ENGINEERING.

The War Department exhibit at the Alaska-Yukon-Pacific Exposition contains a model exhibit of the system of protecting harbors by mines which will serve to show the people of the Pacific coast how perfectly secure against the entrance of hostile ships their harbors may be made. The terrific destruction wrought by mines in the Japanese war has rendered it certain that no captain of a costly modern battleship will jeopardize a ten-million-dollar vessel by venturing into properly mined rivers or harbors.

An important agreement has been reached between the Compressed Air Workers' Union and the employers, by which, instead of being paid in proportion to the depth to which the caissons are sunk, the men will be paid according to the amount of air pressure in which they are compelled to work. The pay will vary from $3.50 for a day of six hours at twenty-two pounds pressure to $4.50 a day for one hour and twenty minutes' work at from forty to forty-five pounds pressure.

Such rapid progress has been made on the "Florida" that she will probably undergo her trials during the next two or three months. Special interest attaches to this vessel because of the fact that she is the first of the "Dreadnoughts" designed specifically as such for our navy, and the first of our battleships to be driven by turbine engines. The "South Carolina" and "Michigan," of 16,000 tons, although they carry a "Dreadnought" armament, were originally designed to be of the "Connecticut" type.

It was recently announced by the Public Service Commission that, with a view to avoiding the objections raised by property owners to a four-track tunnel through Lexington Avenue in this city at one level, which would involve sidewalk encroachment, plans are being drawn for a double-deck tunnel with the two local tracks immediately below the street and the two express tracks immediately below the local tracks. There is an objection to this scheme from an operating standpoint, due to the longer climb necessary to reach the street from the express platforms.

The announcement of the White Star Line that their ships engaged in the Liverpool service will call at Holyhead on both the eastbound and westward voyages has been followed by a persistent rumor that the Cunard Company's ships when running westward will call at Fishguard on the southwest coast of Wales to pick up the late mails from London. These arrangements would result in a saving of several hours' time, and, in the case of the "Mauretania" and "Lusitania," it would then become possible for passengers to be landed in New York on Thursday night.

The launch of the replica of Fulton's "Clermont" and the arrival in New York of the reproduction of Henry Hudson's "Half Moon," remind us of the near approach of the Hudson-Fulton celebration in New York city. The "Clermont," which was built at the Staten Island Shipbuilding Company's yards, was christened by Mrs. Arthur Taylor Sutcliffe, great-granddaughter of Robert Fulton. The "Half Moon," although a three-masted vessel, is but 66 feet in length. She was shipped entire on the deck of the Holland-American liner "Soestdyk."

A solution of the problem of navigating streams in which shallow and deep water are alternately encountered is suggested by Mr. C. J. Bartlett of New Orleans. He proposes the construction of a submerging ship, which is designed to carry two barges when in deep water, and, on encountering shallow water will submerge, float the two barges free, and tow them through the shallower reaches. Each barge is of 1,500 tons capacity and their loaded draft is eight feet. The loaded draft of the ship is fifteen feet and in the light condition she would draw six feet.

The mere mass of the concrete floor and side walls of the locks at Gatun will be sufficient to give them great stability; but, with a view to adding a further safeguard against rupture in the event, say, of earthquake shock, the government engineers intend to reinforce the concrete by imbedding in it no less than seven thousand tons of old rail. This metal consists partly of a light rail which was used during the era of French construction, and partly of more modern American rails, which have been so badly bent that they can no longer be used in the track.

The rise of Germany in the field of yachting is as remarkable in its way as the wonderful development of her merchant marine. A few years ago yachting as a sport was practically unknown in that country. To-day, thanks mainly to the example and untiring efforts of the German Emperor, Germany possesses one of the finest fleets of large yachts in the world. The two latest and finest of these, the "Germania" and the Emperor's new schooner built this year, are probably the two fastest vessels of their class afloat. Commenting on these facts the Yachtsman, of London, says the result of this activity has been that Germany is actually a more important yachting nation than Great Britain.

ELECTRICITY.

An electric glue heater has been put upon the market which is claimed to melt glue in thirty minutes, and to keep it at a temperature of 150 deg. for several hours after the current has been switched off.

A hydro-electric power station is projected near Wadesboro, N. C., on the Rocky River, capable of producing, with the initial installation planned, 6,000 to 7,000 horse-power. The site is within a mile of the new Southbound Railway and a new town is expected to be developed by the industrial facilities.

A successful electric lawn mower, taking power from any convenient source by means of a flexible cable, has been invented by Mr. F. H. Kerr, of Chicago. He is building an improved type of machine capable of operating plows, harrows, drills, and seeders for gardens and small farms.

The largest switchboard in the world is to be installed in the New York terminal of the Pennsylvania Railroad. All the switches of the terminal are to be electrically controlled from this board. Work has just been started on the switchboard. It is to cost $500,000.

Several towns in Ohio are electric-lighted by companies which own and operate no power station, but purchase current from some central station in the district. Instead of risking the building and equipment of a power station which may not be sufficiently patronized to be profitable or waiting for the central station to reach out for the business of small country towns, companies are formed in the latter owning their own wires and buying power.

A steam-driven power plant is being built at Galena, Ill., to transmit power 25 miles north into Wisconsin. The first two units installed will be 1,500 and 1,250 kilowatt three-phase alternating-current generators driven by reciprocating Corliss engines. The current is generated at 2,300 volts, transformed to a line potential of 33,000 and reduced again to 2,300 or lower where necessary, for local distribution. This plant will supply among other places the zinc mining center at Hazel Green.

One of the largest electric organs ever built in the United States is about to be erected in the Auditorium at Atlanta, Ga. It will be played from a movable four-manual control 65 feet away by an 8-volt current from a specially wound generator, and blown by a 20-horse-power motor direct connected to a series of fans raising the air pressure by steps, either a pressure of 10, 15, or 50 inches water column being available in the universal wind chest. A smaller "echo" organ is placed at the opposite end of the auditorium, which can be played either simultaneously or independently.

In addition to the Pennsylvania Railroad, which began to send its passengers through the Hudson tunnels on July 19th, the Erie Railroad will make use of the same facilities, beginning on August 2nd. The schedule for the regular operation of trains calls for six minutes for the trip to Manhattan from Jersey City. The six-minute schedule will chop off about 15 minutes of the time it now takes the commuter to get from Jersey City to Church and Fulton Streets in New York. Arrangements have as yet not been made for the use of the tunnels by the passengers of the Delaware, Lackawanna & Western or the Lehigh Valley roads.

Although the operation of "pay-as-you-enter" cars in New York has been so successful and popular as to promise the introduction of many more, this will not require the "scrapping" of hundreds of serviceable cars of older patterns. The Third Avenue line has had in operation for about a month a double-truck car converted to prepayment service by the lengthening of the platforms. New hoods and knee braces were required but the old vestibules have been retained. The only difference from the new cars is the absence of a division between entry and exit doors, a double sliding door extending the whole width of the car and entry being divided from exit only by the vestibule rail. The operation of the adapted car has been so satisfactory that it is proposed to reconstruct 200 more in this way.

Experiments have been made in Italy to discover the best form of insulator for high-tension transmission lines which run near the sea. It is found that in the vicinity of the sea a thick layer of salt accumulates on the insulator, and serves as a conductor to cause leakage of the current to ground. The Italian experimenters have discovered that the incrustation forms chiefly on parts which are not protected from the wind and rain. The ordinary insulator for high-tension purposes consists of a number of petticoats or bells, in which the salt accumulates to a considerable depth. For this reason it was found best to provide an insulator with an almost flat bell, which would be so exposed to the weather that the crust could not form to any harmful extent. Insulators of this type were used with perfect success over a period of eighteen months on a 25,000-volt line. Under tests in the laboratory they withstood 75,000 volts dry, and 30,000 in a heavy rain.

SCIENCE.

The teaching of cooking is a science in Germany, as is everything else in that Teutonic empire. Traveling cooking schools are now sent about, for the purpose of instructing peasants how to cook cheaply and well. Since country people cannot go to school, the government will send schools to them. These traveling kitchens are now established in Hesse, Nassau, Franconia, and the Palatinate, as well as in Bavaria.

Metchnikoff, in "The Prolongation of Human Life," blames the lower intestine for most human diseases, and consequently for our early death. Dr. Distaso of Paris not only agrees with him, but even advocates the entire removal of the large intestine in childhood, in order to ward off old age as long as possible. Distaso claims to have confirmed Metchnikoff's statements that the large intestine is the breeding place of most harmful germs.

Some idea of the general use of false teeth may be gathered from the statement that 20,000,000 of them are exported from America to England every year. When we consider that probably not more than half the inhabitants of Great Britain indulge in the luxury of false teeth, no matter how many grinders they may have lost, these figures would seem to indicate that nearly everyone in England suffers from defective or missing teeth. As far as observation goes, the United States is no better off than England in this respect.

The Academy of Sciences of France has awarded a prize of $140 to Prof. E. W. Brown of Yale University for his researches relating to the theory of the moon. The sum of $200 has been awarded to Lieuts. Jaence and Colin for their improved wireless telephone. Out of the sum of $20,000 settled upon the Institute by Prince Roland Bonaparte, the sum of $800 has been set by for the encouragement of researches by Prof. Cayeux of the School of Mines, University of Paris, for the particular object of enabling Prof. Cayeux to proceed to the United States and continue his remarkable researches with reference to deposits of ancient minerals.

Prof. W. P. Bowen of the Michigan State Normal College presents a most helpful exposition of what constitutes fatigue, in Hygiene and Physical Education, and what counterfeits it. Some people are evidently simply born tired. "There is much misinformation as to what fatigue is. It is not simply a 'feeling of uneasiness' and discomfort. There is a motor as well as a sensory side which is even more important." Some of the counterfeits of fatigue are drowsiness, weakness, and discomfort from breathing bad air; aversion to work, termed *ennui* by the French, *Müdigkeit* by the Germans; lack of suitable food, loss of sleep, faulty nutrition, indigestion, adenoids, and the early stages of many diseases. One of the commonest forms of fatigue in children arises from the suppression of natural activities by the maintenance of one position for long periods.

As a result of archæological studies pursued during many years J. Prestel claims to have discovered the essence of the method employed in the manufacture of ancient Roman pottery (*terra sigillata*) and its homogeneous glaze. According to Herr Prestel, the secret lies, not in the chemical composition of the paste but in the treatment applied to it and to the colored glaze. The clay was prepared by aging, followed by washing, kneading and stamping. Before firing, the ware was exposed to the sun and air, but sheltered from rain, until it appeared quite dry. The frequent changes of temperature and humidity and the alternation of sunlight and darkness which occurred during this slow process of drying insured uniform shrinkage in firing and durability of the finished ware. When a glaze was used it was applied to the moist ware immediately after the latter was shaped, so that the glaze became intimately united with the body of the ware during the slow drying process. Firing then produced a brilliant gloss and imperishable colors.

Dr. L. A. Bauer has raised the question whether magnetization alters mass. His observations were made upon bar magnets in both the magnetized and demagnetized states and in various orientations with respect to the earth's field. It is obvious that if there be local disturbances of the field, the weighings may give different results for different positions of the magnet, since it is not simply the force of gravitation which is being measured, but in addition the magnetic forces which act upon the bar. Experiments conducted by Dr. Morton G. Lloyd seem to indicate that magnetization to a flux density of 13,500 gausses does not alter the true weight of the specimen by as much as one part in 15,000,000; certainly not as much as one part in 8,000,000. If we make the usual assumption that mass is proportional to weight, we may say that, within the same limits, the mass is not altered. Since in Dr. Bauer's experiments the flux density was probably not in excess of 3,500 gausses, and since the difference found by him amounted to more than one part in 1,000,000, it is necessary to conclude that these differences are due to other agencies.