

ENGINEERING.

It seems that unless the new cyanamide industry should create a big demand there is a possibility of an overproduction of calcium carbide. It is estimated that the yearly demand is 192,000 tons. According to Mr. Pitaval, the French output last year was 26,000 tons as against a maximum capacity of 50,000 tons. He estimated that the carbide factories of the world have an aggregate of 367,000 horse-power.

According to official Canadian railway statistics for the year 1907, the United States has a population of 381 for each mile of railway, and Canada 289. France has 1,590 for each mile of railway, and the United Kingdom 1,821. In India there are 10,119 people for each mile of railroad. In the United States there are 13.61 square miles of territory for each mile of railway; in Canada 161.8 square miles; in the United Kingdom 5.29 square miles, and in France 8.46 square miles for each mile of railway.

The proposed Forth and Clyde Canal has been criticised in the House of Commons on the ground that its cost of \$20,000,000 will be out of all proportion to its subsequent value. Admiral Campbell in reply lays emphasis upon its great strategic value as affording a quick means of transit of warships from the North Sea to the Atlantic, and *vice versa*. In view of the recent construction of a powerful naval base on the Firth of Forth the importance of such a canal outside of its commercial value has been greatly increased.

In view of his classic experiments of twenty years ago and his construction of a gigantic aeroplane, the announcement that Sir Hiram Maxim has built a new biplane cannot fail to arouse much interest in the world of aeronautics. The most valuable feature of his work was the determination of the best form of propeller by means of a whirling arm. Outside of the fact that his new motor (which, together with the rest of the machine, has been built by Messrs. Vickers, Sons & Maxim) is extremely light in proportion to its power, no particulars regarding the machine have been made public.

The proposed method of driving ships by the combination of steam turbine and motors, which at first was received rather coldly, is now beginning to receive the attention to which we consider it to be well entitled. In a recent discussion of the subject in *Cassier's Magazine*, the advantages of the system for cargo boats are stated as follows: More cargo can be carried; coal consumption is less; there is greater propeller efficiency in rough weather and less propeller racing; and the vessel is not totally disabled if the rudder or a propeller shaft is disabled. The disadvantages are that the first cost of the ship is greater and that a more skillful staff is required.

At the recent meeting of the British Association for the Advancement of Science at Winnipeg, interesting papers were read by Sir John Thornycroft on "Hydroplanes or Skimmers"; by Mr. C. B. Smith on "The City Hydro-Electric Plant" of Winnipeg; by Lieut.-Col. W. P. Anderson, Chief Engineer of the Department of Marine, on "Improvements in the Navigation of the St. Lawrence"; and by Col. G. W. Goethals, chief engineer and chairman of the Isthmian Canal Commission, on "Engineering and Construction Features of the Panama Canal." The latter was considered the most important paper, and will appear in full in the Association's Proceedings, only one paper in each section so appearing.

Two of the largest lighters afloat have recently been launched by Messrs. Rennie of Greenwich, England. They are entirely constructed of steel, 112 feet long, 30 feet beam, and 11 feet 9 inches deep, with a draft when lifting 500 tons of 10 feet. They are divided for 66 feet of their length by a well, on either side of which are six separate water-tight compartments, any or all of which can be quickly flooded for balancing, while they may be expeditiously cleared by a powerful steam pump. The quarters for captain and crew are forward, and boiler and engine room aft. The lighters have been built to the order of the Mersey Dock and Harbor Board, and are intended primarily for raising sunken vessels and similar objects.

The Metropolitan District Railway of London and its associated underground lines are subjected to a destructive wear of the rails which was not present in the days of steam operation. One form of this wear is known as "battering," which results in hollows that develop at distances of from two to three feet apart. It is generally found on the inner rail on curves. Corrugation is a well-known phenomenon on electric roads and constitutes one of the most puzzling features of rail wear under electric traction. This trouble is no doubt largely due to the fact that part of the weight of the motors is carried directly on the axles without the intervention of springs and that the center of gravity of the motor car is much lower than that of the steam locomotive. A partial remedy has been found in the use of high silicon rails, which show an increased life of about 30 per cent over rails of the standard composition.

ELECTRICITY.

An electrolytic process for the production of bleaching solution is used by the Amazon Knitting Mills of Muskegon, Mich., by which the cost of bleaching is said to be less and the results obtained much more uniform.

Japan is falling in with the general movement for the electrification of railways, and the Hachioji-Kafu line of the Japanese middle district railway is to be electrified. Fifteen motor cars have already been ordered from the Osaka Railway Carriage Company.

The Canadian Department of the Interior has recently been estimating the available water power of Dominion streams, and concludes that there is over twenty-six million horse-power in accessible localities, of which only half a million has been hitherto developed. The largest power is on the Hamilton River in Labrador where 9,000,000 horse-power is available, the Canadian part of Niagara Falls coming second.

The *Electrical World* has an interesting discussion of Prof. Marks's article on the price of electric service. It is pointed out that on account of the difficulty of cheaply storing electrical energy the consumption of any individual user is as important a factor in the cost of serving him as the operating cost, and that it is therefore reasonable for some sort of standing charge based on his estimated or measured demand to be made in addition to a service charge based on operating cost.

Machinery aggregating 10,000 horse-power and other equipment to the total value of \$400,000 is now on its way to Dawson City, where Klondike mining operations are expected to be facilitated by the provision of electric power. An English company has taken over the present power station, the only coal mine in the district and the local telephone system. Water power is available for part of the year, but is complicated by floods at one season and drought at another. The present power plant uses wood fuel largely, the local supply of which is becoming exhausted, and considerable economies are expected from use of coal screenings hitherto wasted at the new company's power house, which will be erected at their mine.

The city of Glasgow, Scotland, whose record for an efficient and economical municipal tramway system is well known, has also a remarkably well-conducted electric light and power supply department, according to figures recently received for the past year's working. In spite of a decrease in income of \$38,000, due to reduced charges for current, increasing use of economical metallic filament lamp, and general trade depression, an actual increase in available profit balance of \$14,000 has been made. The aggregate horse-power sold is 29,500, an increase of 6,000 over the previous year, and 1,232 new consumers have been added. Eighteen million units out of thirty-three sold were for power purposes bringing in on the average 1½ cents per unit.

The experiments, which we described about a year ago, with apparatus for the destruction of harmful moths by means of a combination of electric light and a suction blower, have been repeated with great success at Zittau, in Germany. The beam from a search-light mounted on the roof of the municipal electric plant is played upon the forest several miles distant and the moths come fluttering up the beam in swarms to where the intake of a powerful suction blower is concealed below massed arc lamps. The moths are drawn in by the suction and exhausted into a wire net cage which is removed as often as filled. As much as 140 pounds weight, representing some 400,000 moths, has been destroyed in this way in one night.

It is not generally known that the disturbances in Persia, reports of which from London have occupied much space in the press of late, pass over the longest telegraph circuit in the world. The telegraph operator at Teheran "speaks" directly to his colleague in London, 4,000 miles away, by wire, automatic repeaters taking the place of operators at ten points on the route. The first repeating station from London is at Lowestoft, where the message is carried forward 200 miles by cable under the North Sea to Emden, Hanover, where it is again automatically repeated; stations at Berlin, Warsaw, Rouno, Odessa, Kertch, Sukhum, Kaleh, Tiflis, and Tauris flash it instantaneously without human intervention, the operator at Teheran being the first to handle it since it left London. The line is continued to India, but in no other place is there so long an automatic circuit.

Mr. George H. Cove of Somerville, Mass., has a solar thermo-battery which is claimed to produce enough current in ten hours' sunlight to supply thirty tungsten lamps for three days. The apparatus consists of a frame of violet glass, like a large window, below which a number of metallic plugs are set in an insulating material. One end of each plug is constantly exposed to the sun while the other is shaded and cool, and the rays permitted to pass by the violet glass set up a reaction in the special alloy used, causing a constant flow of current to the storage batteries.

SCIENCE.

The famous lion of Lucerne appears to be doomed. The entire face of the sandstone rock in which the figure is carved is falling to pieces, and, in spite of every effort on the part of the local authorities, the lion is crumbling away and becoming disfigured.

The Duke of the Abruzzi has made a new record in mountain climbing. The highest ascent hitherto made in the Himalayas, the scene of the Duke's exploit, was by the Norwegians Muradas and Robertsen, who reached a height of 7,300 meters (more than 23,725 feet). The Duke mounted Bright's Peak, which is 7,600 meters (above 24,700 feet) in height. This peak is in the Godwin-Austen group.

Scientists now have placed at their disposal the highest meteorological and astronomical observatory on the American continent. It is situated on the top of Mount Whitney, California, 14,000 feet above sea level. Realizing the value for effective and progressive astronomical and meteorological work of an observatory far above the clouds and free from dust and smoke near great cities, the Smithsonian Institution decided to build a suitable laboratory on Mount Whitney. Now that the observatory is opened it will be used by scientists of the Smithsonian Institution and by others to make observations. The Smithsonian will permit the building to be used by any scientist gratuitously.

We have already made the statement in these columns that the Lick Observatory under W. W. Campbell sent an expedition to the top of Mount Whitney for the purpose of spectroscopically comparing the atmospheres of the moon and Mars, the object being to settle once and for all the mooted question of Martian water. Inasmuch as the moon has an atmosphere which if not non-existent is at least inappreciable, the comparison of its spectrum with that of Mars's atmosphere should prove conclusively whether or not there is any water on Mars. A telegram has been received at Harvard College Observatory from Prof. Campbell in which he states that together with Dr. Albrecht he compared the spectra of Mars and the moon and detected only a little water vapor on Mars. The bands which were measured were of equal intensity and very faint. A reply from Prof. Lowell will naturally be looked for with some interest. It will be remembered that Mr. Slipher of Prof. Lowell's staff has stated that he discovered spectroscopic evidence of water on Mars.

The common impression that the soils of the United States are wearing out and that the crop yields are on the decrease is declared to be erroneous by Prof. Milton Whitney, chief of the Bureau of Soils. The results of his investigation will be published in the next bulletin of the Department of Agriculture. In summing up, Prof. Whitney says that a careful study of the data appears to justify two conclusions—first, that the productivity of the newer agricultural soils of the United States is not decreasing. Individual farming deteriorates and soils wear out, but, as a whole, it seems probable that we are now producing more crops per acre than formerly. The cultivation of the land has been more intelligent, the principle of rotation of crops has been better observed, and, in latter years, a more careful use of fertilizers has been made. In addition, we must recognize the increase in farm animals and stock, the improvements in such by selection and breeding and the increased population which is forcing attention to more intensive methods of cultivation.

An effective method of freeing the air of rooms from dust and germs is especially desirable for primary schools, children's hospitals, surgical operating rooms and spinning mills. The method hitherto in use consists in supplying a current of air which has previously been purified, more or less completely. Richet has devised a simple method of purifying the air confined in a room by causing it to circulate continuously through an apparatus which retains the dust and microbes. The apparatus is simply an electric fan which revolves in a vertical cylinder and produces a current of nearly 2 cubic feet per second. Water, or some other liquid, drips from a 3-quart vessel, at the rate of 1 quart per hour, upon the blades of the fan, from which it is projected, by centrifugal force, in fine drops to the wall of the cylinder. The impurities of the upward blast of air are caught by the spray, which then trickles down the cylinder to a large basin in which the whole apparatus is set. Richet employed glycerin and soap solution, but the air can be purified very well by a spray of water alone. One hundred thousand microbes, estimated by the usual methods, were thus collected in three hours from the air of the laboratory. The dried organic matter collected in the same interval weighed about 1 grain, and the mineral matter ¼ grain. The same apparatus can evidently be employed for the chemical purification of the air by substituting appropriate solutions—cuprous chloride for the removal of carbon monoxide, potash or soda for carbon dioxide, etc.