

Scientific American.

ESTABLISHED 1845

MUNN & CO., EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

TERMS FOR THE SCIENTIFIC AMERICAN.

(Established 1845.)

One copy, one year, for the U. S., Canada or Mexico... \$3.00
One copy, six months, for the U. S., Canada or Mexico... 1.50
One copy, one year, to any foreign country, postage prepaid, £0 15s. 6d. 4.00

The Scientific American Supplement

(Established 1876)

Is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for the U. S., Canada or Mexico. \$6.00 a year, or £1 4s. 8d., to foreign countries belonging to the Postal Union. Single copies 10 cents.

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NEW YORK, SATURDAY, AUGUST 28, 1897.

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THE RELATION OF THE BEET SUGAR FARM TO THE FACTORY.

In view of the widespread attention which is now certain to be given to the cultivation of the sugar beet, it is well to sound a note of warning with reference to one or two elementary facts, the neglect of which may bring much loss and disappointment to the well meaning but misguided husbandman. In the first place it must be remembered that there are many localities which are quite unsuited to sugar beet culture, and that these may occur within districts which are within the sugar belt, and are, generally speaking, well adapted to beet crops. It is therefore desirable that the farmer should make several tests in different parts of his farm before he commits himself to the hazard of a full crop. It will not be necessary to plant any considerable areas; small, detached patches will give him sufficient specimens to determine the value and quality of the crop. When it has been proved that his land is suitable, the next step is to ascertain the cost of delivering the beets to the nearest factory, and whether it is such as to allow beet farming to be carried on at a profit.

As there are only a few localities in the United States where beet sugar factories exist, it will be necessary to erect factories to receive and work up the crops, and it is in making the selection of sites that the greatest forethought and care must be exercised. The factory must be centrally located with regard to the beet-growing district, and at the same time it must, if possible, be situated upon a railroad or have connection through its own private side tracks. If the enterprise is to compete successfully with others, it should have the various materials of manufacture, such as limestone, fuel and water, within easy reach, and, of course, the nearer the factory is to the markets, the larger the net profits which will accrue to the farmer from his crop. It will be evident, from the recent description which we gave of the process of manufacture, that it requires a plentiful supply of water, fuel and limestone. If any or all of these have to be brought from a considerable distance, it can be seen that the profits of the undertaking will be seriously reduced. The necessity of rail connection is further evident when we bear in mind the large amount of residue in the shape of filtered cossettes. This is a valuable feed for cattle, and with reasonable transportation afforded it could be disposed of at profitable prices in the outlying country.

When it has been proved that the soil is suitable, that the materials of manufacture are near at hand, and that a market can be depended upon, any agricultural district may lay out its beet farms and build its own factory with a certain assurance that it will prove a profitable, and, what is better, a permanently profitable, investment both for capital and labor.

REPAIRS TO DRY DOCK NO. 3 AT THE BROOKLYN NAVY YARD.

Great interest attaches to the repairs which are being carried out on the new dry dock, known as No. 3, at the Brooklyn Navy Yard. Judged from the engineering standpoint, the problem is an entirely new one, and as there is no case just like it on record, the engineers will have to act entirely on their own initiative. For this reason the plans will, of course, be somewhat experimental and liable to modification as the work proceeds. In reply to our request for the detailed drawings of this work, the Assistant Secretary of the Navy, Mr. Theodore Roosevelt, informs us that the department does not wish to publish the drawings of the proposed work at the present stage, especially in view of the experimental nature of the work, as above referred to.

Dry dock No. 3, it will be remembered, is the one which subsequently to its opening developed a serious leak along one side near the entrance, which an examination by a diver showed to result from injury to the outside apron. The floor and sheet piling at the edge of the apron were found to be broken, and it was supposed that the dredge which was used in opening the entrance from the East River had struck the apron and injured it sufficiently to allow the entrance of water within the sheet piling. The depth of water (thirty feet) and the nature of the repairs rendered it impossible that the latter should be carried out under water, and accordingly the engineers are making provision for laying bare the bottom of the entrance for a distance of ninety feet back from the caisson gate. This will enable a thorough inspection to be made, not only of the broken apron but also of the side walls, back of the abutments, and of the various walls of wing piling which run out transversely to meet the great inclosing wall of sheet piling which encircles the whole dock. In carrying out this plan the engineers are building a massive cofferdam across the dock entrance, which will have sufficient strength to hold back the waters of the East River until the investigation and repairs are completed.

The cofferdam consists of three lines of heavy sheet piling, which extend in a curved form clear across the entrance from wall to wall. The inner wall will be about 90 feet from the caisson; 13 feet in front of this will be another wall, and 13 feet beyond this a third wall. The curve will, of course, be convex to the thrust of the water, to which it will present an arch effect,

though not much reliance will be placed upon the latter in estimating the strength of the dam. The three walls will be strongly braced in the direction of the thrust of the water, and the whole interior space will be filled to above the water line with carefully rammed puddled clay.

The dam will possess considerable strength on account of its arched form and the interior trussing, and it will be further reinforced and rendered watertight by two embankments of clay and gravel, which will start at the water line and slope away to the bed of the river on the river side of the entrance, and on the inner side will finish against a fourth wall of sheet piling, which will be driven across the entrance about 30 feet from the toe of the apron. In making a junction with the sides of the entrance it has been necessary to cut into the concrete walls (which are carried upon piling), so as to allow the sheet piling of the cofferdam to be driven up to a snug connection with the sheet piling of the entrance.

From the above general description, it will be seen that in cross section the proposed cofferdam is not unlike the familiar earth dam used in reservoir construction. When it is completed and the water has been pumped out of the dock, a full examination can be made of the origin and extent of the leak.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

BY MARCUS BENJAMIN, PH.D.

The forty-sixth meeting of the American Association for the Advancement of Science was held in Detroit, Mich., during the week beginning with August 9. The sessions were held in the beautiful building of the Central High School, which occupies an entire square, facing Cass Avenue, between Hancock and Warren Avenues, and it is safe to say that at no recent meeting of the association have any such commodious and delightful quarters been assigned to it. The first general session was convened at 10 o'clock in the morning of August 9, in the auditorium of the high school, when the association was called to order by Secretary Putnam, who presented Dr. Theodore Gill, the senior vice-president, who had succeeded to the presidency in consequence of the death of Prof. Cope. Dr. Gill declared the meeting opened and introduced Mr. W. J. McGee, who, as senior vice-president, would occupy the chair, on account of the inability of Dr. Wolcott Gibbs to be present. An invocation was made by the Rev. Frank J. Van Antwerp, and appropriate addresses of welcome were made by the Hon. William C. Maybury, Mayor of Detroit, and the Hon. Thomas W. Palmer, former United States Senator from Michigan, who aptly defined science as "the classification of phenomena to the end that principles may be established and declared, from which may be deduced rules of action that shall be applicable to particular cases."

To these words of welcome Mr. McGee made a pleasing rejoinder, after which formal announcements of important matters were presented by the permanent secretary and the local secretary. The general session then adjourned and the sections assembled for organization. This effected, the members separated for luncheon, but later in the afternoon gathered again to hear the vice-presidential addresses.

The presiding officer of the section on mathematics and astronomy was Prof. Wooster W. Beman, of the University of Michigan, Ann Arbor, who spoke on "A Chapter in the History of Mathematics." This address was a sketch of the development of the geometric treatment of the imaginary, particularly in the latter part of the eighteenth and the first part of the nineteenth centuries. The speaker referred, in opening, to the fact that the square root of a negative quantity appeared for the first time in the Stereometria of Heron of Alexandria, B. C. 100. From this date the development of the use of the square root applied to a negative number was briefly traced through several centuries, accompanied by quotations and arguments from the various writers who attempted the problem.

Section B, on physics, was ably presided over by Prof. Carl Barus, of Brown University, Providence, R. I., whose address was on "Long Range Temperature and Pressure Variables in Physics." The first part of his address contained a history of the various attempts to provide suitable apparatus for high temperature measurement. He then considered the applications of pyrometry, referring at great length to the variation of metallic ebullition with pressure. Results already attained show an effect of pressure regularly more marked as the normal boiling point is higher. Igneous fusion was considered in its relation to pressure and with regard to the solidity of the earth. The question of heat conduction was taken up, and the results deduced by various writers as to the age of the earth discussed. High pressure measurement was dealt with. Passing from this subject, the entropy of liquids was considered. This subject of the heat produced by sudden compression of liquids is in its infancy, and only a year ago were any results of a satisfactory nature obtained. The paper ended with a reference to isothermals and several kindred subjects, all of them slightly dwelt on. The section on chemistry was presided over by Prof.