

## ENGINEERING

Work on the last section of the Jungfrau railway has progressed so well during the recent summer, that it will probably be opened next year from Eismeer to Jungfrau Joch. A station at the former place has been hewn out of the solid rock at an altitude of 3,153 meters, capable of accommodating 200 persons.

Buenos Ayres, the name of which suggests palm trees and sunshine and the transaction of business with sub-tropical leisurely haste, is getting sufficiently busy to demand subways. A bill is pending in the Argentine Legislature to authorize the construction of underground electric railways operating in connection with existing surface lines.

The Wolsley Motor Car Company, leading makers of "all-British" automobiles, are giving special attention to aeroplane engines and have delivered several V-type 50-horse-power machines to intending aviators. These motors, although they weigh only 300 pounds, are claimed to be capable of delivering as high as 75 horse-power. One of them was recently installed in a new Voisin biplane.

The Austrian government appears to be divided upon the "Dreadnought" question, the proposed expenditure upon naval construction for next year having been reduced by \$5,000,000. A torpedo cruiser named "Admiral Spaun" will be launched about the end of this month, the first ship of the Austrian navy to be equipped with Parsons turbines, with an estimated speed of 26 knots.

It appears that the Siberian railroad is beginning to show the inevitable results of the haste and cheapness with which it was constructed. The sharp curves and heavy grading have put serious limitations upon traffic, and for great distances the reconstruction will involve an entirely new location. The road is to be changed from single to double track, and the officials are greatly regretting that the large and costly bridges were built to accommodate one track only. On the level plains the double tracking will not be such a serious matter; but in the heavy cuts of the mountain division, and where the steel bridges over the wide rivers will have to be rebuilt, the cost will be very high.

The rapid advance of aviation to the dignity of a science is indicated by the fact that the University of London has arranged for a special course on aeronautics, to be conducted by Mr. A. P. Thurston, one of Sir Hiram Maxim's engineers. It will consist of a series of lectures followed by drawing office practice in the design and construction of aeroplanes. The syllabus of the lectures is as follows: (1) The normal and inclined plane. (2) Stream-line surfaces, center of pressure and resistance of bodies. (3) The propeller and helicopter. (4) Calculations applied to a flying machine. (5) The biplane. (6) The monoplane. (7) Aeronautical engines. (8) Automatic stability and control. (9) Dirigible balloons.

During the past season the old, deep-keel, narrow-beam English cutter "Bloodhound" has been scoring some remarkable wins in races against cutters of the most modern design. Commenting on her performances, the Yachtsman of London says that opinion has been expressed that many present-day designers do not know their business, and adds: "Speaking for ourselves, we say without hesitation that they do not. . . . It is not by any means our purpose to eulogize the performances of the 'Bloodhound' unduly, but we repeat that there is something wonderful in the fact that a yacht so antiquated in shape was able to beat two modern cruisers of fifty per cent over her tonnage." Of course, the feat was performed in strong winds and under reduced canvas. It is in light weather that the modern yacht is so greatly the superior to the older craft.

Tests have recently been concluded by Messrs. Birstall and Monkhouse, of London, of a portable combined boiler and engine, the economy and efficiency of which are so remarkable that we shall hope to describe the tests more in detail either in the SCIENTIFIC AMERICAN or SUPPLEMENT in the near future, limitations of space preventing their adequate discussion at present. The engine is a so-called "locomobile," built by the Wolf Engineering Works of Magdeburg-Buckau, but it must not be confounded with the automobile of that name, as it is not strictly an automobile engine. It consists of a locomotive type boiler, from which the steam is conducted through a superheater in the smokebox directly to the high-pressure cylinder of the engine, which is tandem compound and mounted directly on the boiler under the same jacket, so that the cylinders are surrounded by the flue gases. Such is the heat economy effected by this arrangement, that this commercially constructed "stock" engine and boiler, adaptable to threshing, plowing, sawing, or any of the ordinary work of a portable engine, develops 1 brake horse-power with 1.05 pound of coal and 8.81 pounds of water. The efficiency is very little reduced by running the engine with 20 per cent above its economical load or 30 per cent below.

## ELECTRICITY

A contract has just been given by the Brazilian government to a French telegraph company to erect a wireless telegraph station on a small island 200 miles off the coast of Rio Grande do Norte, the easternmost point of South America. The island is 400 miles from Pernambuco. The station will have an operating radius of 1,000 miles. It will be connected by an auxiliary station at Pernambuco with the Brazilian telegraph system.

The city of Baltimore has adopted an ordinance which requires the testing of every electric meter by the Department of Lamps and Lighting, before the meter may be installed. A charge of ten cents is made for each inspection. Any consumer who is suspicious of his meter may have it examined by the department. A charge of \$1 is made for this service, which is borne by the consumer if the meter is registering properly, or by the company if the meter is found to be at fault.

The recent announcement of the British Welsbach Company that it has entered the electrical field, and is manufacturing metallic-filament electric lamps, has caused quite a stir in England. Many look upon this news as a blow to the gas business. Welsbach mantles have heretofore made it possible for gas to compete with electricity as an illuminant, but the fact that the Welsbach Company is taking up the manufacture of electric lamps would seem to indicate that the gas mantle cannot compete with the metallic-filament lamp.

Electric railways frequently require an extra supply of power owing to a holiday rush or some unusual event which crowds their cars to the utmost capacity. Some of the roads have built their own portable substations, consisting of cars provided with rotary converters or motor generators, transformers and switchboards. Recently one of the large electric manufacturing concerns has put out a stock portable substation of this type, which may be moved to any section of the line and made ready for use at a moment's notice by connecting it to the high-tension line.

The annual Electrical Show at Madison Square Garden which was brought to a close last week was notable for its decorations. Nearly 40,000 yards of orange and white bunting were used to decorate the building. The whole interior of the building was draped with bunting. There was a canopy ceiling which was divided into panels, and candelabra were hung from the intersections of the panels. Each candelabrum contained a cluster of twenty-two 25-watt tungsten lamps encircled with amber-colored 40-watt lamps. Six large chandeliers were placed over the center of the arena. These chandeliers were ten feet in diameter, made up of art glass. Altogether the effect was superior to that of any previous exhibition.

At the recent meeting of the International Association of Municipal Electricians, a resolution was adopted favoring the grounding of secondaries in alternating-current systems. The resolution calls attention to the fact that life and property have been destroyed from high voltages on alternating-current secondary systems, because of the failure of insulation between primary and secondary circuits, and that such dangers may be obviated by grounding the secondary, and it demands the enactment of legislation requiring all alternating-current secondary systems to be grounded, when by so doing the voltage between the earth and any part of the secondary systems will not exceed 250 volts.

A German investigator has found that the insulation resistance of coils made from bare aluminium wire depends upon the compression of the wire, and also on its thickness. The smaller the wire, the less its insulation resistance. This he thinks is due to the fact that the thick wires are soft, while thin wires are hard drawn. He also finds that the resistance is considerably reduced while the coils are wet. He therefore suggests that in making coils of bare aluminium wire, the windings should be separated by non-hygroscopic material. Before winding the coils, they should be wet, so as to oxidize the aluminium. After several days they should be dried in a vacuum, and lacquered.

The following method of impregnating field coils was recommended at the recent convention of the American Street and Interurban Engineering Association. The wire is insulated with asbestos, held in place by a cotton covering. The coil is wrapped with porous tape, and then placed in an air-tight chamber, and heated. The air in the kettle is exhausted, and when the proper vacuum has been obtained, melted asphaltum is permitted to flow in, after which air pressure is applied, forcing the material into the interstices of the coil. When the coil is nearly cool, it is brought to proper shape by means of clamping plates. When the clamps and tape are removed, the coil is covered with an insulation of varnished cambric.

## SCIENCE.

Evelyn Briggs Baldwin, the Arctic explorer, recently stated that he intended to make another trip to the Arctic and go on the ice drift over the apex of the earth and return between the east coast of Greenland and the west coast of Spitzbergen. It is a distance of two thousand miles, and as a progress of no more than two miles a day can be made, the journey will consume four years.

Certain minerals exhibit the curious optical property known as asterism. That is to say, they show a star-shaped figure when light is reflected from them or transmitted through them. This is seen, for example, in the star stone, a sort of sapphire, and in the star ruby. A note in Knowledge describes the asterism of mica. The photograph of a lamp flame taken through a plate of mica shows a six-rayed star, with six fainter radiations between. Outwardly star mica resembles the ordinary form, and shows the same phenomena under polarized light. When examined under the microscope, however, the star mica is found to contain fine needles of another mineral, and these are regularly arranged at angles of 120 deg. To these needles the star seen by transmitted light is due. Star mica has been found in the State of New York, and at Burgess Hill, Ontario.

Henry Gannett, chairman of the United States Geographic Board; Rear Admiral Colby M. Chester, U. S. N., formerly superintendent of the Naval Observatory; and O. H. Tittmann, superintendent of the United States Coast and Geodetic Survey, will compose the membership of the committee of the National Geographical Society which will pass on the records and proofs submitted by Robert E. Peary to substantiate his claim that he reached the North Pole on April 6th, 1909. At a meeting of the board of managers of the National Geographical Society on October 20th the records and observations furnished by Commander Peary were presented, and Mr. Gannett, who had previously been appointed chairman of the committee on polar research, named Admiral Chester and Mr. Tittmann as the other members of the committee to determine Commander Peary's claims.

In order to produce a cadmium spectrum of sufficient intensity for polarimetric work advantage is taken of the favorable properties of the silver-cadmium alloys, by Dr. T. Martin Lowry. On account of their isomorphism the two metals form an excellent series of alloys which are characterized by good mechanical properties and very high melting points. (An alloy with 60 per cent Cd melts as high as 700 deg. C.) In striking contrast to the behavior of the pure metal, the alloy gives a steady arc which can be kept true to center by rotating the electrodes in opposite directions. The spectrum shows the silver as well as the cadmium lines, but these are so far separated that even with a low resolving power the slit of a spectroscope can be opened to its full width without any overlapping of the brilliant "blocks" of light which take the place of the usual "lines."

Arrangements are being perfected in New York for the incorporation of the American Radium Institute, to be devoted to the treatment of cancer and similar diseases. The institute will be conducted much on the same plan as similar ones in Paris and London. The work will be divided into various sections, such as chemical, physical, medical, and botanical, with an expert in charge, and it is believed that for experiments the laboratories of the Rockefeller Institute will be available. Supplies of pitchblende for manufacture are to be drawn from Colorado and other Western localities, where the initial processes of extracting the radium will be conducted. It is announced that the institute is not in any sense commercial and that several of the scientists who are interested in it are not only giving their services free, but are contributing from their own means to the fund which will be required to establish the plant.

The observatory of Treptow has opened an international competition for the best photographs of the Leonid meteors taken from the car of a balloon between November 13th and November 16th, 1909. The developed plates should be sent to the observatory anonymously, but accompanied by a symbol which is repeated in a sealed envelope containing the place, date, and hour of exposure, the name and elevation of the balloon, names of constellations in which meteors have been observed, names of camera and lens, with focal length and aperture, and the length of exposure. The plates should reach the director of the observatory, Dr. F. S. Archenhold, before January 1st, 1910. The results of the competition will be published in the journal Das Weltall. Three prizes, consisting of a telescope and publications, are offered, but it is stipulated that the prize pictures shall become the property of the observatory. The competition would have a better prospect of success if all photographs of the Leonids had been admitted. Balloons are still so rare that it is quite possible that not a single plate will be submitted.