

ENGINEERING.

The New York, New Haven & Hartford Railway Company are about to make tests of the comparative performance of electric and steam locomotives in freight service. To this end they have ordered two freight locomotives. One of these is to be equipped with side rods, and the other will be of the geared type.

Statistics of accidents on the railways of the United Kingdom for the year 1908 show that in accidents to trains, rolling stock, or permanent way, no passengers were killed, but 283 were injured; while of employees, 6 were killed and 164 injured. Accidents of a kind other than the foregoing included 102 passengers and 376 employees killed, and 2,240 passengers and 4,976 employees injured.

The "Alagoas," the seventh of ten torpedo-boat destroyers ordered by the Brazilian government, was successfully launched by Messrs. Yarrow & Co. of Glasgow on July 29th. Like her sister vessels she is 240 feet long by 23 feet 6 inches beam, and will be equipped with two double-ended Yarrow boilers of 4,000 horse-power capacity, supplying the two sets of 4-cylinder triple-expansion engines, refrigerating apparatus, and other auxiliaries.

In a recent paper W. E. Gray states that the manufacture of tin plates originated in Bohemia, hammered iron plates having been coated with tin in that country some time before the year 1600. Tinplate making was introduced into England from Saxony in 1665, and the first tinplate factory in France was established in 1714. Tin plates were first made on a commercial basis in the United States at Pittsburg in 1872.

According to "Railways" of Calcutta, the success of the monorail system in India for carrying freight and passengers is largely a question of finding a satisfactory type of carriage, and Mr. Brennan is now making experiments on short lengths of roads in India to determine this question. The monorail system is believed to possess great value, because of its simplicity and cheapness of construction, for military purposes on mountain roads. The result of the experimental work will be given in a forthcoming report.

The Jamaica Bay Improvement Commission will shortly make a survey for the bulkhead line, which will be built at about 2,000 feet from the westerly and northerly shore of the bay, and will extend from Barren Island to Three Mile Creek. The government will dredge a channel which will ultimately be 30 feet deep and 1,000 feet wide. The dredged material will be used to fill in the 1,250 acres between the bulkhead and the shore line. In the earlier stage of the operations it is proposed to dig the channel to a depth of 18 feet and a width of 500 feet.

The work which has been done in the electrification of steam railroads has probably suffered from the lack of collaboration between the different railroads and interests that have been engaged in such work. Hence, it is gratifying to note that the New York Railway Club has appointed a special committee to take up the subject during the coming fall and winter, and report at the annual electrical meeting of the club in March next. They will collect data and make suggestions as to the direction in which further investigation should be made. Substantially the same action has been taken by the Maintenance-of-Way Association and the American Railway Association.

A new record for mining and shipping anthracite coal has recently been made by the Kingston Coal Company, of Wilkes-Barre, Pa. During the month of July, that company's breaker No. 2 shipped 91,000 gross tons of coal, which, as far as we can learn, beats the record of any in the United States. This breaker has been entirely rebuilt during the last six months without any stoppage of its machinery, improved springboard shakers being substituted for revolving screens, and mechanical pickers introduced to dispense with a large number of boys on the picking belts. The breaker worked twenty-four full working days of nine hours, the greatest number of mine cars dumped in one day being 1,641.

So vast are the crowds which are expected to gather during the forthcoming Hudson-Fulton Celebration, that the Executive Committee have made elaborate plans for the proper care of the health and convenience of the visitors. During the entire time of the celebration there will be open, twenty-four hours a day, a large number of emergency hospitals, provided with telephone connections. A number of physicians and 1,500 trained nurses have volunteered their services. During the three days of the land parades there will be established a temporary emergency hospital at every five blocks, with ambulances stationed at every ten blocks. During the two water events of the celebration, an innovation will be introduced in the form of ambulance launches, with nurses, doctors, and police officers in attendance.

ELECTRICITY.

In recent trials of the Pollak-Virag high-speed telegraph between Berlin and Königsberg, a distance of 420 miles, 2,800 distinctly recorded words were transmitted in five minutes.

So successful have been the experiments with the new Telefunken system of wireless transmission at the new 20-kilowatt station of the Austrian government at Pola on the Adriatic, that signals strong enough to be automatically printed on tape by the coherers were received at Norddeich on the North Sea, Copenhagen, and Berlin.

The wave forms of electric currents have been made visible by M. Abraham of Paris by means of an adaptation of the mirror galvanometer. Upon the mirror being set swinging horizontally by the current, the beam of light is thrown upon a revolving prism and a set of fixed mirrors in such a way that it is spread out in the vertical direction, so that the wave form of the current appears upon a screen.

The French government, which already had the monopoly of telegraph and telephone operations in France, has extended its legislation to include wireless telegraphy. No wireless telegraph or telephone apparatus may be set up on French territory or ships except where authorized by the state, and foreign vessels in French waters may not operate their apparatus in such a way as to conflict with government messages.

Wireless messages transmitted from the Glace Bay station in Canada have recently been picked up with some regularity by the Eiffel Tower receiving station in Paris, proving that transatlantic wireless communication is an accomplished fact. The Paris plant is in no way competing with commercial stations, being purely for military purposes, making no communication with places outside of France except the French African colonies.

The growing importance of the electric vehicle, hitherto somewhat overshadowed by the more showy successes of the gasoline car, is evinced by the fact that at the recent annual convention of the Society of Automobile Engineers in Chicago half the papers presented related to electrical subjects. Two of the papers referred to storage batteries and one to measurement of energy consumed by commercial vehicles, the most animated discussion of the meeting centering around the latter.

The notable successes of wireless telegraphy in procuring speedy assistance for ships in distress at sea in spite of fog and distance, best exemplified by the cases of the "Republic" and the "Ivernia," has caused an application for lower insurance rates for vessels equipped with wireless apparatus to be proposed for the international marine insurance congress at Baden next month. Success of the application should be mutually beneficial, both effecting a saving in insurance cost to shipowners using wireless and extending the use of the latter.

Upon the successful completion of tests now in progress of a 5,000-kilowatt unit, the New York Interborough Railway will install two more General Electric Curtis low-pressure turbines driving 3-phase 25-cycle 11,000-volt generators, each of 5,000 kilowatts capacity, operated by exhaust steam from existing reciprocating engines at the 59th Street power house. It is estimated that the turbines will take nearly as much power from the exhaust steam as the reciprocating engines do in expanding from 150 pounds pressure to atmosphere.

The Great Eastern Railway of England, with one of the largest termini in London and a great suburban traffic, has lost passengers at the rate of 25,000,000 per annum since the advent of the London County Council's electric tramways, and this in spite of a gradual reduction of its fares amounting in some cases to 40 per cent. The council tramways are a municipal undertaking, and while giving good service have been run hitherto at a loss, the deficit being paid out of the rates, so that the railway company, as a large ratepayer, is naturally aggrieved at having to contribute to the support of a successful rival.

The Public Service Commission, which has been considering the question of compulsory electrification of railways passing through the Adirondacks forest preserve, as a means of fire prevention in the latter, has rejected this remedy on account of its prohibitive cost. The additional cost of operation by electricity was estimated to be \$1,156,470 a year more than the present cost of operation by steam locomotives, for the New York Central lines alone, that figure being reduced by only \$100,000 if all the power were generated by water. This great expense is due to the very unfavorable conditions for electric service, the traffic consisting of a few heavy trains over comparatively long distances, whereas economical electrical operation requires a fairly uniform traffic composed of a large number of small trains at small intervals, as in the suburban service of large cities.

SCIENCE.

Capt. R. F. Scott, who recently returned after a thrilling attempt to reach the South Pole, in which he was nearly successful, has announced his intention of setting out on another Antarctic expedition early in 1910.

That the New York Aquarium is certainly meeting with public approval would follow from the remarkable attendance in July, 1909. During that month 528,266 persons passed through the turnstile—an average of 17,040 per day. Up to August 2d, 1909, the total attendance was 2,006,919.

It is announced that Lieut. Shackleton will lecture in the United States and Canada, in order to earn enough money to pay the heavy indebtedness which he incurred on his last Antarctic expedition. The announcement is astonishing, as it was generally supposed that Lieut. Shackleton had been aided by his government. It is stated that the expedition was financed by a small group of Americans who lost their all in the last financial crisis.

The Duke of the Abruzzi cables that he has ascended Mount Godwin-Austen, in the Himalayas, to a height of 24,600 feet. He failed by 3,665 feet in reaching the mountain's summit. We believe, that although he did not succeed in his ultimate object in ascending this lofty peak, he has broken all records for mountain climbing. The Duke had an advantage over the private individuals who were his rivals in the Himalayan field, in so far as the government of India furnished him with guides and porters. For all that, his hardships must have been tremendous. The Workmans have stated that climbing in the Swiss Alps is child's play compared with the feats of endurance which climbing in the Himalayas demands.

As aluminium is extensively employed in the manufacture of kitchen utensils it is important to know how it is affected by the foods which are brought into contact with it. For this purpose Fillinger boiled aluminium foil in fresh milk, sour milk, wine, mineral waters and 10 per cent solutions of various salts. The aluminium foil was weighed before and after the boiling, which was continued for half an hour. No appreciable loss of weight was produced by boiling in sweet milk, white or red wine, or solutions of sodium chloride, potassium iodide, sodium nitrate, potassium sulphate, and calcium nitrate, and only a very small loss was caused by sour milk. The aluminium was strongly attacked, however, by sodium bicarbonate, magnesium sulphate, calcium sulphate, and mineral waters.

Garrigon has tested the radio-activity of the hot springs of the Pyrenees by immersing in their waters a photographic film inclosed in a tube of aluminium. The film showed an impression after a longer or shorter immersion, while a second film, immersed in the same conditions, but inclosed in a tube of lead, remained unaffected. A very thin sheet of lead suffices to stop the radiations of radium, etc., which pass through comparatively thick sheets of aluminium. The following experiment, of similar character, is reported by an Italian scientific journal: A photographic plate, wrapped in paraffined paper (to exclude moisture) and then in black paper, was placed between two plates of iron 1/12 inch thick, which were coated with asphalt varnish. The iron plate next to the sensitive film had five perforations, about 1/2 inch in diameter. The whole apparatus was suspended for 15 hours over a spring, with the perforated plate lowermost. On being developed the photographic plate showed impressions of the five perforations. A control plate, treated in the same manner, but not exposed over the spring, showed no impression whatever.

F. Robin has made a series of experiments on the hardness of steel at low temperature, using a falling ball 2/5 inch in diameter, which gave a blow of about three tons. The metals were in bars about two inches long and one inch square. They were placed in three refrigerating mixtures, producing temperatures of —4, —112, and —300 deg. F. The temperature —4 deg. F. was obtained by a mixture of ice and calcium chloride; the temperature —112 deg. F. by a mixture of carbon dioxide snow and 95 per cent alcohol. The lowest temperature, —300 deg. F., was obtained by a mixture of liquid oxygen and nitrogen containing a very large proportion of nitrogen. The experimenter finds, as Hadfield did, an increase in hardness of steel immersed in liquid air, but the increase is not progressive, the curve of hardness rising suddenly at —112 deg. F. and attaining a great height in liquid air. Cast antimony also increased greatly in hardness, but cooling had comparatively little effect upon aluminium, copper, lead, tin, nickel, and some other metals. Spring steel containing silicon shows little change. Chrome steel showed great variation, while tungsten steel, vanadium steel, molybdenum steel, and rapid-cutting steel gained little in hardness on being cooled to the lowest temperature. Quenched steels gained considerably in hardness.