

ENGINEERING.

At the close of the month of September the halfway mark had been reached in the huge job of excavation at the Panama Canal. By that time 87,172,058 cubic yards, or about one-half of the total excavation, had been removed. The grand total for September was 2,836,385 cubic yards, which is 1,043,952 cubic yards less than the highest record, which was made in March, 1909.

The State Department has been informed that the President of Guatemala has directed a bronze bust of Robert Fulton to be placed in Estrada Cabrera Park in Guatemala city in recognition of Fulton's genius. The government of the United States has directed the American Minister at Guatemala city to express its appreciation to the Guatemalan government for the honor thus done to the memory of a distinguished American.

The Examiner of Patents has decided in favor of Commander Cleland Davis, U. S. N., in the interference proceedings that have been pending for many months past against his application for patent on his projectile-carrying torpedo. One witness testified that in the spring of 1903 Davis drew a diagram of his device upon a napkin and explained that his idea was to insert in a torpedo a gun which would discharge a high explosive shell through the armored bottom of a ship and enable it to explode within the vessel.

The inauguration of railway travel through the tubes of the Pennsylvania Railroad Company between New Jersey and Long Island took place recently without any demonstration and under very prosaic conditions. The first trip was made by a train of dump cars hauled by an ordinary switch engine, which passed from Jersey City beneath the North River, Manhattan Island and the East River to Long Island City. The formal opening of this great work will probably take place within the next few months.

According to a dispatch from Quebec, the Harland & Wolff shipbuilding firm of Belfast, Ireland, working in conjunction with the Canadian Pacific Railway, have acquired a large area of land at Levis, at which dry-dock, ship repairing, and building plants will be built this spring for the purpose of building Canada's navy. Sir Thomas Shaughnessy, president of the Canadian Pacific Railway, refuses to discuss the rumor. It is said that he personally conducted the negotiations between the shipbuilders and the government.

The largest scrap heap in the world is in San Francisco, a relic of the great fire which followed the earthquake of April, 1906. It is 40 feet high, 100 feet square and contains 20,000 tons, all cut in equal lengths of eighteen inches, and piled in one solid mass, with the sides as plumb and true as a brick wall. This is the only one of four heaps of equal size and proportions which remains intact in its original size and shape, the other three having been drawn upon as the material was needed.

An extraordinary accident happened at Durban, South Africa, to an immense traveling coal unloader, mounted on four trucks and traveling on two pairs of standard-gage rails 30 feet apart, which can pick up and dump an ordinary railroad car full of coal. It was blown along the track by a gale until it left the metals, when in spite of the stability due to its large wheel base as compared with its height, it fell over on its side. As it has booms 190 feet long and is nearly 100 feet high, the task of re-erecting it calls for considerable ingenuity.

That the submarine bell is valuable in preventing delay of ocean liners by fog has recently been proved in the case of the "Lucania" and the "Kaiser Wilhelm der Grosse." The former vessel, while approaching New York, was enabled to make the light vessel by submarine bell signals, these being her sole guide. The captain of the "Kaiser Wilhelm der Grosse" when on an eastern passage was shut in by dense fog near Fire Island light vessel. He was able to hear the submarine bell and direct his course accordingly, although, as it subsequently transpired, he was twelve nautical miles distant from the signal station. It is significant that at the same time the fog horn of the lightship was quite inaudible.

A breakwater which, when completed, will be some 10,000 feet in length, is now in course of construction at Hilo, in the Island of Hawaii, to protect shipping from the heavy seas that sweep from the northeast. At present some 400 feet have been completed, and under the existing contract it is estimated that by the middle of next year a length of some 3,000 feet will be in position. The material used for construction is a basalt rock resembling heavy granite, which is quarried some 25 miles away, and transported to the works under contract with the Hilo Railway Company. According to the specifications, from a depth of 3 feet below the water-line to the top, boulders of not less than 8 tons in weight are to be used. The contractors are confident that the rock in question, which weighs 165 pounds to the cubic foot, without the use of cement, will resist any action of the waves.

ELECTRICITY.

The chief engineer of the British Post Office Department, Major Walter O'Meara, is visiting this country for the purpose of studying our telephone systems. The British government is to take charge of the entire telephone system of Great Britain in 1911. It will be operated as is the telegraph system, by the Post Office Department.

The contract has just been let for the huge dam across the Conchos River in Mexico. This dam will form a reservoir of 1,840,000,000 cubic meters capacity. The hydro-electric plant which will obtain power from this source has a capacity of 25,000 horse-power, which will be used at a number of large mines within two hundred miles of the generating station.

An electric railway has just been completed running from Ville Franche to Bourg-Madame. The line is thirty-four miles long and it has a schedule of three trains a day in each direction. Starting from Ville Franche at 1,407 feet above the sea the line rises to 5,220 feet and then drops to 3,750 feet at Bourg-Madame. The motor cars are each equipped with four 50-horse-power motors. The third rail system is used and energy is supplied at about 800 volts.

A circular has just been issued by the Bureau of Standards discussing electrical measuring instruments in general, describing the various types of instruments, pointing to the sources of error and explaining methods of checking them. The Bureau undertakes to test any instruments sent to it for this purpose, making a small charge for the work involved. The circular contains the regulations governing these tests, and a schedule of the fees charged.

The city of Liverpool is at present experimenting with flaming arcs and tungsten lamps for street lighting. A row of flaming arcs is set on posts in the middle of one of the principal streets. The arcs are 20 feet above the ground, and 10 feet below each is a circle of 35-watt tungsten lamps. At midnight the arc lamps are extinguished and the filament lamps are used in place of them. On one of the narrower streets clusters of tungsten lamps are hung over the center of the street from wires strung across from the buildings at opposite sides, thus avoiding the use of poles.

A series of lectures has been given before the Fire Insurance Club of Chicago by Mr. B. E. Blanchard, who is the Chief Electrical Inspector of the Chicago Board of Underwriters. The subjects so far discussed are "Electricity," "The Electrical Inspector," "Outside Work—Systems and Voltages," and "Inside Work." The remaining two lectures will deal with "Low Potential Systems" and "High Potential Systems." These lectures have been found very instructive because the subjects are explained in simple non-technical language, so that the insurance men readily understand them.

The Committee on Units and Symbols of the German Association of Electrical Engineers has just published a report suggesting uniform symbols for alternating-current units. There has been some criticism of these recommendations, because the letters used represent German words and differ materially from the symbols common in other countries. While standardizing of symbols is to be highly recommended, it is pointed out that the symbols should be such that they may be adopted by other countries as well so that eventually we can have an international set of standard symbols and thus avoid some of the confusion that now exists in electrical literature.

Evidently carbon filament lamps are still receiving considerable attention in England. Two patents have recently been issued on the subject, one aiming to regenerate the filament, and the other to prevent the blackening of the glass bulb. In the first case the bulb is opened, and after being cleaned hydrocarbon is introduced. Then on heating the lamp the hydrocarbon is decomposed and the carbon is deposited on the filament. In the second case the inventor believes that the blackening of the glass may be obviated by removing the mercury vapor which enters therein while the bulb is being evacuated. Therefore he proposes to coat the stem which holds the filament with silver, so as to absorb the mercury vapor.

A recent article in the Electrical World contains the following data relative to the utilization of the energy from Niagara Falls. Of the 5,000,000 horse-power represented by Niagara Falls, only about 5.5 per cent is being utilized. Of this, 126,800 horse-power is employed in electro-chemical processes, 56,200 horse-power for railway service, 36,400 horse-power for lighting, 45,540 horse-power for various industrial services; 12,300 horse-power is transmitted over more than one hundred miles, 33,500 horse-power between seventy-five miles and one hundred miles, 3,100 horse-power fifty miles, 79,640 horse-power between ten and thirty miles, while 145,400 horse-power is used locally, showing that many industries have been attracted to Niagara Falls because of the favorable electric power conditions to be found there.

SCIENCE.

Halley's comet appears to be growing brighter somewhat rapidly. It was seen without difficulty at Harvard on October 17th by Prof. Wendell with the 15-inch equatorial, and by Mr. L. Campbell with the 24-inch reflector.

Leon Guillet's and Ch. Griffiths's experiments on the cementation of iron by pure carbon show there is no cementation if precautions are taken to prevent the presence of gases, but it takes place if contact is insured. Moreover, it increases with the pressure, but always occurs extremely slowly.

The American Machinist states that the methods of race-track gamblers, who dope horses in order to make them win races, have been copied by unscrupulous owners of gasoline racing boats. The gasoline is doped with picric acid or some other high explosive, and with the increased power thus obtained the boats are able to win races they would lose if ordinary straight gasoline were used. On the race track there are stories of plugs which have been overdoped and died, and it is said there are also gasoline engines which have been unable to withstand an overdose of picric acid and have gone heavenward.

Samples of air at a height of nearly nine miles have been recently obtained and examined for the presence of the rare gases. The collecting apparatus, carried by a large balloon, is a series of vacuum tubes, each drawn out to a fine point at one end. At the desired height, an electro-magnetic device, connected with each tube and operated by a barometer, breaks off the point of the tube, admitting the air. A few minutes later, a second contact sends a current through a platinum wire around the broken end, melting the glass and sealing the tube. All the samples obtained show argon and neon, but no helium was found in air from above six miles.

A 40-inch mirror is almost completed by Clark for Prof. Percival Lowell, at Flagstaff, Arizona. The mirror is to be thicker than usual to avoid flexure, and is to have a focal length of 18 feet 4 inches. A series of zinc blocks between the iron supporting ring and the edge of the mirror avoid strains on the glass with changes of temperature. When arranged for planetary work, secondary mirrors are to be provided which will transform the instrument into a Cassegrainian reflector of either 154 feet or 75 feet focal length. For photographing nebulae and stars a plane mirror will be used as secondary, giving the images at the principal focus.

Harvard College Observatory issues a bulletin stating that Prof. E. E. Barnard, of the Yerkes Observatory, obtained visual observations of Halley's comet on the 17th and 19th of October. On these two dates Prof. Barnard found that the comet was not fainter than the 13½ magnitude, having a diameter of 15 seconds, and, while it exhibited no elongation, it was "less indefinite and brightening in the middle." In summarizing the late European observations of Halley's comet, Nature points out that the date of the comet's perihelion passage must be advanced 3.4 days, thereby making it April 20, 1910. The comet is at present distant about two hundred and eighty million miles from the sun and two hundred and thirty million miles from the earth.

A French investigator, M. de Wegrier, recently described an apparatus designed to prevent the formation of hail. A similar apparatus was invented by Beckenstein fifty years ago, and was described under the name "géomagnétique" in his "Etude sur l'Electricité." To the top of a pole about 65 feet high, made of the trunk of a resinous tree and painted with oil in order to make it a non-conductor, was attached a mass of gilded copper, with five points, connected to earth by a magnetized (?) galvanized-iron wire. The apparatus also included a large metallic net or grating, buried in the earth. Dr. Frestier has repeated and extended Beckenstein's experiments and has obtained conclusive proof of the efficacy of the apparatus as a preventive of hail.

The method of forcing plants by treatment with ether, as first suggested by Johannsen, is now extensively used on a commercial scale for the purpose of securing out-of-season flowers and fruit. This process, however, will in all probability soon be replaced by the equally effective and less expensive method just described by Prof. Molisch in a pamphlet called "Das Warmbad." The only treatment required is that of immersing the shoots, by inversion, in water at 30 to 35 deg. C., for nine or twelve hours, and afterward keeping the plants in a dark moist chamber at a temperature of about 25 deg. until the leaves commence to appear, after which the plants are grown under ordinary greenhouse conditions. Lilacs, azaleas, spiræas, etc., treated as above during the middle of November were in bloom at Christmas or early in January, whereas untreated plants of the same kind had not commenced to move. Fuller methods of treatment, and the duration and temperature of the bath for different kinds of plants, are contained in the pamphlet.