ENGINEERING.

Negotiations have recently been completed for the construction at Southampton of a large drydock capable of accommodating the new steamers "Olympic" and "Titanic" of the White Star Line. The new dock is to have a depth of 40 feet of water at low tide, so that it can accommodate these vessels at any hour at which they may arrive.

It is reported that the engineers who will design the new Quebec Bridge are considering the question of placing the new structure 10 feet higher above the St. Lawrence River than the bridge that fell. The clearance of the fallen structure was 150 feet above high water. The change is designed to accommodate ships that make Montreal a port of call.

The Navy Department will shortly issue invitations for bids for the construction of a long-distance wireless station in Washington, which is to be of exceptional power and is designed to enable the Department to hold communication with vessels over 2,000 miles distant. Proposals will also be asked for a wireless equipment for ships, to have a radius of not less than 1,000 miles.

The announcement that the Japanese are about to open the railroad which they have built in Formosa is the latest evidence of the good work which they are doing in the island, which was acquired in 1895, at the close of the war with China. At the time of the transfer 62 miles of the road were completed. It now covers a total of 334 miles, and Japan has built the additional 272 miles at nearly $2,000,000 less than the estimates.

The War Department is engaged in experiments to determine what can be done in the way of compressing coffee and sugar into tablet forms under conditions which will preserve them for a lengthy period, with a view to including the product in the new haversack ration which has been adopted for the army. This ration includes hard bread, bacon put up in tins, and salt and pepper carried in stout separate envelopes.

The recent award by the Pennsylvania Railroad Company of a $5,000,000 contract to the Westinghouse Company for the electrification of the New York terminals and tunnel connections, is one of the most encouraging signs of the present revival of business activity. During the past two years this railroad has been conducting an exhaustive series of tests, both of electric locomotives and of the different methods of generation and transmission, which have terminated in the placing of this important order.

It seems likely that the first monorail passenger line to be installed on any scale in the United States will be built within the limits of New York city on the route of the old horse-car line from the New Haven Railroad tracks to City Island. The cars will be carried on two two-wheeled trucks, each pair of wheels running in tandem on a single rail, spiked to ties laid on the ground. Stability will be obtained by two overhead trucks, carried on flexible arms, each truck running on L-shaped overhead rails carried on standards. The guide rails will act as conductors, the current being taken through the flexible arms to the motors.

The report of the commissioners appointed by President Roosevelt to consider the question of mine explosions, attaches great importance to the employment for the handling of explosives only of men noted for their great prudence. To prevent the ignition of coal dust, they advise thorough wetting of the mine for a distance of 60 feet from the shot that is to be fired. They recommend that close attention should be given to the question of leaving such an amount of support to the roof of a mine that it cannot fall in in the event of an explosion, and thereby imprison the workmen. Equally important is the suggestion that employees be removed from the mine when a shot is to be fired. It is also urged that there should be strong co-operation between the government and the operators of mines in the maintenance of strict discipline, and that there should be careful periodic inspection by a corps of competent men.

It was inevitable that the proposals submitted to the Public Service Commission for the construction of a freight subway beneath the streets of New York city would result in a storm of protest from the trucking interests; and hence the opposition of the truckmen at the public hearing before the commission excites no surprise. From time immemorial the attempted introduction of improved means of transit has been fought bitterly by the older systems, whose inconvenience and expense they were designed to avoid. The guiding principle, however, in all such conflicts of private and public interests should be that of the greatest good of the greatest number. The obstruction of the city's streets and sidewalks by the present method of freight distribution has become intolerable; and it is certain that if the proposed subway can be shown to be commercially feasible it will prove to be one of the greatest improvements ever made in this city.

ELECTRICITY.

The Navy Department is considering the building of a long-distance wireless telegraph station near Washington which will have a sending radius of 3,000 miles. This station will supersede the present stations along the Atlantic coast. The Department also expects to call for bids on a pair of high-power ship equipments with sending radius of 1,000 miles each.

A movement is on foot in England to reduce cable charges to America and cut the rate between England and the Continent to two cents a word. The idea is to have the various governments obtain control of the cables, and thus permit their use at the lowest possible figures. No doubt this movement will result in considerable complication, owing to the international agreements that would be required.

According to a recent consular report, there is a total water power in Switzerland of 1,000,000 horsepower, three-quarters of which may be exploited, though at present only one-quarter of this is utilized. Steps have been taken to protect the use of the streams, with a view to prevent the transmission of current to foreign countries. A resolution was recently passed by the Swiss Congress, placing the utilization of water power entirely under control of the federal government.

Advocates of municipal ownership have received a serious blow in Chicago. The city has been lighting its street lamps, 7,647 of them, at $81.64 each per year. At the same time, they have been renting lamps at a cost of $75 per year. According to the report of Bion J. Arnold and the auditor, Arthur Young, the city has been wasting between $200,000 and $300,000 per year by endeavoring to manufacture its own electricity instead of buying it from private plants. The municipal plant has cost $3,639,031, whereas its actual value to-day is but $2,353,869.

The United States Geological Survey is recommending the use of electric power in mines. The electrical equipment, however, must be installed with great care, so as to guard against danger of fire or shock. The underground voltage should not exceed 650 for direct current, or 500 for alternating current, and lower voltages are preferable. Where a higher voltage is used, it should be transmitted by a completely insulated cable. No live electric wire should be permitted in any part of the mine in which gas is found to the amount of two per cent.

The new pay-as-you-enter cars of the Chicago Railways Company will soon be put into service. These cars are provided with very long vestibules, permitting two passengers to enter and leave abreast. The overhang from the center of the trucks is 14 feet, and a very strong construction is necessary to prevent sagging of the platforms. The interior of the car is provided with cross seats, except for a pair of side seats at each end. Each cross seat is provided with a push button, which operates a buzzer over the motorman's head. Special precautions have been taken to thoroughly insulate the wiring. The trolley circuit is incased in a metal conduit on the roof of the car.

The increased use of electricity on the Pennsylvania Railroad has led to a study of the dangers of handling live wires, and the methods that must be employed in resuscitating those who have been stunned by an electric shock. A special pair of pliers has been designed, which enables a man to cut a live wire carrying 23,000 volts without danger to himself. To remove the wire from a body when no other means are at hand, a coat is placed under the wire, and lifted by the sleeves, to raise the wire off the body. This was found perfectly safe, even when the garment was damp. Experiments with fire streams showed that there was no danger of the current flowing down the stream of water even from a high-voltage line when the operator held the nozzle at a distance of between three and four feet from the wire. Experiments with chemical extinguishers showed that they were very dangerous where a solid stream was played on the wire.

A new rectifier has recently been brought out which is entirely mechanical in its operation. It consists of a cylinder of insulating material provided with a pair of metallic contact points. Mounted on a ring which surrounds the cylinder are two pairs of contact points and there are in addition four rectifying disks of carbon which with the cylinder are rotated by a motor. By means of a pair of condensers, sparks are made to leap between the points on the rotating cylinder and first one and then the other pair of contact points. The current flows across the gaps between the points and the rectifying disks when the resistance is broken down by the spark, and is conducted to the storage battery intermittently, but always in the same direction. When starting the rectifier, the motor is brought to synchronism by cranking. The rings on which the four points are carried may be revolved about its axis, so that the condenser will discharge at any point of the wave, and thus the voltage of the rectified current may be regulated.

SCIENCE.

The excavations at Pompeii have led to the discovery of two supulchral monuments, the first belonging to the Edile Vestorius Priscus, which is decorated with frescoes, and the second to a woman named Septima. The latter has a marble inscribed tablet intact and a semi-circular seat raised around a column surmounted by a sun dial, which is identified as an exact reproduction of the mosaic picture (so-called) of philosophers lately discovered at the same spot.

Artificial silk is very deficient in strength, especially when wet, but strong threads and fabrics which have the gloss of silk and are not affected by water can be made by subjecting cotton to various treatments. The oldest process, mercerizing or stretching the fibers in a bath of caustic alkali, produces an inferior gloss. In the newer methods, the cotton fibers are practically covered with a coating of artificial silk, either by dipping them into solutions of cellulose similar to those from which artificial silk is made, or by treating them with solvents of cellulose and thus forming the silky coating out of the fibers themselves. The imitations of silk produced by these methods are very glossy and very strong and durable, for exposure to moisture weakens only the coating and not the body of the fiber.

The distinguished seismologist Emilio Oddone has expressed the view that a great earthquake may, by agitating the whole mass of the earth, cause another great earthquake in a distant and unstable part of the earth's crust. For example, about half an hour before the great earthquake at Valparaiso, Chile, on August 16, the seismographs scattered over the globe registered an earthquake of which the center was located in the northern part of the Pacific Ocean. The hourly observations proved that from 31 to 32 minutes elapsed between the two quakes. This is, very approximately, the time occupied by the first derived wave to traverse the diameter of the earth, the length of which is nearly equal to the distance (7,050 miles), in a straight line, between the epicenters of these two earthquakes. Hence the earthquake in the South Pacific may have been the determining cause of the earthquake at Valparaiso.

A consular report which, as might be supposed, comes from Germany, states that the proper color for beer bottles is a matter of some Teutonic concern. It seems that the actinic or chemical rays of light affect beer harmfully. A German authority on brewing has now shown by an exhaustive series of experiments that no form of colored glass when used for beer bottles affords absolute protection against the effects of exposure to sunlight, and that a wide diversity in degree of protection is observed when glass of different tints is employed. The highest measure of protection is yielded by dark, reddish-brown glass. Repeated experiments have shown that while the chromatic changes in the test liquid take place much more rapidly than the alterations in taste and odor of beer under corresponding circumstances, still the retardation in both cases is proportional. Thus a glass bottle which reduced by 50 per cent the action of the actinic rays on the sensitive solution, as compared with a colorless bottle, would likewise involve double the time of exposure for bringing about a given amount of deterioration in the properties of the beer, if filled with that liquid.

Twenty years ago, the loss caused annually by smoke and fog in London was computed to be more than $22,000,000, divided as follows: Waste of fuel (25 per cent), $5,000,000; additional cost of laundering and wear and tear of garments, $10,750,000; damage to outer garments, carpets, and other fabrics, $5,000,000; loss occasioned by death and illness caused by smoke, $1,600,000. To this must be added at least $5,000,000 for the deterioration of mortar, marble, granite, and other stone in buildings, cleaning and painting walls, signs, and shop fronts, corrosion and perishing of metal work, cleaning windows, deterioration and restoration of paintings, engravings, and books, loss of time by artists, photographers, and others whose occupations require abundant daylight, and damage to trees and plants. Further additions should be made for the cost of artificial light and heat made necessary by the darkness, cold, and humidity caused by the obscuration of the sun, the cost of cleaning chimneys, etc. Finally, the smoke causes the metropolis to be shunned by the wealthy classes, and appreciably diminishes the value of real estate. Hence the total annual loss caused by smoke must be about $30,000,000, or $5 per capita. Mr. John Graham, who makes this compilation and estimate, appeals to every intelligent citizen of London to lessen his individual contribution to the smoke evil by every means in his power. Graham expresses the opinion that the majority of dwellings might be heated with coke or gas instead of coal, and that the smoke discharged by factories could be greatly diminished by the adoption of smoke-consuming devices that are already on the market.