

PRACTICAL TRIAL OF THE PNEUMATIC DYNAMITE GUN.

On Tuesday, Sept. 20, the pneumatic dynamite torpedo gun was tried in practical work. The object of the trial was to show the United States naval authorities decisively the powers of the new weapon. The Secretary of the Navy had placed at the disposal of the company the old coast survey schooner Silliman. The proposed programme was the destruction of this vessel by two or three projectiles.

The eight inch gun already described and illustrated in this paper* was used in these trials. It occupied its old position, on the south of Fort Lafayette, its muzzle pointing toward Norton's Point, the extremity of Coney Island. Gravesend Bay lies between these two places. Two thousand yards from the fort the schooner was anchored, being moored head and stern, so as to float with her stern pointing directly toward the firing point. Her two lower masts and bowsprit were left in place with some of the standing rigging. Otherwise she was pretty thoroughly dismantled.

A number of steamers carried spectators. The Dispatch, U. S. N., with Secretary Whitney and members of the Advisory Board, went to a point about half a mile from the mark and anchored. The revenue cutter Grant, police boat Patrol, navy yard launch, several private yachts and small launches were present, the whole forming quite a fleet. Lieutenant E. L. Zalinski had charge of the piece.

Two range shots were first fired with blank shells. They descended quite near the mark. Next the gun was loaded with a charged shell, containing 55 lb. of explosive gelatine. Before each shot flag signals were exchanged with observers on shore, who triangulated the range. By watching these flags the spectators on the steamers could tell when to look out for the shot. As each discharge took place there was a report much like that of a cannon, followed by a very peculiar whistling sound as the shell passed through its trajectory.

The design of Lieut. Zalinski with the third shell was to injure the schooner, but not to destroy her. This work he reserved for two succeeding shots. When the third one was discharged, it came whistling ominously through the air and fell into the water a short distance astern of the schooner, descended a few feet, and exploded. It threw up a superb fountain of water, two or three hundred feet high, masking the after part of the vessel, and when the water fell back the schooner's mainmast was gone. The head was left swinging at the end of a stay attached to the foremast head, which was broken and sprung backward.

The schooner was boarded by the crews of two launches, and found to be badly injured. Her stern was severely shaken and she was leaking, so that the shot, though it had not touched her, had done much damage. This proved one of the claims of the advocates of the gun, that a shell falling near a vessel will do effectual work.

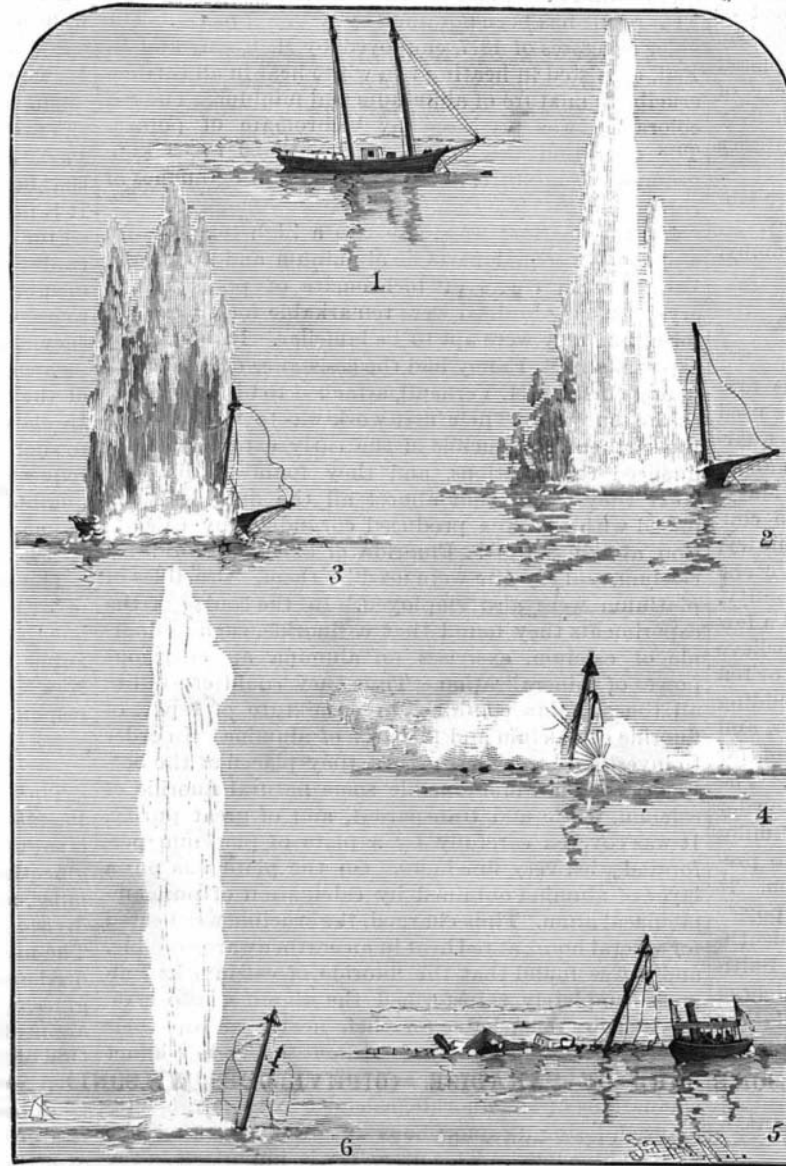
After the two launches had taken their crews on board and steamed away a fourth shot, also a 55 lb. shell, was fired. The third shell had fallen directly in the line of the two masts, and was a perfect line shot. One of the effects of the explosion had been to slew the stern of the schooner around so that she had her after quarter toward the gun. Under these circumstances, when the fourth shell was discharged, it fell very near the hull and penetrated the water until it was directly beneath her, as nearly as possible under the steps of the mainmast, when it exploded. The column of spray that it threw up was greater than before, owing to the overlying vessel. It completely hid the after part, and when it descended the schooner was blown to pieces. Her fragments settled back into their old place, nearly level with the surface of the water. Above the wreckage the step of her mainmast and her iron water tank could be seen. Everything else was nearly level with the water. The foremast still stood over the sunken bow.

An instantaneous photograph taken just as the explosion was felt by the vessel shows the hull lifted up a few feet above its normal position, and the spray and water rising in the air. The view is of interest as illustrating this lifting action.

Thus the target was destroyed in two shots with a total amount of a little over one hundred pounds of gelatine. It showed what terrific power would be possessed by the six hundred pound shells which the new cruiser will be able to discharge.

* See SCIENTIFIC AMERICAN, Vol. 53, No. 18, Vol. 56, Nos. 9 and 15, and SUPPLEMENT, No. 568.

The foremast was still standing, and some dismantled rigging swung from its top. A fifth shell was now fired. This contained the same weight of gelatine, and ranged rather high. Its percussion fuse probably struck some of the floating wreck, for when directly over the vessel, almost level with the water, it exploded with a bright flash of flame. This shot illustrated what would be an effective method of attack in some cases. An



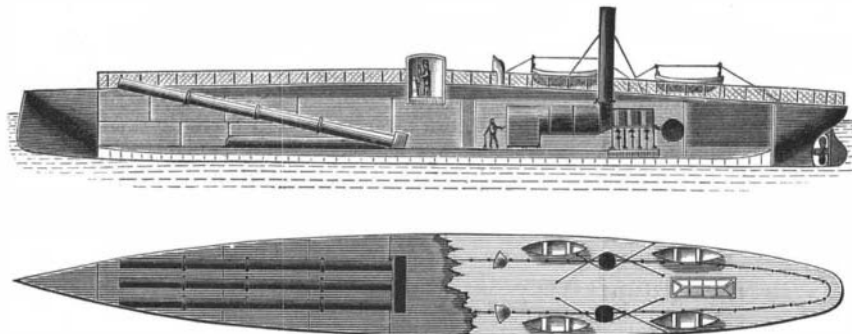
EPISODES OF THE TRIAL.

1. The Silliman before the trial. 2. The first explosion. 3. The second explosion. 4. The third explosion in the air. 5. The wreck of the Silliman after the second shot. 6. The fourth explosion.

aerial explosion of several hundred pounds of gelatine directly over the deck of a vessel would probably render most of her crew *hors de combat*. The experiment of course is an untried one as regards its effects upon life, but it seems probable that much injury might be done in this way.

Finally a one hundred pound shell was fired at the wreck. This also went rather too far, but exploded about ten feet under water very near the vessel. Had she been afloat and not level with the water, it would probably have struck her and done as great damage as the first.

This concluded the exhibition and demonstrated conclusively the powers for destruction of the weapon. The new cruiser that is to carry several of these guns will be an interesting subject of trial. The design is to have her carry the guns in her hold. They will be of



PLAN AND SECTION OF THE DYNAMITE CRUISER.

constant elevation, and the trajectory will be varied by regulating the quantity of air admitted. The pointing and aiming will be executed by maneuvering the vessel.

Several points of interest are brought out by the new piece. The high trajectory that is often objected to has its good feature in a ship, as the range will be less disturbed by pitching under the action of the waves. A practice resembling mortar practice may be tried, it has been suggested, in dropping shells upon a vessel's deck. Two or three falling on a ship would doubtless work their way through her bottom. The sound made

by the shell as it passes through the air is followed by the explosion. To an observer half a mile off the latter is seen before it is heard, and while the whistling of the shell is still audible. Thus, when the shell has exploded, the ear still places it in the air and hears the whistling produced some seconds before. The shell after it has exploded seems still to be on its journey, until finally the noise of the explosion is heard. Some of the observers could see it, but exceedingly good eyes were requisite for this, as the steamers were situated.

The initial velocity of the projectile is considerably more than 600 feet per second, or about one-third that of the shells of heavy ordnance. It should be compared, in justice, not with guns, but with torpedoes. Yet by its remarkable accuracy at a mile range it showed that it is comparable with cannon. In actual war the latter, where exact firing is necessary, are used at ranges well within the reach of the pneumatic gun. The power to accurately place a torpedo charged with a high explosive within a range of two miles will be a factor of great account in future wars of offense and defense. A table of the data of this gun has already been published in the paper already alluded to, and may be consulted with interest after this practical demonstration. It may be mentioned here that although an hour was occupied in the last trials, yet four shots have been fired by Lieut. Zalinski inside of ten minutes without any effort at hurrying and without skilled men.

Inventive Genius Developing in Streaks.

One of the leading authors of the present day has remarked that "genius comes in shoals." There is a depth of truth in the remark, says a contemporary, which must at once be patent to all who are familiar with the history of our country, and in no field of inquiry does the fact stand out so prominently as in the great outbreak of inventive genius by which our country is distinguished. The Elizabethan age was characterized by a shoal of dramatists, next we have a shoal of essayists with the amiable Addison at their head, and down through the years until what Carlyle has called "the mechanical age" set in. The birthday of the manufacturing supremacy of England was undoubtedly the 5th of January, 1769, when James Watt announced his patent "for a method of lessening the consumption of steam and fuel in fire engines." This was the source and sustaining power of mechanical energy whose action quickly

changed the face of the world.

The inventive minds felled in a shoal, and before half a century elapsed England was in possession of the most perfect mechanical appliances. Since the commencement of the "mechanical age" the aspect of the country has been entirely changed. In districts like the "Black Country," where nothing formerly appeared but rural scenery, great manufacturing establishments have been erected, towns raised, and the roar of furnaces, the noise of machinery, the buzz of reels, and ceaseless activity now diversify the scene where nothing was formerly heard but the purling steam or the howling of the tempest. Not only do the inventive minds come in shoals, but shoals of inventors who concentrate their united energy on some special branch of mechanics or science are every now and then springing up, and invention follows invention with surprising rapidity. These inventions are always shifting; at one time there is a run for improved furnaces, at another improved modes of constructing ships; then comes a change to machinery, or some matter of great public interest, like the rivalry in the improving of the different systems of electric lighting. Not only do inventions shift from one branch of science and mechanics to another, but at times a lull comes over one country, and a great outbreak of inventive genius breaks out in another country.

Care of Carriages.

A dry house, free from dust and the sun, and away from the stables, is of first importance. If you keep your buggy near the stables, the ammonia will kill the varnish in a very short time.

Never, under any circumstances, rub oil over your carriage to brighten it up. It is sure to ruin the paint. Use a good sponge and a clean chamois, with plenty of clear, cold water to wash the mud off with. Never use a duster or broom on varnished work. Never allow water to be thrown inside the body. It is sure to affect the glue and swell the timbers, so as to break the joints. Mud allowed to dry on a carriage is of no benefit. Frequent oiling of axles does no harm.

SCIENTIFIC AMERICAN

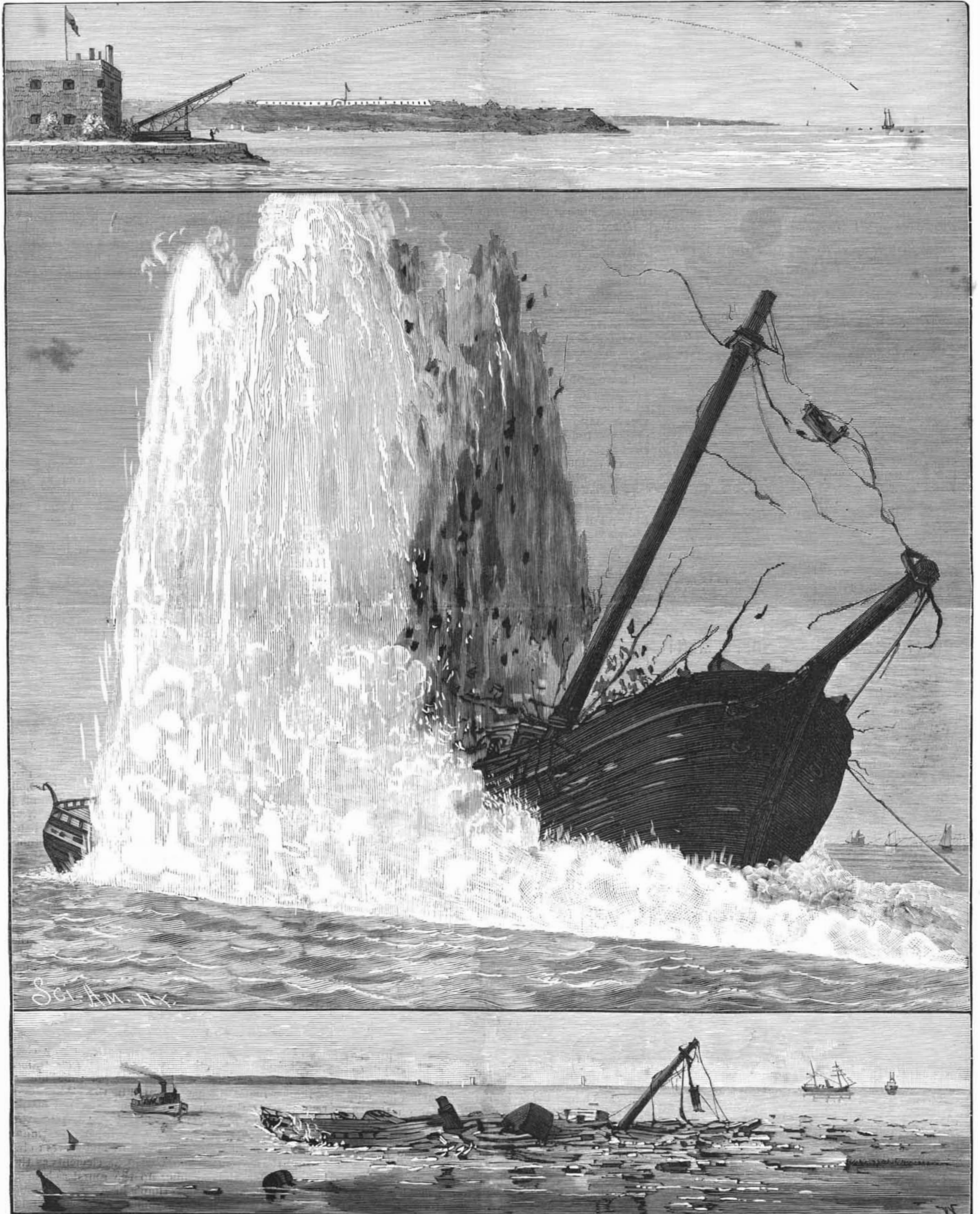
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PRACTICAL EXPERIMENTS WITH THE PNEUMATIC DYNAMITE GUN.—BLOWING UP A VESSEL IN NEW YORK HARBOR.—[See p. 214.]