SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845) ..... $3.00 a year
Scientific American Supplement (Established 1876) ..... 5.00 "
Scientific American Building Monthly (Established 1885) ..... 2.50 "
Scientific American Export Edition (Established 1878) ..... 3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, FEBRUARY 11, 1905.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

CLOSING OF THE CROTON DAM.

The Croton Dam, which in some respects is the most notable among the large storage reservoirs of the world, was closed at 2 P. M. on January 28, by the shutting down of the gates controlling the two four-foot pipes, through which the Croton River had been flowing through the dam during the last few weeks of construction. Although the whole length of the dam has not been carried up to its full height, it is so far completed that by no possibility can the water rise at such a speed as to overtake the progress of the masonry to the level of the crest of the spillway. The incompleted portion is at the southerly end of the dam, and represents that section which was originally designed to be built of earth with a central core wall. The task of pulling down this portion of the dam and rebuilding it to conform to the solid masonry section has been carried through with great expedition under the present Chief Engineer, Mr. J. Waldo Smith, new methods of building the masonry having been employed, which have resulted in the bringing of this greatly-delayed work rapidly to its final completion. It will not take many months to fill the great reservoir to its full level, when there will be a depth of 160 feet of water at the dam itself. The lake thus formed will back up the Croton Valley for a distance of over 15 miles, and will present a shore circumference of 70 miles. When the reservoir is full, the water will rise over 30 feet above the crest of the old Croton Dam farther up the valley, and the total amount of water impounded will be 32,000,000,000 gallons. If the rainfall of the next few months should be normal, there will be about 4,500,000,000 gallons excess of inflow into the dam per month above the amount drawn off monthly by the aqueduct for the use of New York city.

VALUE OF THE TOWING TANK.

We do not suppose that even the most consistent follower of the old rule-of-thumb methods of ship modeling doubts any longer the value of the experimental towing tank or model basin, in determining the best under-water form of ships. Perhaps the only occasion on which model tank data has proved deceptive was that of the famous yacht races between the "Columbia" and "Shamrock II." Mr. Watson, it will be remembered, designed the "Shamrock" largely upon results obtained in towing a large number of models of varying form in the tank of the Denny shipyard. Mr. Herreshoff made no use of tank experiments, and great expectations were based upon the more scientific method that was supposed to have characterized the design of the challenging yacht of that year. The first attempted race was indecisive; but "Columbia" pulled out such a long lead that she seemed to have established, thus early in the contests, a pronounced superiority over "Shamrock." Rumor has it that as Mr. Watson was contemplating, somewhat thoughtfully, the rapidly-widening distance between the two boats, a friend asked him what he thought of the prospects; to which he replied, "I wish that Mr. Herreshoff had a tank." The story is good enough to be true; at least as applied to yachting. The work that is being done at the model basin at Washington is spoken of in strong terms of approval by the Chief of the Bureau of Construction and Repair in his annual report. As an instance of the great value of these experiments to our navy, it may be mentioned that the Chief Constructor states that in the preparation of the design of the new scouts, of which we give an illustration on another page, the information obtained from the model basin was invaluable; since for such vessels, not only the shape, but the length for a given speed, is a matter of great importance. Thus it was found that a scout of 4,000 tons displacement, 350 feet in length, required, in order to make 26 knots, more than double the horsepower of a vessel of the same displacement, but made narrower and shallower, and stretched to 450 feet in length. There is absolutely no method known by which such information can be obtained except through the model basin; and without it, the Bureau would be working largely in the dark concerning the majority of the problems of resistance and propulsion which require solution in the course of its work.

GROWING INTEREST IN FOREST PRESERVATION.

All of us who are concerned at the reckless way in which the magnificent forests of the United States are being cut down by the lumberman's ax, or burned up by forest fires, started by the carelessness of the settler and the hunter, will be pleased to take note that the National Forest Congress recently held at Washington, D. C., was attended by over eight hundred delegates, representing all sections of the country. It has taken time to stir the public up to an appreciation of the magnitude of this question; but it certainly does look as though we had reached, at last, a point where the public conscience has been thoroughly aroused, and the parties who are more particularly and immediately interested in the question are throwing their interest and powerful influence into the scale. Evidence of this was seen in the fact that leading railway officials, well-known lumbermen, managers of mines, and cattlemen and farmers were present in large numbers at the congress. This is as it should be. Time was when the interest in forest preservation was confined to people who had no practical connection with forestry, and were, therefore, drawn to the subject more by sentimental and philanthropic motives than by those of a practical character. At the recent congress, however, the most severe denunciation of forest spoliation came from the men who are interested in the preservation of our forests for practical and personal reasons.

STRENGTH OF PRESERVED TIMBER.

The increasing use of timber, that has been subjected to chemical treatment to preserve it against fire or decay, has led the Bureau of Forestry to make a series of tests for determining the effect which the fireproofing and preservative processes have upon the strength of the timber. Although these are not the first tests of the kind to be made, they are the first in which an effort has been made to determine how much the decrease in strength was due to the preliminary steaming process to which the material is subjected, and how much to the subsequent impregnation with creosote or preservative salts. For carrying out these tests, the Bureau put up a complete plant at the St. Louis Exposition, and the preliminary statement of the results which has appeared will have great interest for all workers in wood, whether in the large pieces used by the bridge and house builder, or in other structural work of a lighter character. Briefly stated, the method adopted was to use an 11-foot timber, which was first subjected to the preliminary steaming. Three-foot sections were then cut from each end, and the remaining 8 feet was treated with the preservative. Test pieces were then taken from the 3-foot steamed sections and the 8-foot steamed and preserved section for comparative tests. It was found that the steaming process diminished the strength of the timber in about direct proportion to the length of time that the steam was applied. There was a diminution of strength of 10 per cent when a pressure of 20 pounds was applied to the timber for four hours, and a diminution of strength of 25 per cent after a 20-pound pressure had been applied for ten hours, the variety of timber employed for the test being green "loblolly" pine. When a steam pressure of 50 pounds to the square inch was applied for four hours, there was diminution of strength of 25 per cent. Every worker in wood that is subjected to structural stresses will agree with the finding of the test committee when it states that it is well to avoid, if possible, the use of these preliminary steaming operations in the wood-preserving industry.

The tests further proved that the loss of strength is to be charged solely to the steaming, and not to the preservatives themselves. Thus, the strength of timber treated with a 2½ per cent solution of zinc chloride, subsequent to the steaming of the timber, proved to be the same as that of the steamed but untreated timber; and the same result was obtained with timber treated with an 8 per cent solution. The treatment with creosote has about the same weakening effect upon the timber as if it were treated with the same amount of water. In other words, creosoted and green timber have about the same strength; but with this important difference, that green timber gains strength as it seasons, whereas the creosote remains liquid in the timber. This has been proved by the analysis of a thirty-five-year-old creosoted pile.

A DESIGN FOR TURBINE CRUISERS.

The former Chief Constructor of the United States Navy, who is now the president of a large shipbuilding company, recently put in a bid for a 14,000-ton armored cruiser equipped with turbines. The proposition will attract worldwide attention, both because of the fact that it is made by the man who, more than any other, is responsible for the designs of the new United States navy, and also because of the daring nature of the proposition. Hitherto the largest warship to which the steam turbine has been applied is the "Amethyst," a 3,000-ton cruiser of the British navy. Mr. Bowles has always shown a disposition to be conservative rather than radical, in the matter of new design, and it is very significant that he should have been so perfectly satisfied with the performance of the new type of engine, as to be willing to commit his company to the venture of installing it on a big warship, whose estimated cost was over four million dollars. Furthermore, the faith of that growing school of naval architects and engineers who believe that the turbine is the coming motive power in all classes of ships except those that are intended to travel at very low speed, has received a strong indorsement in the comparative steam trials of the turbine-driven "Amethyst" and the sister ships of the same class, driven by reciprocating engines, a full account of which was given recently in our editorial columns. It will be remembered that, for speeds above 14 knots, the turbine showed a superior economy that increased with the increase in speed, and that with improvements to be made in the condensers of the turbine, and by leading the exhaust of the auxiliaries into the low-pressure receiver instead of into the condenser, the turbine-driven vessel is expected to show economy equal to that of the reciprocating-engine ship, at speeds considerably lower than 14 knots an hour. Incidentally, it is interesting to note that Mr. Bowles, who designed the armored cruisers "Tennessee" and "Washington," on which the "Montana" and "North Carolina" are an improvement, submitted an entirely different plan for the location of the secondary battery. The change consists in raising eight of the twelve guns on the gun deck to the level of the main deck, where they are mounted, together with the four guns originally carried on this deck, in pairs in six turrets, thereby increasing the command of these guns from 14 feet 6 inches to 23 feet above the waterline. The weight saved by the installation of turbines, moreover, is allocated to the side armor, the thickness of the main armor belt being increased from 5 to 6 inches. This last improvement remedies what we have always considered to be quite a serious defect in the design of the armored cruisers of this class.

OPENING OF DINOSAUR HALL OF THE AMERICAN MUSEUM OF NATURAL HISTORY.

Eight years ago the American Museum of Natural History of New York city began a search for fossil reptiles in the Rocky Mountain States. The prime object of the search was to obtain skeletons of the Dinosaurs, those gigantic extinct animals whose fragmentary remains, discovered in that region and studied and described especially by the late Prof. Marsh, have excited the greatest interest among men of science. In order to place these marvels of an antique world before the public in tangible form, a Dinosaur Hall was planned, in which should be exhibited mounted skeletons of the principal kinds of these creatures. To obtain them, a series of expeditions into the regions of the arid West, where such fossils are to be found, was inaugurated and carried on under direction of Prof. Henry Fairfield Osborn, and the collections of the late Prof. Cope, containing three splendid skeletons of Dinosaurs, were purchased through the liberality of President Jesup.

This programme involved an amount of work hardly to be appreciated by outsiders, and it is yet far from complete. Nevertheless, the mounting of the largest skeleton, the Amphibious Dinosaur *Brontosaurus*, has been completed, the skeleton of a remarkable dwarf Dinosaur, the "Bird-Catcher," has been mounted and placed on exhibition, the preparation and mounting of complete skeletons of three other large and very extraordinary types (the Carnivorous, Duck-billed and Plated Dinosaurs) are well under way, and diligent search is being made for complete and mountable skeletons of other important kinds. Many other less complete specimens have been found, some of which are exhibited in the wall-cases around the hall.

The Dinosaur Hall will be opened to the public on February 16, 1905. The chief interest, of course, centers in the giant mounted skeleton of the above-mentioned *Brontosaurus*. In this hall visitors may see the largest fossil skeleton that has ever been mounted, and besides may obtain some idea of the variety and extraordinary character of the animals which populated the earth during the age of reptiles, millions of years ago, before the age of mammals had begun or the various races of quadrupeds which inhabit the world commenced their evolution.

In the issue of January 21, 1905, the SCIENTIFIC AMERICAN published an account of the mounting of the *Brontosaurus;* a few additional facts at this time may be of interest to the reader.

It will be remembered that the collection, preparation, and mounting of this enormous fossil has been a