, which will largely increase the total production of artificial nitrates. Nevertheless, Eyde does not fear competition, in view of the constant increase in demand throughout the world. From experiments made in various countries, it may be concluded that artificial nitrate is as good a fertilizer as Chile saltpeter, and on some lands a better one.

The age of a fish can be determined with accuracy by inspection of the otoliths, or bony concretions, which are found in the auditory apparatus. These otoliths increase in size during the entire life of the fish, each year adding two layers, a light-colored one formed in summer and a dark one formed in autumn and winter. The alternate layers are sharply contrasted and very distinct, so that there is no difficulty in counting them. The number of pairs of layers is equal to the number of years the fish has lived. By this method Wallace has made an interesting study of the distribution of fishes of the plaice species over various sea bottoms, according to age. In this way the rapidity of growth of fishes and the effect of fisheries on the population of the sea can be determined.

The new German exchange professor for Columbia University is Dr. Karl Runge of Göttingen, Germany. Prof. Runge was born at Bremen in 1856, studied at Munich and Berlin, receiving the degree of doctor of philosophy at the latter institution in 1880. Before his appointment at Göttingen, he was professor in the Technical High School at Hanover. He has an excellent command of English. Dr. Runge's first original work was in pure mathematics, and he early obtained a high position among German mathematicians. Of later years his interest has been more largely in applied mathematics. He has, for instance, made important investigations in spectrum analysis and in astronomical and nautical researches. His most recent specialty, and one upon which he will give a course at Columbia, is the study of graphical methods in physical and technological research.

By using the soundings shown on the Admiralty charts, Prof. Edward Hull has demonstrated that a series of iso-bathic contours can be drawn, showing the form of the ocean bed. In this way we can determine the margin of the continental shelf, which breaks off into deep water near the 100-fathom contour; as also the channels of the submerged river-valleys which traverse it down to depths of about 1,000 fathoms. By this means those of the "English Channel River" and those of the Loire, the Gironde, and the Adour, off the coast of France; also those of the Caneira, Arosa, Lima, Douro, Mondego and Tagus from off the coast of Spain and Portugal, have been determined. The existence of these channels, formed by erosion under land conditions, indicates great changes of level in late Tertiary times, resulting in the climate of the "Glacial period."

The existence of a rich fauna in the sea proves that the salts contained in potash wastes, if sufficiently diluted, are not injurious to fish. Nevertheless, it has frequently been observed that if strong saline solutions are discharged into streams, the salt is distributed throughout the water very slowly. In some cases, a strong saline current, sharply distinguished from the rest of the stream, persists for several miles, and may destroy either the fish or the organisms upon which they feed. Chemical purification of the waste waters of the potash manufacture has been attempted. In the Mehner methods, the waste water, which contains a large percentage of magnesium chloride, is mixed with lime, which precipitates the magnesia in the form known as Sorel cement. This mass, mixed before setting with inert substances, may be used for filling the voids caused by the extraction of the potash salts, or solutions of magnesium chloride may be concentrated to a strength of four molecules of water, in which condition the salt takes up two additional molecules of water and may, therefore, be used in dehydrating additional quantities of solution, thus producing a pasty mass which is convenient for the filling of voids.