

THE NEW CROTON DAM.

The water supply of New York City is derived principally from the watershed of the Croton River. When it was selected, over fifty years ago, by the authorities, it was very doubtful if they fully realized its advantages and disadvantages, yet it is but fair to say that, in spite of all that has been done and said about it and all criticisms that have been levied upon it, it has done remarkably good service during the past, and may be relied upon in the future to supply water for many years to come.

Over the area represented by the watershed of this stream an enormous quantity of water falls during the year and billions of gallons, going absolutely to waste, pour torrentlike over the Croton dam at some seasons. Long ago the original Croton Lake formed by the old Croton dam proved inadequate for impounding water, and additions have been made from time to time in the establishment of other dams, of which a number now exist.

The water for the City of New York may now be said to be stored and impounded in a succession of steps. As representing the lowest of these steps, the city and Central Park reservoirs and the new Jerome Park reservoir may be cited. By means of the old and new aqueducts, these lower steps in the series connect with the next higher one, which is the original Croton Lake, and New York's water now comes from the identical lake created over fifty years ago by the small and almost insignificant masonry dam thrown across the line of the Croton River where it passes through a defile. The Croton Lake thus established is a long narrow body of water, riverlike in character and supplied by numerous tributaries of varying importance. Going up the course of this stream upon some of these branches, we find other steps in the series where further up the stream other dams have been recently constructed, each impounding its own body of water. In this way the highest storage level is reached and the Croton system will be seen to include a number of lakes or reservoirs, all tributaries of the main Croton Lake by the natural watercourses.

The storage capacity of the old lake is placed at about one thousand million of gallons. At a point on the line of the Croton River, about three and a half miles below the location of the present dam, work is now in progress on the erection of what is known as the new Croton dam, on the Cornell site, as it has been termed, and our illustration shows the present aspect of the work as now in progress.

In a preceding issue (SCIENTIFIC AMERICAN, July 9, 1892) we have illustrated the completed structure. This dam is the outcome of the proposed Quaker Bridge dam, the gigantic structure which it was proposed to establish further down the river, and will be one of the largest dams ever erected by man.

The principal portion extends directly across the stream, its southern section being of earthwork and the higher portion to the north being in masonry. The earthwork dam contains the usual rubble masonry core, with a 6 foot crest, which crest is 5 feet above the water level, though still below the summit of the earthwork. The masonry dam varies in width at the bottom according to its height, with a maximum height of 238 feet and a maximum width of 185 feet. It is established on a level bed prepared in the natural rock, with two ditches or cuts running its length to give it a better bite upon the rock, the masonry work being carried down into these cuts.

The spillway is quite peculiar in arrangement and forms one of the characteristic features of the dam. Starting at the bottom of the northern end of the dam, it rises in a series of steps parallel with the axis of the dam, by which about two-thirds of its height is reached. Here a platform or level area is established, and from it the remaining steps of the spillway rise, their faces being nearly at right angles in direction to the main axis of the dam. The top of the spillway is 24 feet below the level of the water. The gap formed by the spillway is to be crossed by a bridge. The dam is to be 1,200 feet long and the spillway will provide a crest of 1,000 feet in length for water to escape over. This provides a factor of safety adequate for inundations many times greater than could take place under any conceivable conditions. The steps of the spillway are about 4 feet in width and 5 feet in rise.

Across the dam and bridge, a private department road will be carried, 20 feet wide, leaving a margin of 5 feet on each side for necessary railing and coping. The new dam will increase the area of Croton Lake to 7,500 acres, with a capacity of 30,000,000,000 of gallons, submerging the present Croton dam and back of it Muscote dam, in what may be designated the upper levels of the water supply. As one of the objects of Muscote dam, which impounds 6,000,000,000 of gallons, is to maintain an even level of water to meet the desires of the inhabitants of the neighboring country, the net or available contents of the dam may be taken as 24,000,000,000 of gallons, or over two months' supply of water for the city of New York.

M. BERTHELOT, the celebrated French chemist, has received the Grand Cross of the Legion of Honor.

Contracts Awarded for Ten Torpedo Boats.

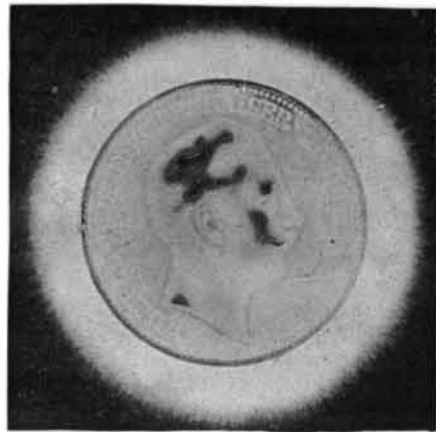
The contracts for the building of ten torpedo boats were awarded by Secretary Herbert on October 6. Four of these are to steam 20 knots an hour, three 22 knots, and three are to have the high speed of 30 knots an hour.

The amount appropriated for torpedo boats by the last Congress was \$1,300,000, and the number of new boats was limited to thirteen. The total cost of the authorized boats will be about \$1,100,000. Of the 30 knot boats, one, which is to be of 250 tons displacement, is awarded to the Union Iron Works, of San Francisco. The other two will be of 143 tons displacement and will be built by the Bath Iron Works, of Bath, Maine. Of the other boats, Baltimore gets one, Portland, Oregon, two, and the rest will be distributed among Eastern and Western bidders. The larger boats above mentioned are of the type known as torpedo catchers, their particular work being to overtake and sink the smaller torpedo boat proper. For this purpose they are given greater size and speed, and carry a considerable armament. The 143 ton boat will have four 1 pounder guns and the 240 ton boat six 6 pounder quick firers. It is not unlikely that they will surpass the contract speed, and by so doing prove themselves to be the fastest of their kind afloat.

PHOTOGRAPHY BY AN ELECTRIC DISCHARGE.

The discovery of Roentgen has given a remarkable impetus to electrical experimentation, especially when connected with photography. We have repeatedly given reproductions of radiographs and magnetographs. We now give a photograph produced by an electric discharge.

The subject is a German coin, and the picture was produced by an electric discharge from an induction coil, the coin having been placed on the sensitive plate and the contact having been formed by accident. We have had this experiment verified by actual trial, and



PHOTOGRAPH OF A COIN PRODUCED BY AN ELECTRIC DISCHARGE.

have found that by placing a coin upon a sensitive plate, the plate resting on a sheet of metal connected with one terminal of the coil, with the other terminal connected with the coin, a discharge of one or two seconds suffices to produce an image of the coin. Surrounding the image is a halo produced by the radial discharge.

Although images produced in this way are not new, we give this particular example on account of the completeness of the image.

Area and Population of Japan.

According to a Japanese journal, says the Journal of the Society of Arts, although it is recorded in history that the census of Japan was taken as early as 281, no figures then obtained remain on record. In the year 1720, the population numbered 26,065,422; in 1815, 25,622,000; in 1880, 35,929,000; in 1885, 37,869,000; and in 1893-94, although the exact figures are not known, it may be inferred from the rate of increase during the preceding two decades that the population of Japan at the end of the year 1894 could not have been much less than 42,000,000. As Formosa has been newly added to the Japanese territory by the treaty of peace, and more than 3,000,000 of people in Formosa have, in consequence, become Japanese subjects, the present population of the country is probably more than 45,000,000. The area of the new territory being 2,532 square ri (sq. ri = 5.9 square miles), the total area of the country, which was before the war 24,794 square ri, is now 27,326 square ri. Japan, in the extent of her territory compared with European countries, stands now next to Spain; being about equal to Sweden. She is larger than Great Britain and Ireland by 6,933 square ri, and is the eleventh largest country in the world. Her population is greater than that of France by 6,600,000, but less than that of Germany by 4,416,000. Compared with Great Britain and Ireland, she has 7,100,000 more people. In population, therefore, Japan ranks as the fifth power in the world.

Science Notes.

It has been decided to erect a statue of Jenner in Tokio, Japan.

Sir William Turner has estimated that a whale of 50 tons weight exerts 145 horse power in swimming at a rate of 12 miles an hour.

A submarine mountain range has been discovered in the southern part of Davis Strait by the Danish steamer Ingolf, which has been carrying on deep sea explorations on the Iceland and Greenland coasts for the past two years.

According to Nature, specimens of fireamp recently collected by M. Th. Schloesing, Jr., with suitable precautions, from many sources, all contained nitrogen, showing a notable amount of argon; the ratio of argon to nitrogen was, within the limits of experimental error, about the same as in air.

It appears that the specific heat of sulphur in the viscous state is distinctly higher than in the liquid state. M. J. Dussy has ascertained that if the total quantity of heat lost by one grain of sulphur in passing from a temperature T to 0° C. is plotted against the temperature, there is a distinct change of curvature at about 230° C.

A young man who had been used for about four weeks as an object for demonstrating X rays phenomena discovered to his surprise that his skin was peeling off at the places which had been exposed to the rays, causing sores in some places. He also began to lose his hair, and is now threatened with premature baldness. —Elektrotechnische Rundschau.

In a communication made by M. H. Moissan to the Academy of Sciences, Paris, the author stated that experiment had shown that the black diamond reduced to a very fine state of division, and heated in a stream of oxygen to a temperature of 200° Cent. below that of combustion of the diamond, gives off a very small amount of carbon dioxide, the diamond remaining transparent.

Herren Sarasin have recently explored the southeast arm of the island of Celebes in the Moluccas, and have discovered there two large lakes, Matanna and Towuti, at a height of 400 and 350 meters respectively above sea level. In the former a sounding of 480 meters was made without finding bottom. Remains of a prehistoric village built on piles, but now submerged, were discovered, the bronze and pottery found being very like that obtained in similar villages in Europe.

A disadvantage of the metric system, says the Observer, is found in the use of the Centigrade scale on the thermometer. Prof. H. A. Hazen points out that the degrees in this are twice too large, while weather records are complicated and filled with errors by having half the temperatures with minus signs before them. Prof. Hazen suggests that both the Centigrade and Fahrenheit scales have their zero point dropped to forty degrees below zero of the present scales. This would obviate the difficulty of the minus sign in meteorology, but the Fahrenheit degree would remain the better.

The preparations for the exploration of the South Polar regions by M. De Gerlache, a Belgian naval officer, are almost complete. The crew of the Belgica will be chiefly composed of Norwegian sailors and harpooners, but of the three officers holding responsible positions two are Belgians. Three Belgian scientific men have generously offered their co-operation and will accompany the expedition. Belgium does not furnish, however, a zoologist capable of taking deep sea soundings, and an appeal has been made in the scientific journals of England, France, and Germany for a competent man to supply the deficiency.

A paper on "The Important Relation of Plant Life to Photo-Chemical Climate," based on observations made at Vienna, Buitenzorg (Java) and Cairo, was recently presented to the Vienna Academy of Sciences by Prof. Wiesner. The measurements of the chemical intensity of light were made by a process corresponding in principle to the photographic method of Bunsen and Roscoe. The following, Nature says, are the principal results arrived at: (1) The greatest chemical intensity of light in Vienna amounted, in Bunsen-Roscoe units, to 1.500, and at Buitenzorg to 1.612. (2) The average ratio of the noon intensity to the daily maximum at Vienna was as 1:1.08, and at Buitenzorg as 1:1.22. (3) At Vienna the yearly noon intensity varied in the proportion of 1:2.14, and at Buitenzorg in the proportion of 1:1.24. (4) As a rule, the daily maximum at Vienna occurred about noon and at Buitenzorg in the late forenoon. This explains the relatively high maxima at Vienna and the relatively low maxima of Buitenzorg. In clear or uniformly cloudy weather the maximum occurred generally at noon at both places. (5) At Cairo a strong depression of the daily curve of intensity was observed at noon during a perfectly clear sky. This depression was also observed on rare occasions at Vienna, but to a smaller extent. (6) At Buitenzorg the chemical intensity of light was generally greater in the forenoon than in the afternoon. At Vienna this excess was greatest in June and July; the morning intensities were generally higher than the corresponding evening intensities, even when the sky was similarly clouded.