

ENGINEERING.

As an evidence of the thoroughness which marks the practice of the United States Steel Corporation, it may be mentioned that they are about to institute a new departure in steel works practice by establishing near Duquesne, Pa., a special bureau for scientific research. Systematic experimental work will be carried on in the laboratory which is to be built, with a view to improving the processes of steel manufacture as practised by the many constituent companies of the corporation.

In the recent opening of a new wireless post office station at Bolt Head, on the Devonshire coast, England, the postmaster general said that the principal objects in erecting the station were to carry out the obligations thrown on the post office by the radiograph convention of 1906, and to make sure that other parties to the convention live up to their obligations. The most important object, however, was to carry out the deliberate policy of the post office of preventing the growth of any form of monopoly in wireless telegraphy.

The Aeronautical Society of Great Britain has recently acquired a plot of experimental ground, which measures about one-half a mile square. Although the greater part of it is level, a certain section contains several steep mounds, about 50 feet in height, which are well adapted for experiments in gliding flight and the testing of new models. Ultimately, a well-equipped laboratory is to be erected, containing a whirling table and other experimental plant. The society is by no means a new one, having been in existence over fifty years.

The excavation of the New York State barge canal is being done on some sections by machines of unusual capacity. Conspicuous among these is a bridge conveyer, sometimes known as the grab machine. It consists essentially of a cantilever bridge, 428 feet in length and 90 feet in depth, supported on two traveling towers, and a grab bucket of truly Cyclopean dimensions operated from the cantilever. The bucket weighs 17 tons empty, and its jaws, when extended, are 20 feet apart, and measure 10 feet in width. The capacity of this huge maw is a dozen cubic yards or from 12 to 15 tons at each bite. The jaws crunch together with an ultimate closing power of 137 tons.

The Committee on Water Pollution of the Merchants' Association of New York city have submitted a plan for dealing with the sewage, which is at present causing intolerable conditions along the water front. It is proposed to pass all sewage through screens or catch basins, and all the ordinary flow through larger tanks, where over fifty per cent of the remaining solids will settle to the bottom. The sewage, as thus clarified, will be pumped overboard into the remaining section of the original sewer. The resulting deposits would be either pumped into tank steamers and carried twenty miles into the open sea; or passed through filter presses; or dried in rotary separators. The entire cost of the scheme would be about \$32,500,000.

A plan for a freight and passenger subway for Manhattan Island has been submitted to the Public Service Commission by Mr. McBean, who built the Lenox Avenue Subway tunnel beneath the Harlem River. The freight subway proposed by Mr. Wilgus, as illustrated in our recent Engineering Number, was designed for freight only. The McBean subway is designed to permit the entrance into Manhattan of both the freight and passenger trains of the railroads which terminate in Jersey City, and also to provide direct tunnel connection for the railroad systems which now enter New York from the north and for the Long Island trains. He proposes the construction of a union passenger station at Park Row, Cherry and Pearl Streets. Unlike the Wilgus plan, the tunnels would provide for the admission of full-sized freight cars to Manhattan, and the subways would also include a roadway 22 feet in width for automobiles and trucking. The total cost is estimated at \$130,000,000.

Prof. Boermel is the author of a design for an earthquake-proof building, the essential features of which are a massive foundation, consisting of a massive bowl upon which is placed a rocking foundation, the radius of whose curved bottom surface is somewhat less than that of the bowl. At its center is a half-spherical pivot, fitting into a cup bearing at the center of the foundation. Upon the rocking foundation is built the house or other desired construction. To prevent the movable portion from canting too freely, and to bring it back to the vertical position after the earthquake shock has passed, it is supported at eight points, near its periphery, by a series of spring buffers, which are bedded in the lower bowl-shaped foundation. The shock of an earthquake is transmitted to the building through the yielding springs, and its interior steel-frame structure is relied upon to take care of any remaining stresses that pass through the springs to the building itself.

AERONAUTICS.

On January 5th a U. S. patent was issued to the Wright brothers on a method of automatically curving the surfaces of a double horizontal rudder when the rudder is operated. The more the planes are inclined, the greater is the curvature (and hence the lifting effect) produced.

King Leopold of Belgium has offered \$5,000 for the best treatise on aeronautics to be brought out this year. In this connection it is interesting to note that the New York Public Library has issued a separate catalogue of the aeronautic works on file. There are no less than 556 books in this catalogue, which is very complete and contains nearly every aeronautical volume published up to the present.

The International Sporting Club of Monaco, France, is conducting a flight competition for aeroplanes from January 24th until March 24th for cash prizes amounting to \$20,000. Each machine is required to thrice make a flight across the bay and around Cape Martin and to return to the starting point. The total distance of this circuit is about 6 miles. One of the German automobile papers has already published a photograph showing a number of well-known aeroplanes in full flight over the bay. No aeroplanes of demonstrated ability have as yet been entered.

The French Minister of War has recently given out specifications for a new series of dirigible balloons. These specifications are as follows: Speed, 50 kilometers (31.05 miles) an hour to be maintained for 15 hours while carrying six passengers of a mean weight of 165 pounds each; total volume, 6,500 cubic meters (229,547½ cubic feet) as a maximum; total length, 90 meters (295.2 feet); height, 20 meters (65.6 feet); greatest diameter, 13 meters (42.64 feet). The test before acceptance must be made over a 310-mile circuit against a wind of 7 meters per second (15 miles an hour), and must be a continuous flight of 15 hours at an altitude which, for two-thirds of the time, must be greater than 1,300 meters (4,264 feet). The airship must pass over certain fixed points. It must be able to ascend to a height of 2,000 meters (6,560 feet) with safety. A prize of \$1,000 will be given to the competitor submitting the best plans, and smaller prizes to the other competitors.

The popular subscription for Count von Zeppelin, the inventor of the huge German airship, was closed on December 24th after a total amount of over \$1,500,000 had been raised. Since acquiring the remodeled third airship of the Count, the government has decided to order four new air craft of this type for naval use. Russia has a new dirigible of the von Parseval (German) semi-rigid type, but the first trials with it have not been very successful. Italy's military dirigible has been deflated until spring. Spain has slated an appropriation of 300,000 pesetas (\$58,500) for military aeronautics. And to cap all, the House of Representatives at Washington has just granted the total sum of \$500,000 asked for by our military authorities besides authorizing two new battleships. By the voting of medals to the Wright brothers last week the Senate as well showed an interest in aeronautics—an interest which, it is to be hoped, will be sustained when the aeronautic appropriation asked for comes to be voted upon.

Mr. James Gordon Bennett has offered to the Aero Club of France an aeronautic prize consisting of an International Aviation Cup for aeroplanes and all other heavier-than-air machines. The offer was made to the Aero Club through Count de la Vaulx and Mr. Cortlandt Field Bishop, and it was accepted with enthusiasm by the club. This new cup, which is valued at \$2,500, is to be transferred by the Aero Club to the International Aeronautic Federation, and the first contest will be held in France this year. Besides the cup, Mr. Bennett has given three prizes of \$5,000 each, which will be awarded during the first three annual events. The International Aeronautic Federation now has two international cups, one for spherical balloons and another for flying machines. This new event will be a long-distance contest upon a previously-determined course, either in a straight line, in a broken line, or in a closed circuit. The winner of the contest will be the one who covers the complete course in the shortest time. Each year, before the end of January, the International Federation is to draw up the rules of the annual event, based upon the progress made up to that time. The club which is charged with organizing the event is to conform to the programme elaborated by the Federation. From the outset, the event will be open to aeroplanes of all kinds, on condition that they can show previous experiments which are noteworthy and conclusive. The cup event may be held every year between May 1st and November 15th, and the date is to be fixed by the club holding the cup before the 1st of April. The event is to be held in the country of the winning club, and for the first year it will be held in France under the auspices of the Aero Club, which will receive the entries for the contest.

SCIENCE.

From Madrid comes the report of a shower of meteorites near Burgos on December 27th, 1908. Five of the meteorites, which set fire to a farmhouse, were collected. They were found to weigh from 2 to 11 pounds each, and to have a crystallized internal structure, while the surface was covered by the blade crust which is characteristic of meteorites and is produced by the partial fusion of the outer layer by the heat generated in traversing the earth's atmosphere.

In a communication to the French Academy of Medicine, Dr. Ménétrel reported on some clinical observations relating to the eradication of birthmarks by treatment with warm air (110 deg. to 120 deg. C.) He was accidentally led to the discovery of this method in treating a patient by hot applications for a refractory case of facial neuritis. In the course of this treatment he observed the discoloration of a birthmark on his patient. It has been previously observed that birthmarks yield to treatment with radium. This, however, must be used with great caution.

The water produced by the melting of glacier ice in summer flows down through crevasses to the bottom of the glacier and, forming a channel by erosion, emerges often as a large stream. In the Arctic regions these phenomena take place on a very large scale. The Danish expedition to the northeast coast of Greenland, conducted by Mylius and Erichsen, discovered and explored vast caverns thus formed by glacial streams. Some of these caves are 60 or 70 feet in height and more than a mile long. In winter the streams cease flowing but the caverns or tunnels remain ready to receive the streams of the following summer.

The Referee Board of Consulting Scientific Experts appointed by President Roosevelt to pass finally upon the pure food decisions of Dr. Harvey W. Wiley, Chief Chemist of the Department of Agriculture, has reversed the findings of Dr. Wiley, and given it as their opinion that benzoate of soda is not harmful to health. The findings are based on triple experiments, which were carried on over four months and which were very similar to those conducted by Dr. Wiley with his special "poison squad" of young men. The report is signed by President Ira Remsen, of Johns Hopkins University; Russell H. Chittenden, director of the Sheffield Scientific School of Yale University; John H. Long, professor of chemistry in the medical school of the Northwestern University; and C. H. Herter, professor of physiological chemistry in the College of Physicians and Surgeons, New York.

Bananas were first imported into Europe on a large scale from the Canary Islands. Until a few years ago they successfully met the competition of the Antilles and the coast of Africa. But a disease has spread in the banana cultures, and exportation has fallen off in alarming measure. As the banana figures prominently in the food of the town population of England, the British government appointed a commission to investigate the causes of the degeneration of this useful plant. According to the report of this commission, the planters have only themselves to blame; they have given the soil no rest for years past, nor practised any rotation of crops. Confident of the proverbial richness of their soil, they have applied no fertilizers. The enfeebled plants have fallen a prey to a disease known as *Cloesporium masarum*, which is gradually gaining a foothold in all plantations. The report closes with the observation that the disease is successfully fought by a proper application of fertilizer to the soil.

G. A. Haffner in German patent 201,976 claims a process for the manufacture of matches with invisible heads. Two methods are described. According to the first, the ends of the match stalks are roughened, placed in powdered sulphur, and heated to 120 deg. C. or more. According to the second method, the end of the match is treated with a mixture of nitro-hydrocarbons and stearin or paraffin or petroleum. Suitable igniting materials are then introduced into grooves or holes suitably prepared in the wood. These grooves may be impregnated with solutions, of which the one contains potassium chlorate or chromic acid, the other barium chlorate. In place of the chromic acid metallic salts may be used, such as nitrates, acetate, or organic nitro compounds. Their purpose is to prevent the efflorescence of the chlorates and to increase the sensitiveness of the match. The mass of the match-head consists of 100 parts potassium chlorate, with or without 20 parts of barium chlorate; 50 parts of a mass prepared by fusing together 30 parts of sulphur, 25 parts of powdered zinc, 15 parts potassium bichromate. To this is further added 10 parts of powdered glass, coloring matter, and a suitable quantity of water. The striking surface should be painted with a mixture of 15 parts dextrine, 1 part gum tragacanth, 25 parts hyposulphite of lead, 20 parts lead peroxide, 10 parts antimony trisulphide, 2 parts of glass, and 100 parts of water. To this mass 1 to 2 per cent of amorphous phosphorus may be added.