ENGINEERING.

New traffic records were made by the Subway and elevated railways in New York during the Hudson-Fulton Celebration, 2,200,000 passengers being carried on the day of the military parade.

A variable stroke petroleum engine has been designed by Messrs. J. F. Gill and T. C. Aveling, intended to overcome the difficulties which prevent such engines being applied directly to the shaft of a vehicle, as in the case of the steam engine.

The total excavation now made in the Panama Canal tc the end of September last is 87,172,058 cubic yards, which is only about three hundred yards short of one-half the total excavation required. As the average daily excavation is over 100,000 cubic yards, it may safely be said that half the work was done by the end of the first week in October.

The hurricane in New Orleans on September 20th caused an interruption in the operation of the pumps of the drainage system, owing to their being electrically operated and the overhead transmission line being blown down. Temporary wires were strung up hastily on telegraph poles, and pumping resumed in 48 hours, but it is now proposed to build a duplicate transmission line, and eventually to put the whole of it underground.

In connection with the landing of the Cunard steamers at Fishguard in Wales, the Great Western Railway of England has put on a new special train to London, which has been making remarkable time. On a recent run a train with a total weight of 300 tons was drawn by the new engine "King Edward" from Fishguard to London, 261 miles, at an average speed, including one stop of four minutes, of 61.2 miles per hour.

An improvement much needed elsewhere also is being tried by the Chicago Railways Company for the forced ventilation of street cars. A double ceiling is used with a number of openings like those of a hot-air heating system, the space between upper and lower ceiling acting as an exhaust duct. Fresh-air intakes are cut through the floor near the sides of the car, the screened air admitted passing through electric heaters under the seats before entering the interior of the car.

A remarkable piece of work was done by Messrs. David Rolls & Son of Liverpool in the fitting of a new high-pressure cylinder of improved design to the steamer "Star" of New Zealand. The vessel being engaged in the meat trade, it was desired if possible that the change should be made in the time required to discharge her cargo at Liverpool; and although it involved the machining and fitting of all auxiliary parts, it was completed in five and one-half working days.

One of the unusual features of the work on the Ashokan reservoir in the Catskills is the use of special steam rollers for "puddling" the earth fills on either side of the concrete core-walls of the dikes. Over six million cubic yards of earth must be spread in six-inch layers, moistened and rolled, eventually forming a dam 300 feet high in places and four miles long, so the work of the rollers is considerable. They have corrugated front rolls and cross-cleats on the rear rolls, so as to thoroughly knead the moist earth, and each covers the work done by thirty men, a dozen teams, and a cableway, and is guaranteed against breakdown in continuous work for seven years.

In the House of Commons recently the question was raised as to whether the Home Office would consider the question of compelling tramway authorities to fix on their cars a device for making a continuous noise when the speed exceeds a certain limit, as is now done in the case of motor omnibuses. Mr. Masterman replied that the question was under consideration, but the application of the device to tramcars presented special difficulties, owing to the varying limits of speeds authorized for tramways. Mr. Myer asked if Mr. Masterman was aware that some of the cars on the Thames Embankment traveled at a speed of over 20 miles per hour, but no answer was given.

There has been much favorable comment in the engineering press upon the completion, in six months less than the contract time and well within the estimated cost, of the widening of Blackfriars Bridge in London. This bridge, which is 140 years old, consists in its present form of five iron arches ranging in span from 155 to 286 feet between masonry piers founded on wrought-iron caissons filled with concrete, the original masonry arches having been removed and the bridge enlarged in 1864. The work completed last month by Sir William Arrol & Co. as contractors was necessitated by the plan of the London County Council to carry its tramways across the bridge, to connect its northern and southern systems. The roadway was widened by 30 feet, which involved the moving bodily for that distance of wrought-iron face ribs, 155, 174, and 186 feet long respectively, out to the end of the extended piers.

ELECTRICITY.

It is reported that a series of wireless telegraph stations are to be installed in Siberia which will enable the War Department of Russia to keep in communication with the easternmost parts of the empire. These stations are to be large enough to operate over a radius of a thousand miles.

It has been suggested from time to time that the air in the subway could be rendered less obnoxious by supplying each car with apparatus for producing ozone, but the mere conversion of oxygen already in the subway into the form of ozone would not solve the difficulty. What is needed is a fresh supply of oxygen to take the place of that consumed by the passengers and converted into carbon dioxide. A recent editorial in the Electro-chemical and Metallurgical Industry calls attention to the system of Dr. R. Von Foregger, who a few years ago proposed the use of fused sodium peroxide. Water added to this chemical would cause the production of sodium hydroxide and would liberate oxygen. The sodium hydroxide would then absorb the carbon dioxide of the air and thus in addition to furnishing a fresh supply of oxygen it would purify the air as well.

Strange as it may seem to the uninitiated, the cost of operating an electric car depends to a large extent on the motorman. The economical motorman will permit his car to coast whenever possible and in this way will effect a considerable saving of power. Each application of the brakes means a waste of power. Recently an apparatus has been devised for keeping a record of the periods of coasting of different cars. The device is connected both with the electrical controller and with the air brakes and operates only when both the controlling apparatus and the brakes are in the "off" position. The record is made on a paper ribbon driven by a clock. This record makes it possible to judge of the relative economy of different motormen operating on the same line and encourages them to let the cars coast whenever it is possible to do so without falling behind their schedule.

One of the main advantages of electrifying a railroad system lies in the fact that instead of having a large number of portable power plants represented by the locomotives, all the different power units are brought together in one central station and thus considerable economy is possible, if for no other reason because a separate reserve power is not required for each train. The same argument applies to the centralizing of central power stations. Instead of having different concerns manufacture their own electricity the power could all be generated in one large station. Recently the New York Edison Company has offered to furnish power for the Broadway-Lexington Avenue subway. The Edison Company points to the fact that it is well equipped to furnish the power required and has an adequate reserve to meet all demands.

Replying to the popular demand that the Illinois Central Railroad should electrify its terminal in Chicago, President Harahan points out the fact that electric traction is still in the experimental stage and that little as yet is known of the use of electricity for handling freight. The Illinois Central is obliged to interchange trains and cars with other roads and considerable inconvenience would be occasioned by the use of electric traction in its freight yards. He also suggests that the smoke nuisance could be eliminated by other means, and until a comprehensive plan has been developed for electrifying all the railroads that enter Chicago it would be impracticable for the Illinois Central to make a change in the power it uses. The railroad is making experiments with cars operated by gasoline engines and is testing the use of coke instead of soft coal. As a matter of fact, the railroads of Chicago contribute only a small portion of the smoke that clouds the city. However, the City Council is considering an ordinance which will compel every railroad in Chicago to use electricity.

The extensive use of trackless trolley cars in continental Europe has led British manufacturers to make experiments with a view to producing a type particularly adapted to the requirements of their own traction systems. Recently a car has been developed which possesses many very interesting features. Chief of these is the trolley head and its connection to the car. A three-wire system is used, the current being collected from two outer wires while a central wire takes the place of a ground. The head is supported in a horizontal position by means of a sort of parallel-ruler connection, there being two poles connecting it with the roof of the car. The head can be converted into a single-pole trolley head whenever it is desired to run the car on a track system, and in this case the ground is taken care of by a pair of shoes which ride on the rails. The overhead wires are so arranged that they can be adapted for a track system at a minimum expense whenever the traffic makes such a change advisable. It is merely necessary to remove the outer wires and leave only the central trolley wire.

SCIENCE.

Jean Comandon announced before the Academy of Sciences on October 27th the development of a new method of photographing bacilli by the combined use of an ultra-microscope and a cinematograph.

After examining the documents presented for consideration by Lieutenant-Commander Peary, the National Geographical Society has reached the decision that he reached the North Pole, and has decided to award him a gold medal for his exploit.

A cablegram has been received at Harvard Observtory from Kiel stating that Winnecke's comet was observed by Pons of Laplate, Oct. 31 d. 5040 Gr. M. T. in R. A. 17 h. 11 min. 51.6 sec. Dec. —27 deg. 18 min. 43 sec. The comet is visible in a small telescope.

Prof. Metchnikoff, as our readers well know, advocates the drinking of much fermented milk to check the intestinal putrefaction of food, and thus prolong life. In furtherance of his end, bonbons have been prepared, consisting of a lactic-acid product surrounded by a sweetened chocolate coating. The sugar of the coating assists in lactic-acid fermentation.

An alloy which may have a considerable value for steel processes is now manufactured in the electric furnace in France. This is the mangano-silicide of aluminium, formed of manganese, silicon, and aluminium, containing generally from 1 to 2 per cent of iron and 0.25 per cent or less of carbon. Sulphur and phosphorus are practically absent. The new alloy has been found to answer very well as a de-oxidizing agent in steel making. During the refining it is transformed to silicate of manganese and aluminium, giving a very fusible slag which is easily separated from the melted metal. It is claimed that the steels which are obtained by the process are very homogeneous and are free from porosity. The proportion of the new alloy is about as follows: Manganese, 75 per cent; silicon, 37 per cent; and aluminium, 18 per cent. In the steel process, 100 parts of alloy combine with 71 parts of oxygen to give 171 parts of slag.

The $1,000,000 given by John D. Rockefeller will go a long way toward eradicating the "hookworm." The worm was identified in 1903 by Dr. Charles Wardell Stiles of the Rockefeller commission. Soil pollution is responsible for the existence and spread of the worm. It can be eliminated from the human body by a simple treatment of thymol and Epsom salts, the patient in most cases being cured in several days. Pronounced anæmia is the chief symptom of persons afflicted with the hookworm disease, accompanied by emaciation and great physical weakness. Laziness, mental lassitude, and stupidity are other symptoms. Uncinariasis is the technical name for the disease. Hookworm disease was probably known to the Egyptians near 3,000 years ago, but its cause was not understood until about the middle of the nineteenth century. The hookworm is about half an inch long. It lives in the small intestine.

Once it was possible to buy radium at $2 a milligramme; now the market price is $90 a milligramme, equal to $2,500,000 an ounce. This was one of the striking statements in a very interesting speech delivered by Sir William Ramsay at the foundation stone laying ceremony of a new radium factory in Limehouse, an eastern suburb of London. The British Radium Corporation, which is going to extract radium from pitchblende found in the Trenwith mine, Cornwall, is believed to be the first company in the world to attempt the production of the precious mineral on a commercial basis. It is one of the romances of science that the material in the old days was regarded by the Cornish miners as a nuisance, for it prevented them from obtaining copper from smelting. For a long time it was cast on the dumps or left underground. To-day the comparative value of crude pitchblende ore is far in excess of the gold quartz of Johannesburg or the blue earth of the diamond mines.

The swamp potato (*Solanum Comersonii*), which grows wild in Uruguay, has lately been cultivated in France, where it has produced a variety with violet tubers. The new variety is characterized by extraordinary productiveness, resistance to disease and frost, and the production of large aerial tubers in the axils of the leaf stalks. German potato growers, however, find the new variety so similar to the long-known variety "Paulsen's Blue Giant" that they are inclined to think that the latter has, innocently or designedly, been exploited in France as a novelty. The same opinion is held by a prominent English potato grower. The two sorts have also been cultivated, side by side, at the experiment station of a Swedish society for the improvement of moors, where they appeared to be identical in foliage, flowers, and tubers. The swamp potato, however, proved less productive than the old Blue Giant, and its most strongly emphasized peculiarities, antipathy to lime and preference for marshy soil, could not be detected. Similar results were obtained on an experimental plantation in Silesia.