(No Model.)

3 Sheets—Sheet 1.

J. O'KELLY & B. A. COLLINS.

MEANS FOR OPERATING MARINE TORPEDOES.

No. 388,299. Patented Aug. 21, 1888.

FIG. 1.

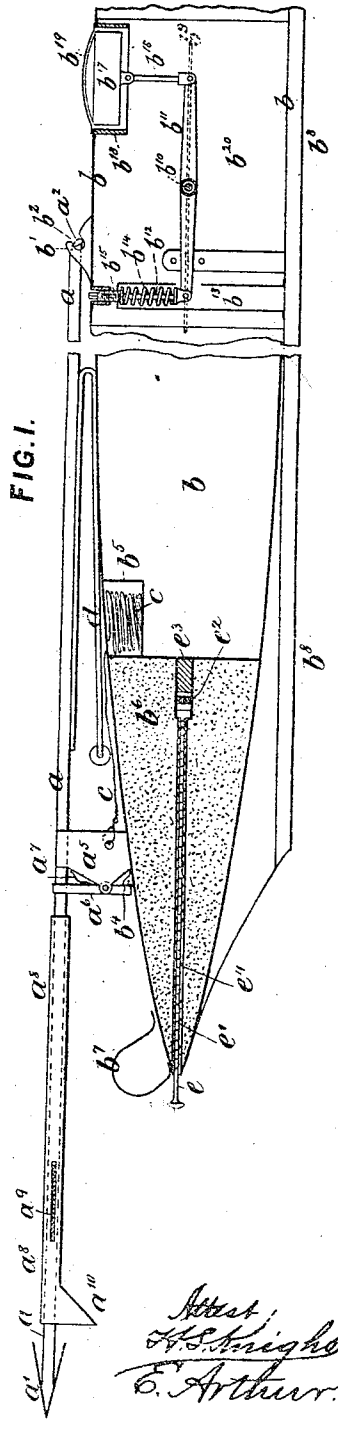


FIG. 4.

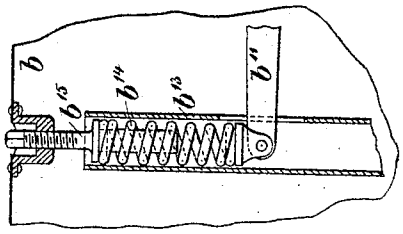
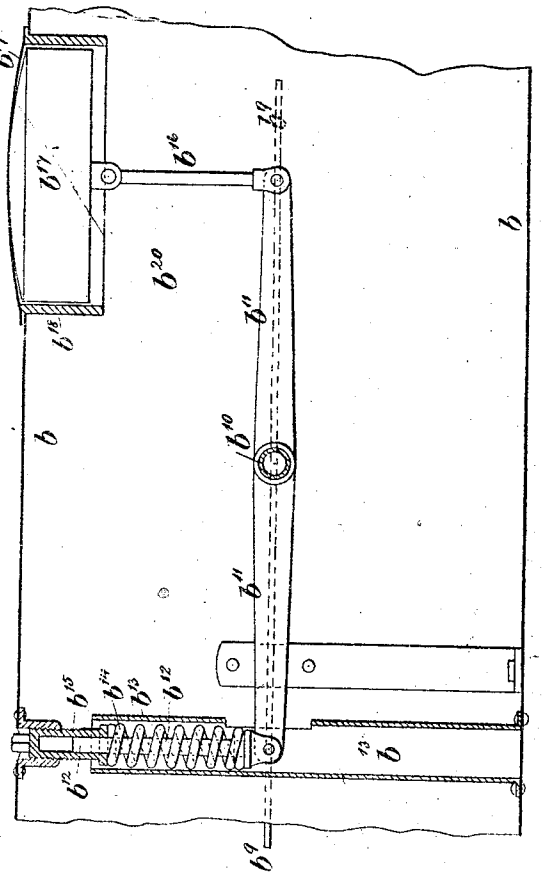


FIG. 2.



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(No Model.) 3 Sheets—Sheet 2.

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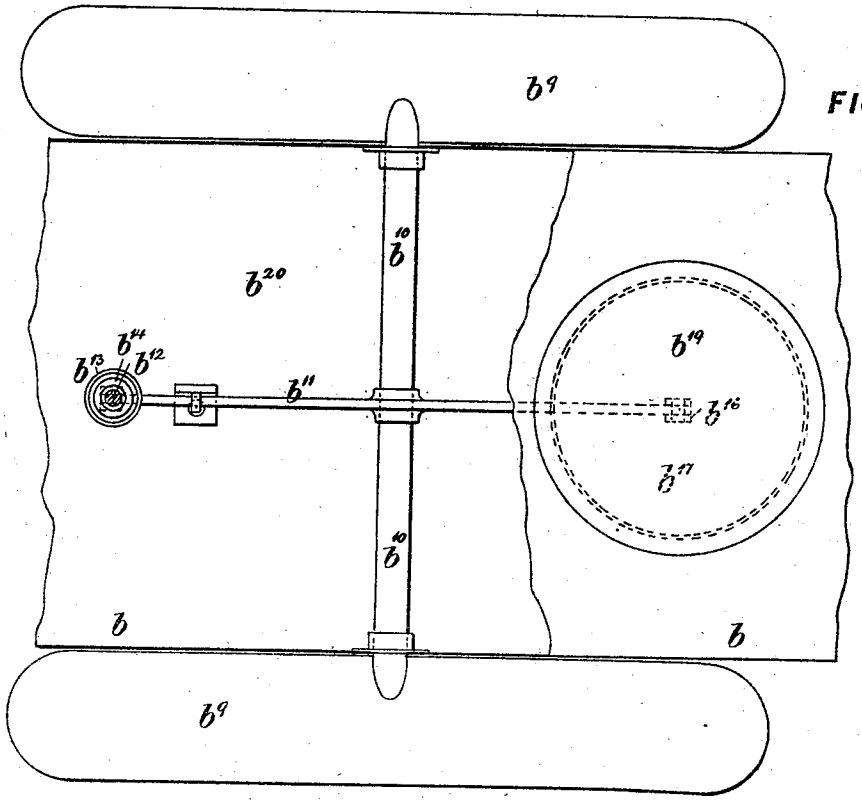


FIG. 3

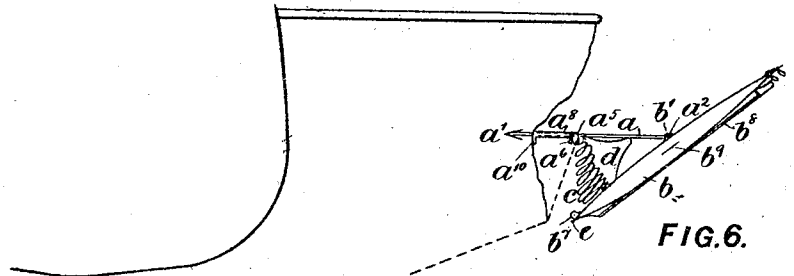
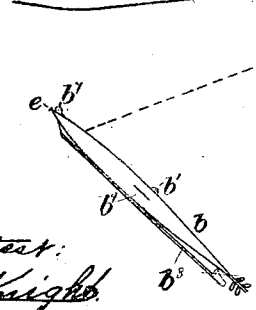


FIG. 6.



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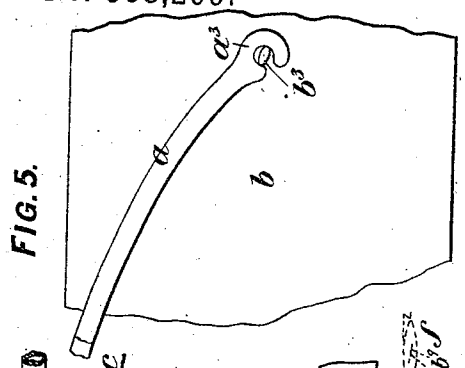

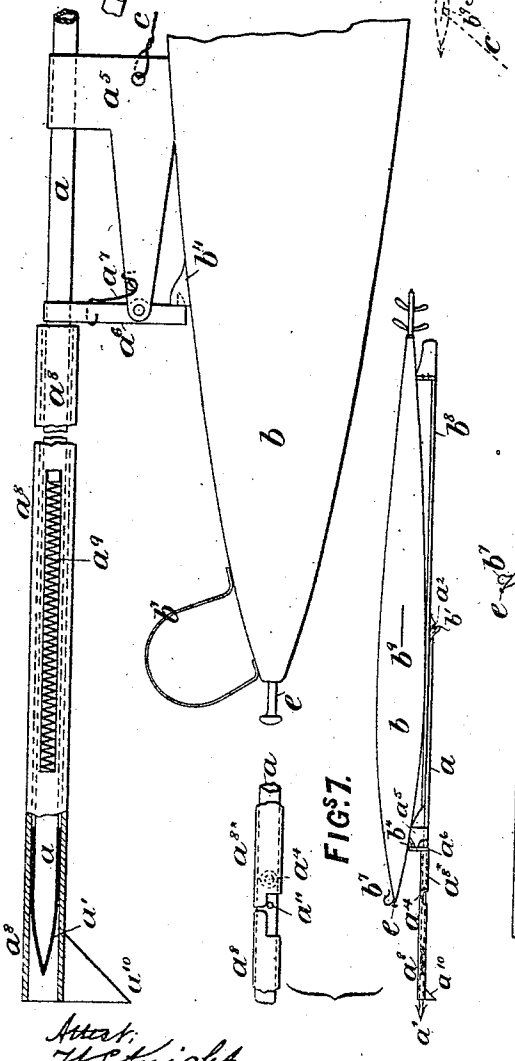

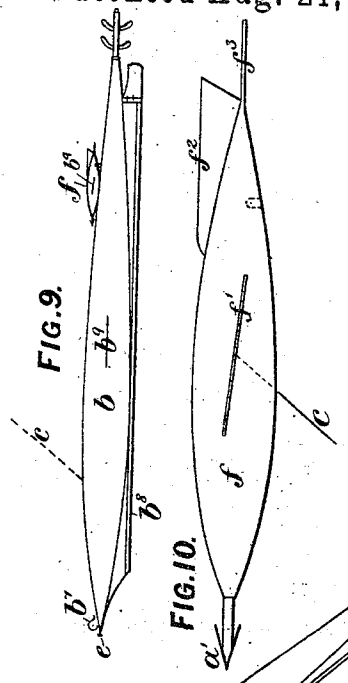

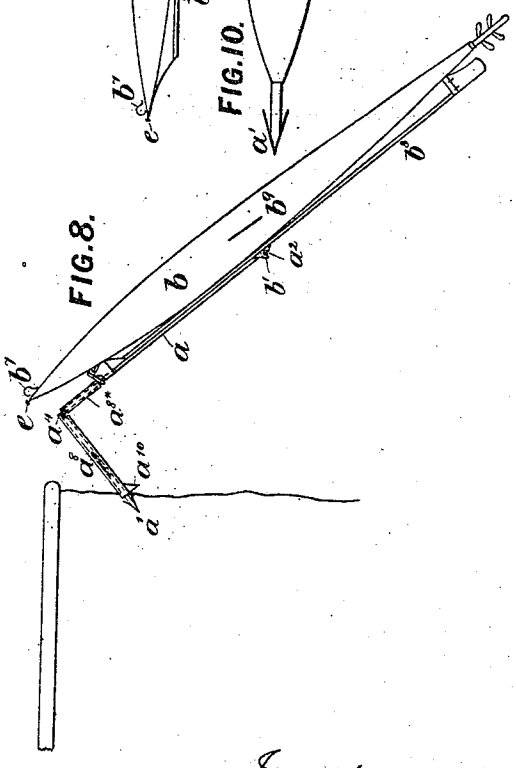

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UNITED STATES PATENT OFFICE.

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MEANS FOR OPERATING MARINE TORPEDOES.

SPECIFICATION forming part of Letters Patent No. 388,299, dated August 21, 1888.

Application filed November 30, 1887. Serial No. 256,568. (No model.)

To all whom it may concern:

Be it known that we, JAMES O'KELLY, of 65 Bessborough Street, London, England, journalist and member of parliament, and BERNARD AMBROSE COLLINS, of 26 Machell Road, Nunhead, Surrey, England, meteorologist, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in or Connected with Torpedoes, of which the following is a specification.

The invention relates, first, to means whereby, in the event of torpedoes encountering netting defenses, they shall be capable of attaching themselves thereto and of diving under the netting or jumping over the netting-boom and effectually strike the object aimed at.

The invention relates, secondly, to means for preventing torpedoes from rotating around their own axis and for causing them to remain at any previously-determined depth of immersion in the water.

In order that our invention may be clearly understood and readily carried into effect, we will proceed to describe the same with the aid of the accompanying drawings.

Figure 1 is a vertical longitudinal section of part of a torpedo constructed according to our invention. Figs. 2 and 3 are respectively an enlarged vertical longitudinal section and a sectional plan of part thereof. Fig. 4 represents a slight modification of part of Fig. 2. Fig. 5 represents a slight modification in the construction and mode of connection of the attaching and radius pole to the torpedo. Fig. 6 is a diagram representing an improved torpedo in contact with the netting defenses of a ship, and showing the way in which it dives underneath such defenses and attacks the ship's bottom. Fig. 7 represents a modification in the construction and position of the attaching and radius pole of the torpedo. Fig. 8 is a diagram representing the action of the torpedo shown at Fig. 7. Fig. 9 represents another modification in the construction of the apparatus for attaching the torpedo to the netting defenses and directing it to the ship's bottom, and Fig. 10 is an enlarged view of part of Fig. 9.

In all the figures like parts are marked with similar letters of reference.

The following is a description of the apparatus represented at Figs. 1 to 6.

We use a pole or tube, *a*, of steel or other suitable material, preferably about one inch in diameter and of such a length as will suit the torpedo upon which it is placed, so that the lance-head *a'* of the pole or tube *a* shall project a suitable distance from the nose of the torpedo, for the purpose hereinafter explained.

The pole or tube *a* is fixed to the torpedo in either of two ways—one, as represented at Fig. 1, by fitting the rear end of the pole *a* with oval or flat shaped trunnions a^2, which are fixed at an angle in relation thereto and lock in fulcra or lugs *b'*, fixed on the back amidship of the torpedo *b*, such lugs or fulcra *b'* being formed with openings b^2, through which the trunnions a^2 pass, either for connecting or disconnecting the pole *a* with the torpedo. The other method of connecting the pole *a* with the torpedo is represented at Fig. 5, in which case the rear end of the pole *a* is forked and fitted with hooks a^3 to fit onto oval or flat shaped trunnions b^3, fixed on the sides of the torpedo also amidship. In either case the pole *a* will remain secured to the torpedo *b* as long as they remain parallel with each other, and when they form any angle greater than thirty-six degrees, or other given angle, the trunnions a^2 or b^3 will pass through the openings in the fulcra or lugs *b'* or in the hooks a^3, thereby completely disengaging the torpedo from the pole *a*, except that it is connected thereto by a line, *c*, as hereinafter described.

The pole *a*, with lance-head *a'*, may also, as shown at Figs. 7 and 8, be attached to the bottom of the torpedo, in a similar manner to that described above with respect to the top, in which case it is formed of two or more sections connected together by "rule-joints" a^4, so as to obtain any required direction at the moment of striking the netting. The rule-joint a^4 is, when in the position shown at Fig. 7, held rigid by the tube a^{**} extending over the same; but when the torpedo strikes the netting the tube a^5 is driven back against the tube a^{**}, so as to free the joint a^4. The adjacent ends of said tubes are formed as shown in the enlarged view, Fig. 7, and a stop, a^{11}, is provided to limit backward motion of tube a^5.

To the pole, as shown at Fig. 1, we secure one or more strong springs, *d*, in such a manner that when the pole and torpedo are parallel with each other the spring or springs *d* are compressed between the pole and the back of the torpedo; but when the spring or springs *d* are free to act they will assume an angle of about ninety degrees, or other required angle.

The pole *a* and torpedo are held together in the following manner: On the pole *a*, about two feet (more or less) behind the nose of the torpedo when it is in position thereon, we secure a knife-edge plate, a^5. This plate a^5 extends downward, so as to touch the head of the torpedo when the springs are compressed, as before described. To the knife-edge plate a^5 is hinged a steel bar or trigger, a^6, the lower end of which forms a latch that catches under a slight projection, b^4, on the head of the torpedo. The upper end of said bar or trigger a^6 is forked, so as to pass on either side of the pole *a*.

The knife-edge plate a^5 is so shaped that the trigger a^6, when pressed from the front on the forked end, will completely disengage itself from the torpedo's head, and thus allow the compressed springs *d* to act.

The trigger a^6, when in position—that is, when holding the torpedo and pole *a* together with the springs compressed between them—is held so by a small spring, a^7, placed between it and the knife-edge plate a^5, so that no force other than that to be described can cause the latch or trigger a^6 to loose its grip on the torpedo's head.

In front of the forked portion of the trigger a^6 an outer tubing, a^8, is placed on the pole *a*. This outer tube, a^8, moves freely within certain limits backward on the pole *a* upon force being applied from the front. It is held in position with its rear end about two inches from the trigger-fork a^6 by a small spring, a^9, which is secured to the inner pole, *a*, so that the force exerted must be sufficient to compress the spring a^9 before the outer tube, a^8, can move back to the fork of the trigger a^6.

The front end of the outer tubing, a^8, is fitted with a knife-edge plate, a^{10}, of sufficient length to prevent its passage through the links of the nettings used for the defense of warships. The lance-point *a'* of the pole *a* is in the form of a harpoon-head, having two or more ears that lie back while the head is passing through the net-links, and spring open again as soon as it has passed clear through. This prevents the pole *a* from disengaging itself from the netting when it has once struck.

To the pole *a*, preferably at the knife-edge plate a^5, the end of a strong wire or hemp line, *c*, is secured. This line is preferably about thirty-five feet long, but may be of other convenient length, and it is wound on a reel placed within a chamber, b^5, next that, b^6, holding the exploding charge. The action of this line will be described farther on.

Immediately over or around the firing-pin *e* at the nose of the torpedo we place one or more springs, b^7, the back end or ends of which are not attached to the torpedo, so that when pressure is exerted on the head of the torpedo from any direction other than that from the front the spring or springs b^7 will resist, so as to prevent the charge from being exploded; but when the torpedo strikes "head on" the spring or springs b^7 will offer no material resistance and the firing-pin *e* will be driven back.

The firing-pin *e* above referred to consists of a rod of steel, which is inclosed in a tube, *e'*, that leads to the center of the charge from the nose of the torpedo. At its rear end is secured a small casing, e^2, of glass, containing fulminate of mercury or any other substance that will explode on concussion.

The forward end of the steel rod *e* projects about two inches, or double the distance between the fulminate-casing e^2 and a steel block, e^3, upon which it strikes when driven back, and the head is formed into a button shape of about one inch in diameter. The steel rod or firing-pin *e* is held in position—that is, with its rear end about one inch from the exploding-block e^3—by a spiral spring, e^4, which winds around it and between it and the tube *e'*, through which it passes.

For the purpose of preventing the rotation of the torpedo around its own axis during its progress, we fix thereto a keel, b^8, running, preferably, from the nose to the tail, but being almost flush with the bottom of the torpedo at its greatest diameter. We also fix thereto a horizontal fin, b^9, at each side of the torpedo, midway between the nose and the tail, which not only serve to prevent the torpedo from rotating around its axis, but are operated in the following manner for the purpose of enabling the torpedo to be kept at any required distance previously determined upon beneath the surface of the water: These fins b^9 are secured at their centers to a shaft, b^{10}, which passes through the torpedo, so that they can be moved to form any desired angle with the axis of the torpedo. To the shaft b^{10} is secured a beam-lever, b^{11}, extending fore and aft of such shaft, so that if the front portion of said lever b^{11} is depressed the front half of the fins b^9 will also be depressed, and cause the torpedo to descend by reason of the force of the water acting on the inclined fins. On the other hand, when the rear portion of the beam-lever b^{11} is depressed the fins b^9 will assume such an angle with the horizontal that the water acting upon the lower surface of the fins will cause the torpedo to ascend upon a gradual incline. To the front portion of the said beam-lever b^{11} we hinge a vertical rod, b^{12}, which moves freely up and down within certain limits in a tube, b^{13}. Outside this rod b^{12}, or in any other suitable connection with it, we place a spiral or other spring, b^{14}, capable of being set to exert any desired pressure upon the front portion of the

said beam-lever b^{11} by a screw, b^{15}, operated by a key or other suitable mechanism. To the end of the rear portion of the beam-lever b^{11} we secure another vertical rod, b^{16}, by a hinge. The upper end of this rod b^{16} is secured by a hinge to the plunger b^{17} of a cylinder, b^{18}, of, say, from four to six inches diameter and of suitable depth. The top of said plunger b^{17} is convex, and when the fins b^9 are perfectly parallel with the axis of the torpedo it is flush with the outer skin on the back of the torpedo; but even when the front portion of the beam-lever b^{11} is depressed the convex surface of the plunger b^{17} will not exert any retarding influence on the progress of the torpedo.

At Fig. 2 the vertical rod b^{12} is shown hinged to the beam-lever b^{11} and to work in the tubular screw b^{15}, the lower end of which latter acts to regulate the pressure on the spring b^{14}; but in the modification represented at Fig. 4 the vertical rod b^{12} is disconnected from the beam-lever b^{11}, and is fitted with the screw b^{15}, while it has formed on it a boss or flange which acts to adjust the pressure on the spring b^{14}. The plunger b^{17} is covered with a water-proof elastic cover, b^{19}, which, while allowing the pressure of the water on the plunger b^{17}, will effectually exclude the water from the chamber b^{20} containing said apparatus.

The operation of the above mechanism connected with the side fins, b^9, is as follows: Suppose the area of the plunger b^{17} represents one-fifth of a square foot and the torpedo were required to keep at, say, thirty feet below the surface of the water. A pressure of three hundred and eighty-four pounds is placed upon the spring b^{14} on the front end of the beam lever b^{11}, and consequently the front of the fins will be depressed to the limit they can reach. The torpedo, when discharged, will in moving forward cause the water to act on the upper surface of the fins b^9, and as they are at a descending angle with the horizontal the torpedo will gradually descend. Now, as the pressure of the water on every part of the torpedo will increase with the depth to which the torpedo descends, the pressure exerted at, for example, the depth of thirty feet upon the upper portion of the plunger b^{17} will be $30 \times 64 \div 5 = 384$; consequently the pressure on the plunger will equal that on the spring b^{14}, and the fins b^9 will be brought into a horizontal position, so that the torpedo will neither ascend nor descend. If from any accidental cause it descends lower, the fins will be depressed in the rear and the torpedo will rise, and if it ascends the fins will assume the position first described and cause it to descend.

Torpedoes constructed as shown at Fig. 1 are intended to act as follows: The pole a, having the spring or springs d attached, is locked at the center of the torpedo in the manner described and shown. It is then pressed forward so as to compress the springs d and bring the harpoon-head a' immediately in front of the nose of the torpedo. The trigger or latch a^6 is then caught under the projection b^4, and the mechanism is then ready to act. The torpedo is then launched in the direction of the objective vessel, and it is propelled by means well known, but which it is unnecessary further here to refer to. When the netting around the war-vessel is reached, the harpoon-head a' passes through the links and cannot release itself again, owing to the ears, which spring open, as before described. After the harpoon-head a' passes through, the links of the netting come in contact with the knife edge plate a^{10} on the front of the outer tubing, a^8, with the result that the said tube is driven back against the forked portion of the trigger a^6. The trigger is therefore forced out of its vertical position and its lower end is disengaged from the head of the torpedo. When the pole a is released, the springs d begin to act, and as the torpedo cannot more forward its head is depressed until it reaches the angle of thirty-six degrees or other fixed angle with the pole a. The oval trunnions then slip through the slots in the fulcrum or hooks, thereby releasing the torpedo from the pole a, and the torpedo then dives clear of the pole a. As the torpedo dives the line c pays out until the thirty-five feet or other length is reached. Then the direction of the torpedo's movement is changed, and it has to describe a circle of which the thirty-five-foot line is the radius. Hence, no matter at what angle the netting is struck by the torpedo, that angle will be followed by it describing the circle mentioned, and it cannot fail to bring the torpedo in contact with the hull of the vessel. If the nose of the torpedo strikes the netting while diving, the spring or springs b^7 will protect the firing-pin e; but when the torpedo strikes the hull of the vessel head on, the charge cannot fail to explode. When using the pole a having rule-joints, as represented at Figs. 7 and 8, we obtain an upward direction with or without the use of springs d for the purpose of clearing the netting-booms on the surface of the water; but, supposing a pole a with rule-joints is attached to the top of the torpedo in the position shown at Fig. 1, we obtain a downward direction of the torpedo and accomplish the work in the same manner as described with respect to Fig. 1.

In the modification represented at Fig. 5 we form the outer tube, a^8, long enough to inclose the harpoon-head a' of the pole a, and we give it a longer traverse, so that in the event of the torpedo striking the side of a vessel without previously attaching itself to the netting defenses the outer tubing, a^8, shall be driven back and the latch a^6 operated to release the pole a in a similar manner to that described with respect to the arrangement shown at Fig. 1.

In the modification represented at Figs. 9 and 10 we connect the line c at one end to the torpedo about midway between the nose and the center thereof. The other end of this line

is secured to a fish or other shaped float, *f*, so arranged that when the torpedo is moving through the water the float *f* will move parallel with and above it the distance allowed by the line *c*. The said float *f* is provided with fixed fins *f' f² f³* and with the harpoon-head *a'*, which in Fig. 1 is shown attached to the pole *a*, so that if it comes in contact with the netting defense of a war-ship it will attach itself thereto, and, as the line *c* will not permit the torpedo to move ahead, it will cause it to describe a circle upward toward the vessel's bottom, the radius of which circle will be limited by the length of the line. The said float *f* is housed upon the back of the torpedo by means of a steady-pin, as shown, in such a manner that when the torpedo is launched the float will immediately be released from such steady-pin and take up its position and continue to move parallel with the torpedo. The tendency of the float will be slightly toward the surface; but this will be counteracted and the depth of its immersion regulated by the depth-regulating mechanism of the torpedo.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. The combination of a torpedo, a detachable harpoon carried thereby for engaging with the defenses of the object to be destroyed, and a line connecting the torpedo and the harpoon after their separation, substantially as set forth.

2. The combination of a torpedo and a harpoon connected by a separable bearing and adapted to engage the defenses of the object to be destroyed, a connecting-line to control the subsequent movement of the torpedo, and suitable driving mechanism, substantially as set forth.

3. In combination with a torpedo, a harpoon, a plate on the torpedo having a trigger pivoted thereto, means for releasing the trigger from the harpoon, detachable connection between the harpoon and torpedo, and a spring for forcing the torpedo away from the harpoon when the latter attaches itself, substantially as and for the purpose set forth.

4. In combination with a marine torpedo, a suitable device having a lance-head provided with ears adapted to lie back while the head is passing through the net-links of the netting defenses of a vessel and to spring open again as soon as it has passed clear through, detachable connection between the lance-head device and the torpedo, and a line connecting them together, substantially as and for the purpose set forth.

5. A torpedo provided with means for enabling it to attach itself to or make use of the netting defenses of a vessel and to be directed underneath such netting or over the boom, said means consisting of a harpoon projecting from the forward part of the torpedo, detachable connection between the harpoon and torpedo adapted to operate when the harpoon strikes the netting, means for directing the torpedo into a divergent course, a line connecting the harpoon and torpedo, and means for regulating its depth of immersion, substantially as set forth.

6. In combination with a torpedo, a harpoon, a plate secured to the torpedo, a forked trigger pivoted to said plate, a projection on the torpedo with which said trigger engages, said harpoon being adapted to rest between the forks of the trigger, a spring situated between the latter and the plate, a sleeve on the forward part of the harpoon, a plate on the end of the said sleeve, a detachable connection between the rear end of the harpoon and the torpedo, a spring adapted to be compressed by an inward thrust of said sleeve, whereby the harpoon is disengaged from the torpedo and a line connecting the latter and the harpoon, substantially as set forth.

7. In combination with a torpedo, a harpoon, oval trunnions and round bearings connecting the harpoon and the torpedo, latching mechanism near the forward end of the harpoon detachably securing the latter to the torpedo, means for engaging said latching mechanism, a spring or springs adapted to be compressed between the harpoon and torpedo, whereby the former will be forced away from the latter when they are detached, and a line connecting them together, substantially as set forth.

8. In combination with a torpedo, a harpoon, a sleeve fitted loosely thereon, a plate on the forward end of the sleeve, latching mechanism detachably securing the harpoon to the torpedo and adapted to be engaged by said sleeve, detachable connection between the rear end of the harpoon and the torpedo, a spring interposed between them, and a line connecting them together, substantially as and for the purpose set forth.

9. In combination with a driven torpedo having a firing-pin on its point, as explained, a spring, *b*, situated at one side of the firing-pin, whereby premature action of the latter is prevented when the torpedo strikes the netting or other defenses of a vessel, as set forth.

10. In combination with a torpedo, means for regulating the depth of immersion, consisting of fins b^9 on both sides of the torpedo secured to a horizontal shaft, b^{10}, passing through the latter, beam-lever b^{11}, secured to the shaft, vertical rod b^{16}, hinged to the lever, plunger b^{17}, having hinge-connection with the rod b^{16}, cylinder b^{18}, in which said plunger is adapted to be raised or depressed, elastic cover b^{19} on said plunger, effectually excluding water from the cylinder, tube b^{13}, within which the front portion of the lever is adapted to play, a spring, b^{14}, within the tube, bearing on the end of the lever, and an adjusting device provided with a shoulder against which the

spring bears, substantially as shown and described.

11. In combination with a torpedo having a detachable harpoon and the devices for controlling the torpedo when the harpoon strikes the netting or other defenses of a vessel, a spring interposed between the torpedo and harpoon, adapted to direct the torpedo in a downward course when it is released from the harpoon, substantially as and for the purpose set forth.

Dated this 11th day of November, 1887.

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