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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 512,

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EFFECTS OF THE FLOOD ROCK EXPLOSION.

There is every reason to believe that the calculations of the engineers, in all their work on Flood Rock, were fully borne out, and their anticipations in every way met, by the results of the explosion of October 10. Over the whole of the area which had been mined, covering about nine acres, only a small proportion of which was above even low tide, the throwing up of water by the explosion showed that the dynamite everywhere had done its work, while the plans had been so judiciously made that the entire energy of the vast quantity of explosives employed was developed in the breaking and shattering of the rock. Many had looked for a much greater show of flying rocks and timbers, but this the engineers had guarded against by using much less dynamite around their entrance shaft, and under the rock exposed above water, than was placed in the parts where the water could act as a sufficient cushion. The official survey has not yet been completed, but sufficient has been determined, from the soundings and the inspection of divers, to show that the rock has been pretty thoroughly broken up. The rock has been sinking daily since the explosion, and on the north and south sides is so shattered that it can be dredged without difficulty. On the east and west sides the surface fragments are larger, and will probably require blasting, but the whole reef seems to be full of fissures, generally following the trend of the rock.

A NEW DYNAMITE GUN.

Many attempts have been made to substitute dynamite for the ordinary projectile thrown from the heavy gun. Its terribly destructive powers and the comparative safety with which it may now be handled make it peculiarly adaptable to offensive operations. It cannot be said that the experiments thus far made have been particularly gratifying; indeed, the contact of dynamite with an object representing the armored side of a ship, made in some experiments a year ago, was disappointing in its effect, doing nothing like the damage that had been promised and expected. Yet the experiments were but crude; and the fact that dynamite can safely be thrown from the mouth of a heavy gun by means of compressed air is of importance in itself, and hopes are entertained that a means will yet be found of utilizing the principle to advantage.

A very interesting experiment looking to the development of this principle was made last week at Fort Lafayette in New York Harbor, with a dynamite gun sixty feet long and an eight inch bore, poised on the redan of the fort, and resembling a great telescope. The object of the constructors of this gun is to throw dynamite against the sides or upon the decks or in the water and close to a hostile ship. They claim that they can do this with precision and dispatch within a radius of about two miles. It cannot be said that they demonstrated this in the experiments of last week, and yet these experiments were attended with enough success to impress the careful observer with the practicability of the project.

To show the power of the gun, a projectile weighing 200 pounds was thrown about a mile and a half, the air gauge showing one thousand pounds pressure, and the elevation of the piece being 30°. Then a projectile somewhat resembling a fish torpedo, having a core of five pounds of No. 1 dynamite surrounded with a quantity of explosive gelatine, was thrown to a distance of something over a mile, but failed to explode. There is reason to believe that this failure was owing more to the ordinary mishap attending public exhibitions of crude apparatus than to any defect in the principle.

Aware of the uncertainties of firing at a movable mark, the constructors of this dynamite gun have anticipated the failure of a shot to take effect by striking the water instead of the ship; and besides the percussion in the contact point of the projectile, there are two small dry batteries in its wooden tailpiece, which, when reached by the sea water, are expected to act upon a fulminate cap, and the detonation explodes the dynamite. The charge of a hundred pounds of dynamite that this gun is intended throw will, they say, if exploded in the water within several hundred feet of the modern iron war ship, kill those on board by shock. This is surely an extraordinary assertion, and there is reason to believe that they would find it impossible to sustain it.

But the experiments of last week show that dynamite can safely be thrown a short distance by compressed air, and this knowledge may be used with effect in advancing the science of harbor defense.

The air for firing is stored in six large reservoirs having walls capable of sustaining a pressure of 2,500 pounds to the square inch. The firing pressure of 1,000 pounds comes into the chamber behind the missile so slowly, and with an increasing pressure so gradual, that all danger of premature discharge of the dynamite by shock would seem to be avoided.

The expressed belief of the projectors that this gun will prove most effective placed *en barbette* in land works or in barbette towers aboard war ships seems to have little to sustain it, because its range—two miles—is so limited that it could not be worked while the marine guns carried by modern war ships were in play. At the distance of three, four, or five miles—a point-blank range for the great guns of to-day—a modern war ship could lie at ease out of its range, and tear it to pieces. If "it should be protected by heavy guns of modern construction," as suggested by one of its constructors, there would be scarcely any need of it at all, for it could take no part in a pounding match at what would be short range for modern guns.

But if it will fulfill the promises made for it, it would be invaluable in harbor defense when placed aboard of a quick moving torpedo boat. In order to make the ordinary torpedo effective, the torpedo boat must run up and take a position close aboard the enemy before discharging the projectile—always a dangerous and uncertain operation. But if this telescopic gun will throw its charge of one hundred pounds of dynamite only a mile with precision from the deck of a torpedo boat, it would possess advantages over the ordinary method which are readily apparent, and the most powerful war ship afloat, if beset by three such torpedo boats, each similarly armed, might belch forth her tons of iron and steel, and set all her pepper-boxes to work in vain.

It has not yet been proved, however, that the dynamite gun can do what is promised for it.

BENDING CAST IRON.

The quality of cast iron in softness—yielding to tool working—and in toughness has been greatly improved within the memory of many workers who are not old men. The crisp, brittle, hard character of cast iron has been changed to a material of a purer condition and therefore better nature.

One of the peculiarities of modern cast iron for machinery purposes is its flexibility, its capacity of being moved from its moulded position and retaining its new contour. In the older time it was necessary to peen a casting in order to permanently bend it; and this peening was rarely more than skin deep. The action of peening is simply to expand the surface of the casting by the quick, sharp blows of the peen end of the machinist's hammer—the unattached parts must, perforce, give to this persuasion. The consequence is that the hammered side is stretched, just as hammering will stretch lead, or silver, or copper, or any malleable metal. But the objection to the peening process is that the after-working by the file or the planing tool may destroy all the work done by the peen end of the hammer.

But it is possible to permanently bend cast iron without resort to such heroic methods as peening, and the ruder one of heating to redness in a forge fire, bending while soft, and plunging into cold water; the last so risky of breaking the casting that it is seldom tried except on cheap stuff like grate bars or similar traps. Good cast iron can be bent and keep its bend without the slow process of peening or the risky one of bending under intense heat and chilling in cold water with the chance of breaking. And this quality is sometimes handy.

In a cotton mill for spinning peculiar yarn, the leaders on a spooler require to have a decided curvature near their heads. For convenience in finishing and fitting, and for economy in production, castings were preferable to forgings. These castings were made flat; but after being finished they were heated over a blaze, and bent under a lever. The amount of bend was more than 30°.

A casting was made recently which required two turns or bends in its length, the casting weighing something over three hundred pounds. The superintendent determined to make the casting straight, plane and finish it, and afterward bend it to shape. This was successfully accomplished. The curved pattern would have been costly, the resultant casting might have been faulty, and the hand dressing and finishing of the double curved casting would have made the piece cost more than if forged. But a forged piece, of wrought iron, was just what was not wanted; it was a casting, and it was made.

Where the bends were to be made were stationed alcohol lamps, the piece being suspended between proper supports. After the under side being heated to a degree that would have drawn hardened steel to a straw color—as a supposable degree of heat—a pressure, by weighted lever, was introduced on the upper side of the casting. As the lamp was moved from point to point, it was surprising to see how the iron yielded to the pressure and the heat. A curve was made that could not have been finished by planing, and yet the bent casting retained its finish, only the discoloring by the lamps being necessary to be removed by emery cloth rubbing.

A crooked casting, withdrawn out of line by injudicious pattern making and lack of sensible moulding in the foundry, was about to be thrown on to the scrap heap at a loss of nearly a hundred dollars. It was straightened to usefulness simply by the careful use of two gas flames diffused by wire netting, and by the use of weight. It is quite possible to bend or to straighten cast iron to an appreciable extent by a quite low degree