

ENGINEERING.

As a sure indication of returning business prosperity, it is gratifying to learn from the committee of the American Railway Association on power efficiency that the decrease in the number of idle cars continues, the total number being now reduced to less than 100,000. Analysis of the returns shows that as the demand for cars increases, the roads are repairing the cars that were temporarily unfit for duty, and are placing them in active service.

The record for rapidity in excavation is continually being broken at the Isthmus of Panama. The latest instance occurred on October 22, when 313 10-yard dump cars were loaded in 370 minutes, an average of 1 minute and 11 seconds per car. Assuming that they were loaded to their full capacity, a cubic yard of material was placed on the cars every 7 seconds. The only interruptions occurred when the dipper was cleaned and the shovel moved forward to a new position.

The school of target practice established on the battleship "Sardegna" by the Italian Minister of Marine has shown excellent results. The competition for the gunlayers' prize was carried on from ships which were steaming at a speed of 14 knots at a little under 3,000 yards past a target measuring 23 feet by 56 feet for the heavier guns, and 10 feet by 30 feet for small guns. The average for all the ships was 60 per cent of hits, and on some ships it rose to 75 per cent.

According to the report of the United States Geological Survey on the petroleum industry for 1907, nearly 18,855,691 barrels of oil were consumed that year as fuel by the railroads of the United States. This is an increase of over 3,000,000 barrels above the amount used for the purpose during the preceding year. It is estimated that 13,593 miles of railroad were operated by the use of fuel oil, and the total mileage by oil-burning locomotives is estimated at over 74,000,000.

The new Lackawanna tunnel through the Bergen Hills in Jersey City, which has been driven to provide two additional tracks and extends parallel with the old tunnel, is nearing completion. It has been built to facilitate the handling of the heavy suburban traffic of the road. With a view to the probable future electrification of the system, connections are being sunk in the roof for carrying the electric conductors. The opening of the tunnel will take place early in December of the present year.

The largest dredger in the world, the "Leviathan," recently launched for the Mersey Docks and Harbor Board, is 487 feet long, 69 feet broad, and 30 feet 7 inches deep. Her pumps are capable of dredging 10,000 tons of sand into her bunkers in 50 minutes from a maximum depth of 70 feet, and she can carry these 10,000 tons out to sea at a speed of 10 knots. The dredging plant consists of four sets of engines, driving four centrifugal pumps connected to two 42-inch suction tubes on each side of the vessel.

The wooden schoolship "St. Mary's," after sixty years of service, first as a warship, and latterly as a schoolship in the service of New York, has been bought by a Boston firm for junk at a price of \$5,000, and is being broken up for the metal that is in her. Sixty years ago she was one of the fastest warships in the United States navy. From 1874 until October of the present year, when her place was taken by the "Newport," over 1,000 boys had passed through this famous old vessel, and graduated from her after taking a two years' course in navigation and seamanship.

Evidence of the profound impression made upon France by Wilbur Wright's recent success with his aeroplane is shown by the statement in the Army and Navy Gazette that the French Ministry of Marine are seriously considering the placing of an order for a large number of aeroplanes of the Wright type for the Coast Guard Service. It is reported that a member of the Army Commission of the Chamber of Deputies, who witnessed Wright's feat of flying for over an hour with a passenger on board, stated that the aeroplane has now been developed to a point where it will be of great value for military scouting.

Travel between New York and Brooklyn has seen a remarkable increase during the past year. The total travel in both directions for twenty-four hours was 816,000 as compared with 706,000 last year, an increase of about 16 per cent. The opening of the Subway tunnel and the growing traffic over the Williamsburg Bridge have caused a decrease of travel over the Brooklyn Bridge from 423,000 in 1907 to 310,000 in 1908. An analysis of the traffic across the East River shows that the ferries carried 165,000; the Subway, 160,000; Williamsburg Bridge, 182,000; and Brooklyn Bridge, 310,000. Nothing could show more forcibly than do these figures the commanding position held by the famous Brooklyn Bridge among the transportation facilities between Manhattan Island and Long Island.

ELECTRICITY.

The superintendent of the Hackettstown Electric Light Company reports that during a severe storm last summer, a severe lightning discharge passed through thirty-three series tungsten lamps. The film cut-outs in the sockets were punctured, but when these were replaced, the lamps were found to be undamaged except for a slight twisting of the filament.

A very effective gas lamp has recently been introduced, which has every appearance of an arc lamp, but gives a softer and more steady light. It consists of incandescent gas mantles, which are inverted so as to throw all the light downward. The mantles are protected by a globe of ground glass, which distributes the light and conceals the fact that the lamp uses gas instead of electricity.

The efficiency of wireless telegraph for communication between the earth and balloons or airships was recently tested near Brussels. Messages were successfully transmitted to a balloon, which also received signals from the Eiffel Tower in Paris. One of the objections to wireless apparatus in a balloon is the danger of igniting the gas with sparks generated by the apparatus.

Many strong arguments are being advanced for the installation of 25-volt wiring in buildings, so as to permit the use of tungsten and tantalum lamps. The principal advantage is that the same candle-power may be obtained with a much shorter and stronger filament. Furthermore, the lights can be run at a higher efficiency. To be sure, a transformer will be necessary, but the cost of the transformer would soon be made up by the greater efficiency of the lamps.

At the recent electrical exhibition in Manchester, a novel arc lamp was shown, which was provided with carbon magazines. The carbons are arranged in the form of flaming arc, one of the magazines being stationary, and the other movable, so as to bring the carbons in contact when starting the lamp, and to permit of adjusting the carbons so as to regulate the arc. The mechanism feeds the carbons steadily, and as soon as a carbon burns out another one is brought into play, the burnt-out carbons dropping into the globe of the lamp.

The Public Service Commission has granted permission for the building of an electric monorail road between Bartow Station on the New York, New Haven and Hartford Railroad and Belden Point, City Island. This will be the first passenger monorail to be built in this country. The system will be similar to that used on the experimental road at the Jamestown Exposition. The cars will run on a single rail at the ground, and will be prevented from toppling over by a pair of guide rails above.

One of the indispensables of torrid India is the punkah, or large fan, which is operated by a colored servant to secure a draft of air and keep insects from disturbing the sleeper. The native is not always reliable, being apt to doze, and for this reason efforts have been made to devise a mechanically-driven punkah. These efforts have failed, owing to the difficulty of duplicating the action of the hand-worked punkah, the special value of which consists in the sudden jerk given the fan by the native at each turn. Recently an electrically-driven punkah has been devised, according to the Electrical Review and Western Electrician, in which this jerking motion is perfectly imitated by a "lath-shaped spring" covered with leather, which slaps the fan to and fro.

In German cities and towns considerable attention is paid to the generation of electricity from heat obtained in the destruction of refuse. Statistics for a number of German towns show that one kilogramme of refuse yields from 0.6 kilogramme to 1 kilogramme of steam at a pressure of 8 to 12 atmospheres. The following table has been compiled to show how much electrical energy should be obtained per day in cities of different size:

Inhabitants.	Kg.	Kw.-hours.
250,000	286	2,500,000
100,000	104	911,000
50,000	47	411,000
20,000	17	149,000

Since the middle of May the St. Clair tunnel, running between Sarnia, Ont., and Port Huron, Mich., has been operated with electric locomotives. The operation has been in charge of the contractors, in order to thoroughly test the equipment. On the 12th of this month the tunnel was handed over to the Grand Trunk Railroad. The St. Clair tunnel is 6,032 feet long, with a two per cent grade at each end. Heretofore it has been necessary to break up the freight trains at each terminal into separate sections, so that they could safely be drawn through the tunnel by a single steam locomotive. The use of electric locomotives eliminates the danger of suffocation in the tunnel, and permits long freight trains to be drawn through, thus saving considerable time, which heretofore has been used in making up the sections.

SCIENCE.

The latest medical protest against the smoke nuisance comes from Dr. John T. Wainwright, who points out in the Medical Record that sunlight and health are almost synonymous terms, and that smoke means noxious gases. To drive home his point, he cites as modern instances the smoky towns of Manchester and Leeds and their notoriously high death rate. There is also a commercial side to the question. A Chicago merchant maintains that smoke damages \$200,000 worth of his goods every year, which seems suspiciously but not incredibly high.

The tuberculosis exhibits of the recent International Tuberculosis Congress have been sent to New York, and are to be set up at the American Museum of Natural History. The exhibit, by far the largest of its kind ever collected, will be on view for at least six weeks, in which time there will be many public meetings and conferences on the prevention and treatment of tuberculosis. These are expected to extend the interest in the exhibit itself and increase its educational value. The exhibit will be open to the public from 10 o'clock in the morning until 10:30 at night daily and on Sunday afternoons.

A report for the calendar year 1907, just issued by the United States Geological Survey, contains the startling announcement that the total production of our mineral resources is valued at more than \$2,000,000,000. This means an increase ranging from 5 to 40 per cent. The largest contributions to the mineral wealth of the year were made by coal and iron, which together represented considerably more than half of the total. The value of the coal mined showed a gain of about 15 per cent on 1906. The increase in iron was somewhat less.

The Pennsylvania Railroad recently sent out an instruction train for a three days' trip through eastern Pennsylvania, to deliver free lectures to the farmers along the line. The lecturers were members of the faculty of the State College of Agriculture. The three coaches of the train were fitted up as lecture rooms, and at each of the twenty-two stops forty-five-minute talks were made. Besides lectures on increasing the fertility of the soil, there were discourses on methods for increasing the output of dairy products, the care of live stock, testing seed corn and the cultivation of alfalfa.

The devastation of the Hudson River Palisades, now happily averted by law, finds its counterpart in the threatened destruction of the famous Giants' Causeway. Americans are usually branded as unsentimental, money-making despoilers of nature. Guilty as we have unquestionably been, it is doubtful if we have ever outdone the despoliation of the Giants' Causeway, which is now occurring at the hands of a British syndicate. The basalt of which the Causeway is composed is an excellent road-making material, and to be trodden under foot seems now its ultimate fate. This latest bit of vandalism is in large measure due to the automobile. The advent of the high-speed motor car has brought about a necessary improvement in the macadam road, and the best possible road is made by the Irish basalt of which the Giants' Causeway is constituted.

At one time a large part of the potassium nitrate used in the manufacture of gunpowder was obtained from natural and artificial niter beds, by leaching out the niter which formed on the surface of stones and rubbish exposed to humidity and sprinkled with liquid excrement. During the wars of the French Revolution and Empire, when it was impossible to import niter from India, artificial niter beds were established in every part of France. The Committee of Public Safety published instructions concerning their operation and Fourcroy devoted many pages to them in the Encyclopedia. This crude process is now being revived, after having been abandoned for a century. Müntz and Bazin have taken out patents for a method by which farmers can produce for their own use fertilizers rich in nitrates, which may be substituted for Chile saltpeter, which is increasing in price year by year. The process differs very little from that of olden times, except that stones and rubbish are replaced by peat, which is peculiarly well adapted for nitrification, very cheap and naturally rich in nitrogen. Advantage has also been taken of the discoveries of bacteriologists in regard to the properties and functions of nitrifying microbes. Dry peat is ground and mixed with one-tenth of its weight of chalk, half its weight of water and a little phosphate of lime. The mixture is placed, in a bed about three feet deep, in a building where the temperature can be kept constantly at about 70 or 75 deg. F. The bed is then sprinkled with a solution of ammonium sulphate or any other ammoniacal liquid, such as sewage, factory waste, liquid manure, or the ammoniacal liquor of gas works. Within one month all the ammonia is converted into nitrate. The mixture can then be either used directly as a fertilizer or leached for the extraction of the niter, which can be purified and sold for industrial purposes.