TORPEDO EXPERIMENTS AT NEWPORT.

To the Editor of the Army and Navy Journal.

SIR: Undoubtedly one of the most interesting events connected with the tour of inspection of the Senate Naval Committee, in the U. S. S. *Despatch*, was the witnessing of the experiments at the U. S. Torpedo Station, at Newport. A more lovely day could not have been desired. The water was almost without a ripple, and the rather unusual clearness of the atmosphere, lent a peculiar brilliancy to the spray of the various columns of water thrown up by the numerous torpedoes.

By 10 A.M. the harbor was dotted with hundreds of sail and row boats, and the Torpedo Station thronged with spectators; the officers and midshipmen of the practice ship *Constellation*, the *Intrepid* and the *Despatch* forming no small proportion of the expectant crowd. The programme of experiments was to have commenced at 11 A.M., but owing to the expected arrival of the Secretary of the Navy, it was deferred till afternoon, the guests meanwhile being amply occupied during the long noon hours by an elegant lunch, provided by Captain Simpson, the commandant of the station.

Shortly after 2 P.M., the first torpedo was exploded. The object of this experiment was to show the action of an electrical ground torpedo in its simplest form, viz., a simple iron case, containing 100 lbs. of powder, lying at the bottom in 10 feet of water, at about 200 yards from the wharf in the inner harbour, and connected with the shore by two insulated cables, the firing being accomplished by a Farmer's Dynamo Electric Machine.

The effect of the explosion was very fine—a large column of water was thrown full 100 feet in the air, and fell with a heavy crash, leaving showers of mist to sparkle in the sunlight as they were drifted slowly towards the shore by the scarcely preceptible breeze. The explosion was over in far less time than it takes to describe it, and it is hard to conceive that to produce this apparently simple effect *with certainty*, it should require so much brain work and experiment as it actually has done to attain it. The simple matter of a water tight joint for the entrance of the cables to the torpedo, one that would be water proof at all depths, readily adjustable and durable in all climates, has required years of downright hard work to bring it to its present state of perfection. The fuze, too, is a perfect study in itself, and as for the electric machine, it will suffice to say that the Farmer's machine is an instrument which has shown its superiority for certainty and magnitude of effect over every other description of mechanical electrical apparatus, either foreign or domestic, which it has been possible to procure at the station since its organization in 1869, a statement of no small importance considering the great variety of rejected apparatus to be seen in the Electrical Department of the station.

Numbers 2 and 3 were ground torpedoes, the explosion of which was effected by ingeniously devised circuit closers of different descriptions invented at the station. As the experiment was intended only to show the effectiveness of this method of exploding a submerged charge by the contact of a passing vessel, and not in reality to destroy the boat used in the operation, the torpedoes were placed at the bottom, at some distance from the small bouy containing the circuit closer, whose position was indicated for the convenience of the spectators by a small staff attached to each bouy, and projecting above the surface of the water. The results were excellent. At the instant that the small sail boat used for the purpose was seen to be in contact with a staff, the explosion followed as if by magic. Though the torpedo was far removed from the point of contact, one could easily imagine what would have been the effect had each torpedo been directly under its own circut closer as in actual warfare. Nos. 4 and 5 were boat torpedoes, the regulation iron case now furnished to all vessels in the U. S. Navy. They were fired from spars rigged out from the bows of a frigate's launch, the operation being conducted by the class of officers now under instruction at the station.

The rigging out was effected, and the explosions occurred in rapid succession, with very fine effect to the eye of the ordinary observer, but to that of the modern seaman the practicability of such an arrangement in actual warfare was rendered doubtful from the fact of a rowing launch being used: a condition of affairs rendered necessary, however, in consequence of the breaking of a shaft in the steam launch generally used for such work.

Numbers 6 and 7 were improvised torpedoes, viz. A water breaker well pitched inside and out, for Uncle Sam is to poor to use specially prepared iron cases for *every* emergency, and these experiments were well calculated to show what could be done when one is obliged to make use of the means nearest at hand to accomplish the desired effect, a fact which few of your readers will doubt when they recall the famous "beer barrel" torpedoes of the Confederates. No. 8 was a 300-pounder, planted in about 20 feet of water, and fired by means of two plane tables. The object of this arrangement was to show the method of locating the position of a ground torpedo by means of cross-bearings taken from two different points on the shore, thus doing away with the necessity of any buoy or other marker on the surface of the water to give warning to the enemy of the location of the charge. The sight bar of each plane table is kept continually pointed to the approaching vessel, and each closes a break in the circut between the firing battery and the torpedo fuze at the instant that it points exactly to the position of the submerged charge. As the object of the experiment was merely to show the principle of the arrangement, no boat was used, but a small buoy directly over the torpedo indicated its position, and the result of the experiment plainly showed that no explosion could possibly occur except when the sight bars were pointing in the exact direction of the buoy, but when they *did* point to this spot *simultaneously*, the firing of the charge was certain to be effected. Contrary to what a casual observer would expect, there was less to please the eye in the explosion of 300 lbs. of powder, in 20 ft. of water, than that of 100 lbs. in 10 ft., and, in deed, it was noticeable that the explosion of the simple barrels in shallow water produced a more perfectly symmetrical column than which followed the explosion of their more scientific neighbours of heavy iron.

After witnessing these explosions, all of which occurred in the inner harbor, the committee repaired to the opposite side of the island, where the location of the torpedoes in our outer harbor was pointed out, and they were then conducted to the north end of the Island, where experiment No. 9 awaited their arrival. This experiment was to consist in showing the effect of unconfined dynamite on wrought iron. The block of metal was the best of heavy forging 4 in. thick, and shaped somewhat like a letter L, the length being about 8 in, and the width about 5 in. at the narrowest part and 7 in. at the widest. The weight of the iron was 56 lbs. 9 oz.; and its specific gravity 7.869. 4½ lbs. of 75 per cent. dynamite (75 of nitro-glycerine to 25 of silica) was placed one the iron, and held in position by a box of ½inch pine, of the same shape as the metal block, and *without top or bottom*. Two electric fuzes were inserted in the mass (which very much resembled brown sugar), and the observers repaired to a safe distance from whence they were shown, instead of the experiment intended, a remarkable exemplification of one of the peculiar qualities of this formidable explosive. By accident, the fuzes inserted were ordinary powder exploders, charged only with rifle powder, instead of fulminate of mercury, which constitutes the usual exploding charge for nitro-glycerine and its compounds.

On passing the electric current, the fuzes exploded, setting fire to the nitro-glycerine in the dynamite, which burned harmlessly away, and so quickly as to merely char the inside of the wooden frame leaving the silica in a dry powder on the surface of the iron. Later in the day the experiment was repeated, except as regards the kind of fuze. The block of iron was placed as before on a mass of granite, about *30 in. thick by 4 ft.* long and 2 feet breadth, near the water's edge.

On passing the current, the dynamite exploded with tremendous violence, the mass of iron bounding into the air some thirty feet, and falling into the water, while the solid granite was *badly shattered in the* vicinity of the position occuped by the iron, besides being broken completely in two. The iron on being taken from the water was too hot to hold in the hands, and while the upper surface was deeply *dished*, besides being opened in the direction of the fibre at various points, the lower surface presented an exact imprint of the rough surface of the granite on which it had rested. It may be well to note here for the benefit of inquiring readers, *that when the specific gravity was* taken on the following day it was only 7 702, *showing the iron to have become lighter* under the action of this rather extraordinary trip-hammer.

Following the first experiment with the dynamite came the grand feature of the day, the blowing up of the the *Cornfied Point*. This vessel was formerly a lightship, a strongly built craft about 80 ft. long by 25 ft. beam, and light as a cork, only drawing 5 *ft. of water, with high wall sides, for*merly painted red, but now of a dirty pinkish hue. Her lightness was a matter of considerable annoyance to the officers of the station, but the danger of impeding navigation in case she should sink if loaded with stone, besides the lack of such ballast at the disposal of the station, and above all, the excessive difficulty of the towing her, whether ballasted with stone or water, or even when light, with the steam facilities of the station, rendered it advisable to abandon all projects for increasing her weight or draught.

The torpedo, or rather group of torpedoes, consisted of 120 lbs. of nitro glycerine, placed in 4 cans of heavy galvanized iron, each containing 30 lbs. They were placed in 40 feet of water, and arranged in a square of 40 feet on a side, the torpedo being 15 feet below the surface of the water. They represented a submarine mine, such as could be used in actual warfare; planted in deep water, in the ordinary channel of a harbor, at such a depth as not to interfere with navigation, their situation noted by a position indicator on shore; their connecting wires weighted