THE MASTODON AT THE BROOKLYN INSTITUTE MUSEUM.

BY PROF. ALFRED G. MAYER.

During the summer of 1899 a skeleton of *Mastodon giganteus* was found upon the farm of Frederick W. Schaeffer, at Newburg, N. Y. This skeleton was purchased by members of the board of trustees of the Brooklyn Institute Museum, and is now mounted and on public exhibition at the Museum building, on Eastern Parkway, Brooklyn.

The skeleton is almost complete, so far as the trunk is concerned, but most of the leg-bones were not found. These have been replaced in plaster or from other mastodon bones.

The skeleton was found about four to six feet below the surface, lying upon the clay bottom of what had been a small pool of water. After the death of the mastodon this pool became partially filled with a layer of peat, having a maximum thickness of about three and one-half feet. Numerous sticks gnawed by beavers were found scattered through this peat, showing that the beavers had lived there long after the death of the mastodon. The peat was covered with a layer of clay and of black loam about two and a half feet in thickness.

There is some reason to suppose that the Brooklyn mastodon died long after the glacial period, but a careful examination of the locality must be carried out by some competent physiographical geologist before any statement to this effect can be made with certainty. The Brooklyn mastodon was an adult individual, and is peculiar in that the tusks curve upward and inward, their outer points being not more than eight inches apart.

In most mastodon skeletons it will be remembered that the tusks bend outward. There are no traces of tusks having been present in the lower jaw. Such tusks are seen in young mastodons, but they were shed at maturity by the females and occasionally replaced by a permanent tusk on the left side in the males.

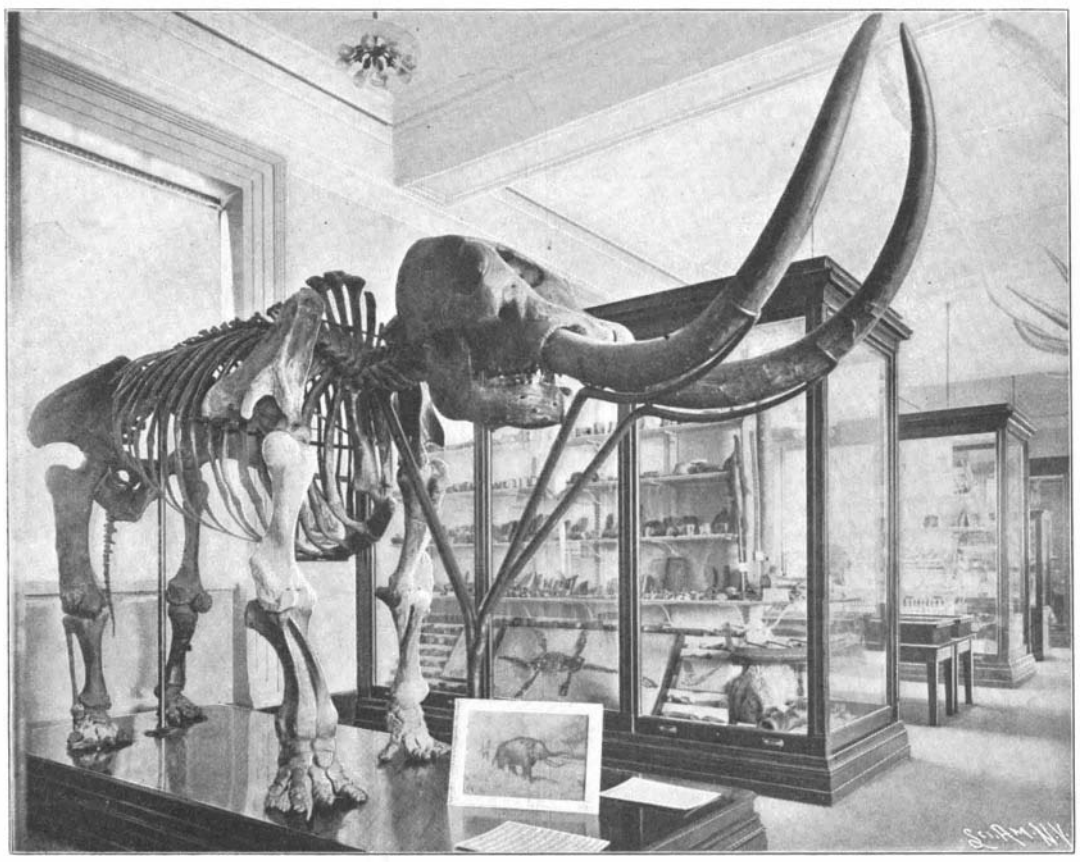
The mastodon was common from Mid-Tertiary times until near the close of the glacial epoch, over the United States, from the Gulf of Mexico northward and from the west banks of the Hudson River to the Mississippi Valley.

It was rare to the eastward of the Hudson, and this river probably proved a barrier to its migrations.

Several good skeletons have been found at Newburg, where they appear to have become mired in soft swampy ground. There is reason to believe that the animal fed upon the twigs and leaves of trees, for half-digested spruce twigs were found in the midst of the ribs of one of the Newburg mastodons.

The mastodon probably presented the appearance of a huge hairy elephant having remarkably long, massive tusks. Although we have no direct evidence, there is some reason to believe that man coexisted with the mastodon in North America.

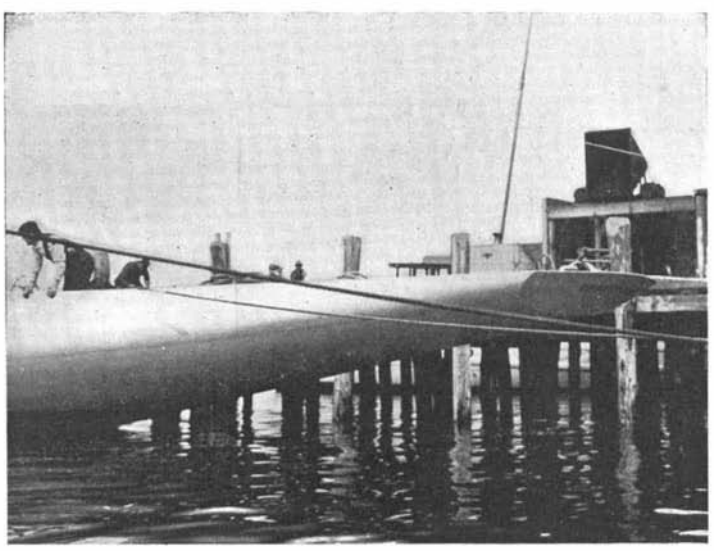
The mammoth (*Elephas primigenius*) lived in North America at the time of the mastodon and probably survived long after the latter disappeared. It is certain that prehistoric man hunted the mammoth in Europe, for numerous remains of carved mammoth bones are found in the caverns of the Vézère and at other places in France. Among these is a rude drawing of the mammoth executed upon a slab of mammoth ivory.



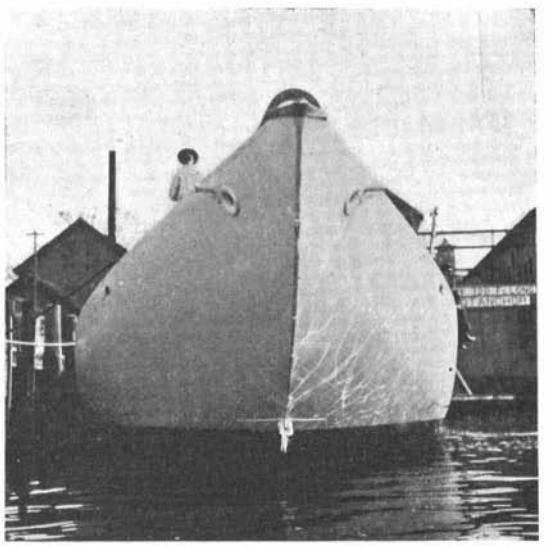
THE MASTODON AT THE BROOKLYN INSTITUTE MUSEUM.

LAUNCH OF THE "CONSTITUTION."

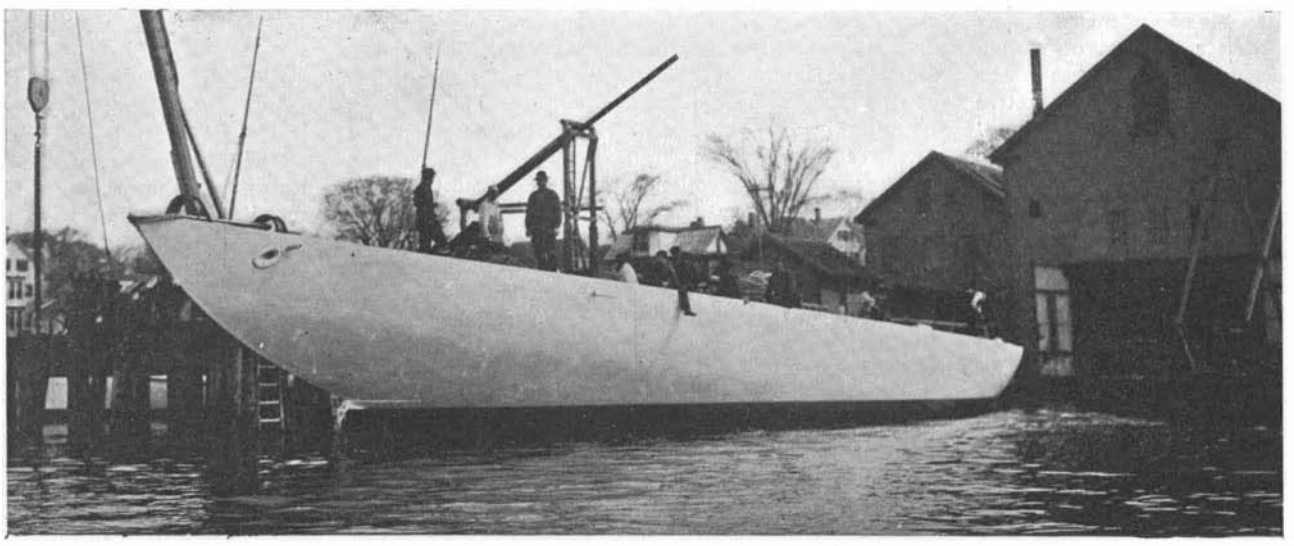
The accompanying photographs, which were taken the day after the launch of the "Constitution," are instructive as showing the difference between "Constitution" and "Columbia," at least in that portion of the two boats that shows above the water-line. In our last issue we gave full plans of the construction of the new boat, and stated that the chief difference would lie in the saving of weight in the hull of the boat, due to the adoption of an entirely novel system of framing, and in an increase of beam by exactly one foot. The dimensions of the "Constitution" are: Length over all, 132 feet 6 inches; beam, 25 feet 2½ inches; draft on normal displacement, 19 feet 10 inches, at which draft the water-line length will be 89 feet 9 inches. In a comparison with the "Independence," which may be taken as representing the most up-to-date construction of the conventional type, it was shown that the longitudinal framing adopted in "Constitution" has resulted in the reduction of the total weight of the plating from 30 tons in "Independence" to 22 tons in the Herreshoff boat. There is also a saving as compared with "Columbia" due to the substitution of a plate-steel deck covered with cork tiling for the relatively heavy wooden deck used in "Columbia." Against this reduction of weights is to be put the fact that the sail-plan of the new boat has been increased by 10 per cent over that of "Columbia," which means that the spars and rigging must be proportionately stronger and heavier, and that the weight of 1,300 square yards of extra canvas must also be added in. The extra weight due to this increased sail spread, moreover, is carried at an average height of 40 or 50 feet above the deck and, therefore, will offset some of the weight saved in the hull plating and deck. Moreover, the body of the boat is larger, and this again will offset some of the weight saved. But even after all is said and done, it is probable that although "Constitution" is a larger and far more powerful boat, her displacement will be about the same as that of "Columbia." The photographs show at once that there is much more boat above the water, her freeboard being from 9 inches to a foot greater than that of her predecessor; in fact, she has such high topsides as to be suggestive in this respect of "Shamrock II." The tumble-home which was so marked in "Columbia" is less noticeable in the new boat. The bow is very lofty and its sections are more round and full, giving the boat a more seaworthy appearance, and suggesting that she ought to make splendid weather of it when thrashing her way to the weather mark against a strong breeze and a lumpy sea. The quarters and stern appear to be deeper than those of "Columbia," and when she heels, "Constitution" will derive not a little sail-carrying power from the modeling of these long and powerful quarters. At the same time we think that, from an artistic point of view, she is scarcely as beautiful a boat as "Columbia," although she will doubtless beat that boat by from 5 to 10 minutes, according to the state of the wind and sea.



THE PORT QUARTER



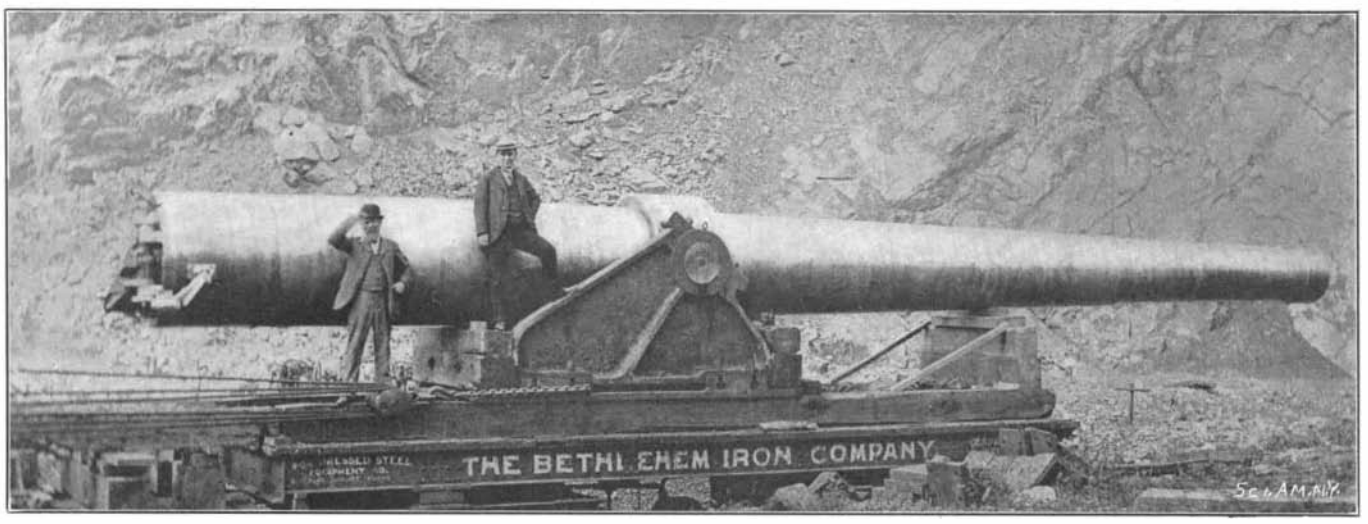
BOW VIEW.



"CONSTITUTION" THE DAY AFTER THE LAUNCH.

Mr. Charles Davison, a well-known authority on Seismology, contributes an article on "The Progress of Seismology During the Nineteenth Century" to Knowledge. The following is a short extract: "Changes in the amplitude, period and direction of earthquake-vibrations are readily distinguished without instrumental aid; but seismographs have done more than merely add precision to the evidence of our senses. They have rendered manifest features of the earthquake-motion that would otherwise have passed unnoticed. Still more interesting are the revelations of the horizontal pendulum with regard to the pulsa-

tions of distant earthquakes. By the disturbance of magnetographs, levels, or lakes, the propagation of surface undulations to immense distances had been known for more than a century. For the fuller knowledge gained during the last twelve years, we are indebted to the late von Rebuer-Paschwitz and those upon whom his mantle has fallen—Prof. Milne, Dr. Agamennone, Mr. Oldham and others. Much still remains to be learnt in this fascinating field of inquiry, but it is no slight feat to have proved that, in an earthquake, two series of elastic waves traverse the body of the earth with velocities of not less than 9 and 5 1-3 kilometers per second respectively; while the slow-period undulations spread over the surface at the rate of 3 kilometers per second, the latter having been traced to distances of more than four-fifths of the earth's circumference. It is an achievement worthy of the last years of the century. While the more obvious earthquake phenomena were well known fifty years ago, closer study has revealed others of equal importance. Statistical inquiries have proved that earthquakes are far more numerous than was formerly supposed, the most modern estimate being that one takes place on an average every half-hour."



THE 18-INCH GATHMANN GUN, MOUNTED ON PROOF CARRIAGE.

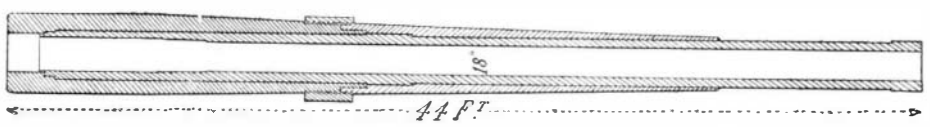


DIAGRAM SHOWING CONSTRUCTIVE FEATURES.

GATHMANN 18-INCH TORPEDO GUN.

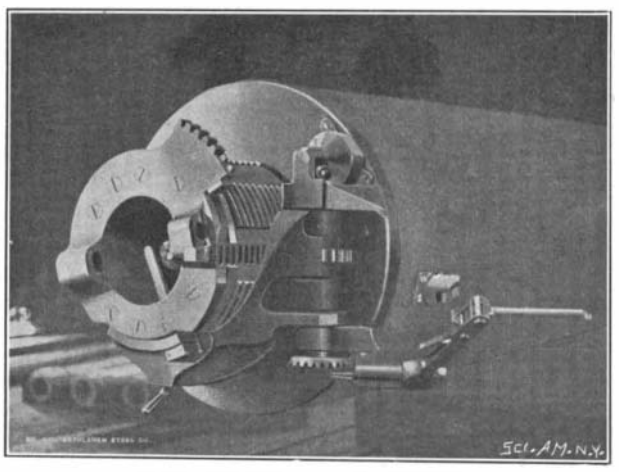
BY EMIL GATHMANN.

The Gathmann 18-inch gun which was recently completed at the Bethlehem Iron Works is essentially a torpedo or high-explosive, shell-throwing weapon. This is the reason for making the gun of so large a bore, as shells containing enormous explosive charges are to be thrown therefrom. The following are particulars of construction and ballistic data, as obtained at recent proof firing at the Bethlehem Proving Grounds, Reading, Pennsylvania.

Total weight	59.6 tons
Total length	44 feet
Diameter over chamber	45 inches
Thickness over powder chamber	13¼ inches
Max. tang. resistance, square inch	40,300 pounds
Max. rad. resistance, square inch	38,500 pounds
Rifling, Gathmann type.	
Twist	Zero to 1 in 25
Powder charge	310 pounds
Gathmann type of rod.	
Projectile	1,800 pounds
Explosive charge of projectile	630 pounds
Pressure in powder chamber	20,000 pounds
Muzzle velocity, expected	2,100 foot seconds

The mean of eight proof rounds fired is as follows: Projectile, 2,000 pounds; powder, 300 pounds; muzzle velocity, 1,900 feet; pressure, 19,000 pounds. From these data it will be seen that with the Gathmann regular 18-inch torpedo shell carrying 600 pounds of desensitized guncotton, total weight only 1,800 pounds, a velocity of about 2,100 foot seconds can be expected with about 20,000 pounds maximum chamber pressure when Gathmann form of powder is used. This will give quite a flat trajectory to any range at which modern ordnance is likely to be employed, and an extreme range equal to that of any service gun. The total energy of impact of an 1,800-pound solid shot at this velocity will be some 55,000 foot tons, which is much greater than can be obtained from the navy's new 12-inch 40-caliber rifle with its 850-pound projectile at 3,000 feet muzzle velocity. The smashing effect of the 1,800-pound shot would certainly be very great. When a Gathmann 18-inch aerial torpedo, carrying over 600 pounds of high explosive, impacts against the target, the striking energy will be truly enormous. The writer has calculated, and Lieut. Meigs, Ordnance Engineer of the Bethlehem Steel Company, agrees thereto, that some half million of foot tons energy will result therefrom.

THE BREECH OPENED.

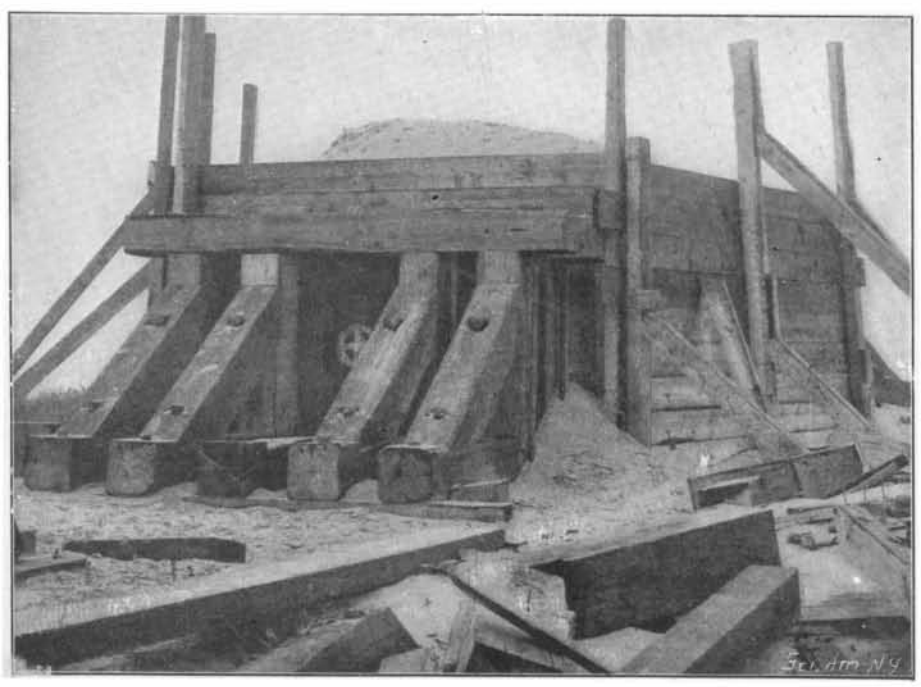


BREECH-BLOCK WITHDRAWN.

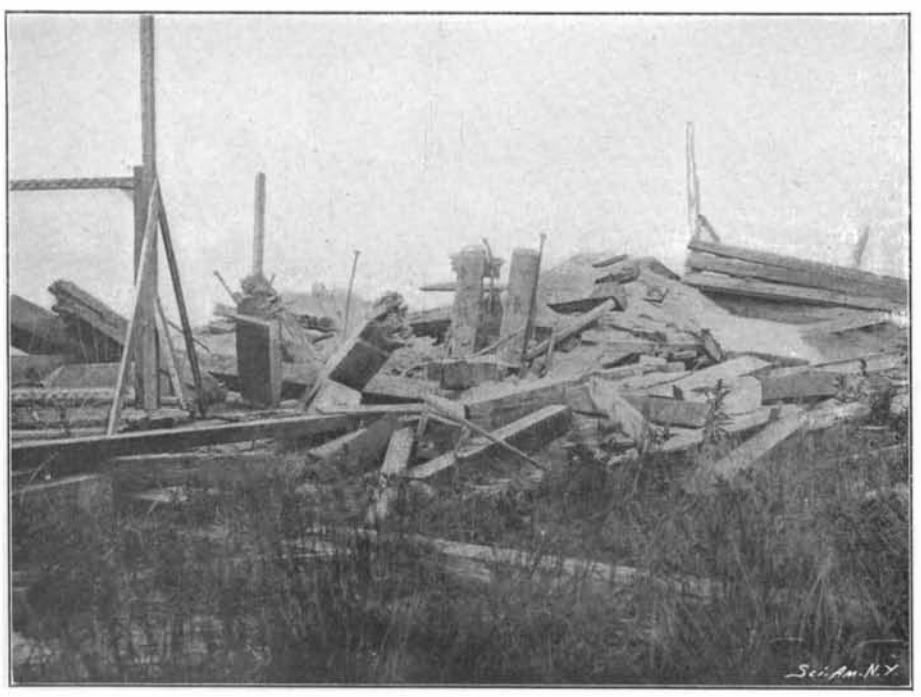
In reply to the experts who tell us that the effects on heavy armor plates of the torpedo shell will be nil, it may be said that from tests already made with 12-inch torpedo shells fired from army 12-inch rifles at high velocity (2,000 foot seconds and over) carrying a charge of from 140 to 200 pounds of wet guncotton, it has been determined that a forward direction is always given to the explosive wave when the torpedo is detonated by a base fuse. Armor plates of 10 and 12 inches in thickness, together with their entire backing, were repeatedly destroyed, or in fitter language entirely obliterated, as can be seen by the official photographs. To determine the effect of very large charges of high explosives against the heaviest of armor plates, a wooden box containing 500 pounds of guncotton compressed in cakes was suspended and placed in contact with the vertical and convex face of a large Harveyized armor plate, 17 inches thick and 8 by 10 feet section. Upon detonation of charge the plate was smashed to fragments and the supporting structure entirely demolished. To obtain full force of any high explosive upon armor plate or other strong structures (that is, to utilize energy in doing disruptive work) it is necessary that explosives be in a very close contact with objects attacked. With the torpedo shell invented by Mr. Louis Gathmann, this condition of close contact of explosive charge with target against which it is impacted is realized. The safety detonator and base fuse devices, the joint inventions of Mr. Louis Gathmann and of the writer, insure with certainty the safe delivery of torpedo from bore of gun, and the detonation of the explosive charge upon impact of torpedo with any resisting target.

The problems connected with the building of the large caliber guns which are needed in this system of ordnance (18 inches in this instance) are principally those well known in the practice of modern ordnance construction and design. Nevertheless numerous new features have been incorporated in the 18-inch Gathmann gun which have proven of great value in actual trial.

A few words more to explain just what is meant by the Gathmann system. The problem has not been one of devising ways and means to get the high explosive out of the gun gently, for desensitized gun-



REAR VIEW OF TARGET CONSISTING OF 10-INCH PLATE BACKED BY 180 TONS OF EARTH.



THE TARGET AFTER BEING STRUCK BY GATHMANN 12-INCH SHELL, CONTAINING 200 POUNDS OF WET GUNCOTTON.