G. E. ELIA.

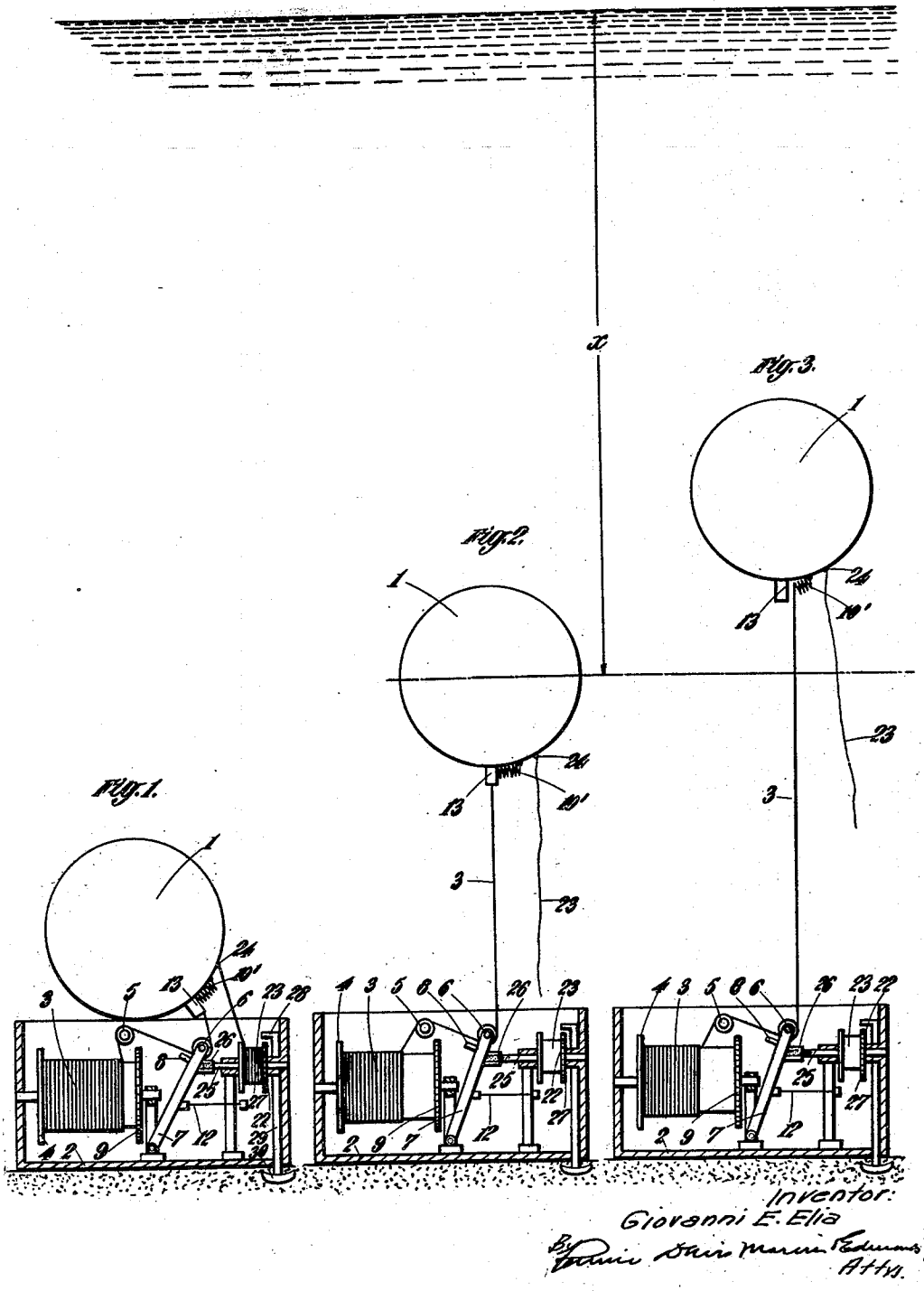
SUBMARINE MINE.

APPLICATION FILED JULY 3, 1917.

1,296,273.

Patented Mar. 4, 1919.

2 SHEETS—SHEET 1.



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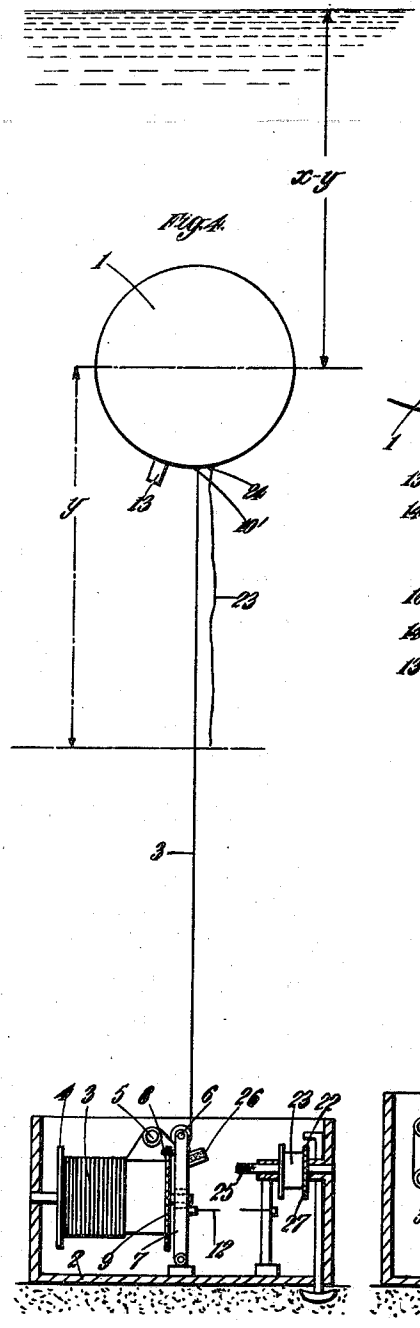


Fig. 4.

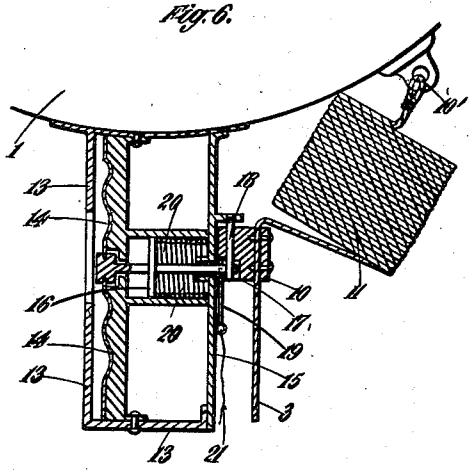


Fig. 6.

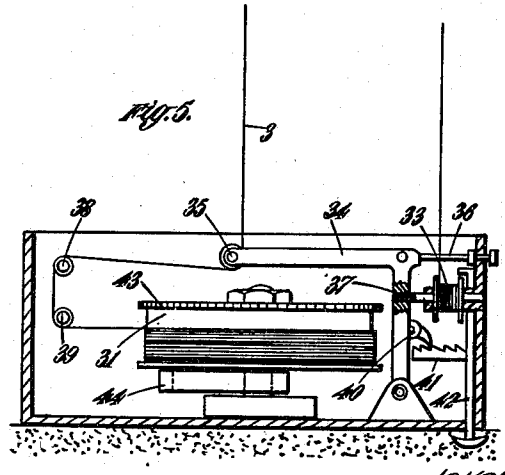


Fig. 5.

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UNITED STATES PATENT OFFICE.

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SUBMARINE MINE.

1,296,273. Specification of Letters Patent. Patented Mar. 4, 1919.

Application filed July 3, 1917. Serial No. 178,368.

To all whom it may concern:

Be it known that I, GIOVANNI EMANUELE ELIA, a subject of the King of Italy, residing at Vickers House, Broadway, Westminster, in the county of London, England, have invented certain new and useful Improvements in or Relating to Submarine Mines, of which the following is a specification.

This invention relates to submarine mines in which there is provided a flotation chamber or mine proper and an anchor connected thereto by a mooring cable, the said flotation chamber and anchor descending together on the launching of the mine until, on arriving at or near the sea bed, the flotation chamber separates from the anchor (which carries the paying-out gear for the mooring cable) and ascends toward the surface of the water until it approaches the desired depth of submersion, whereupon a hydrostatic device releases a slack length of the mooring cable, thus producing a sudden variation in the tension of the mooring cable which has the effect of actuating a device in the anchor for stopping the further paying out of the mooring cable.

According to the present invention a predetermined length of the mooring cable is held in a coiled or slack condition until released by a hydrostatic device whereupon the ascending flotation chamber rises rapidly and is subsequently arrested after taking up the slack cable, thus causing a sudden pull to be exerted on the cable which has the effect of bringing into operation a device for arresting the further paying out of the mooring cable. The operation of the said arresting device may be controlled by a member which is normally retained in an inoperative position but which is adapted to be sheared or broken by the sudden pull exerted at the proper moment on the mooring cable. Means may be provided for holding the flotation chamber locked to the mooring cable until the mine has been launched and has reached the sea bed, the said means being preferably of such a character as to act also as a safety contrivance by preventing tension being placed on the shearable member by the action of the aforesaid sudden pull until the paying out of the mooring cable has permitted the flotation chamber to become separated from the anchor to a predetermined extent.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawing, in which:—

Figures 1 to 4 are diagrammatic views showing the position the parts of the mine assume during the anchoring operation; Fig. 1 representing the parts after the mine has been launched and has reached the sea bed; Fig. 2 after the flotation chamber has separated from the anchor and the hydrostatic contrivance is about to act; Fig. 3 after the hydrostatic contrivance has acted; and Fig. 4 after the flotation chamber has reached the desired depth of immersion and further paying out of the mooring cable has stopped.

Fig. 5 is a diagrammatic view of a modified form of the mine in which the axis of the drum which carries the mooring cable is disposed vertically instead of horizontally.

Fig. 6 is an enlarged view of the hydrostatic contrivance.

1 is the flotation chamber and 2 is the anchor. 3 is the mooring cable which is wound upon a drum 4 rotatably mounted in the anchor 2. This cable passes around a pulley 5 connected to the anchor and also around a pulley 6 connected to the pivoted pawl 7 which constitutes the aforesaid locking device and has a part 8 adapted to engage with the toothed end 9 of the anchor cable drum 4. Toward the upper end of the cable 3 is located a block 10 (see Fig. 6) and between the block 10 and an eye 10′ on the flotation chamber to which the upper extremity of the cable is connected, the cable is coiled at 11 as aforesaid for a predetermined length.

The pawl 7 is normally held in its disengaged or unlocked position by a breakable or shearable member 12 which is shown as a tension wire and is of sufficient strength to resist the pull on the pawl 7 resulting from the buoyancy of the flotation chamber during the paying out of the mooring cable 3 but which becomes broken by the aforesaid sudden pull on the mooring cable 3 when the ascent of the flotation chamber is arrested. 13 is the hydrostatic contrivance comprising a diaphragm 14 to which one end of a spring pressed plunger 16 is connected, the other end entering a recess 17 in the block 10. This block is attached to the hydrostatic contrivance by a rod 18 with which the end

of the plunger 16 engages and is held in engagement by a pin 19. This pin is connected by means of a cord 21 to the anchor casing 2 so that during the ascent of the flotation chamber the pin 19 is withdrawn, thus disengaging the plunger 16 and releasing the hydrostatic contrivance. The plunger 16 is then subjected to the influence of the diminishing pressure of the sea water on the diaphragm 14 as the flotation chamber rises, which pressure is opposed by the spring 20 appertaining to the plunger 16. When the pressure of the sea water becomes less than that exerted by the spring 20, the latter moves forward the plunger 16, thus withdrawing its extremity from the rod 18. The block 10 then falls clear of the rod 18 thus leaving the coil 11 unsupported and the flotation chamber free to rise rapidly, until the slack due to the coil 11 has been taken up, whereupon a sudden pull is exerted on the mooring cable which snaps the tension wire 12 and causes the pawl 7 to engage with the paying out drum and stop further ascent of the flotation chamber.

In order to lock the aforesaid pawl 7 positively against accidental movement a small auxiliary rotary drum 22 is provided upon which is wound a short auxiliary cable 23 whose upper end is attached to the flotation chamber at 24. Rigidly connected to the drum 22 so as to rotate therewith is a screw threaded shaft 25 which engages with a screw threaded extension 26 on the pawl 7. When the drum 22 rotates the shaft 25 will be disengaged from the extension 26 and will thereby release the pawl 7. In order to prevent the premature separation of the flotation chamber 1 from the anchor 2, the end 27 of the drum 22 may be toothed and adapted to be engaged by a pawl 28 forming part of a sliding rod 29 whose extremity 30 protrudes through the base of the anchor casing so that the rod 29 will be raised and the pawl 28 lifted out of engagement with the drum 22 when the anchor reaches the sea bed. The mooring cable drum may also be provided if desired with a separate device (not shown) for unlocking the drum when the sea bed is reached.

In the modified arrangement shown at Fig. 5, 31 is the mooring cable drum which in this modification is mounted on a vertical axle 32. 33 is the small auxiliary drum and 34 is the pivoted pawl which in this instance is constituted by a bent lever having a pulley 35 at its free extremity around which the mooring cable 3 passes. 36 is the breakable member and 37 is the screw threaded shaft adapted to be rotated during the unwinding of the auxiliary cable and to be disconnected from the pawl 34, 38, 39 are a pair of additional pulleys around which the mooring cable passes, and 40 is a pawl attached to the pivoted pawl 34 which engages with a rack 41 attached to the sliding locking rod 42. The pawl 40 when the rod 42 is raised prevents the pawl 34 from swinging backward after the member 36 is broken and the continued pull of the flotation chamber due to its buoyancy causes the pawl 34 to swing forward into engagement with the toothed upper end 43 of the drum 31 thus locking it and preventing the further unwinding of the mooring cable. The operation of this modified arrangement is otherwise similar to the arrangement shown at Figs. 1 to 4.

The mooring cable drum may be provided with the usual brake shown diagrammatically at 44 in Fig. 5, for regulating the speed at which the flotation chamber ascends in the water during the paying-out of the mooring cable from its drum. The operation of the various parts of the mine will be clear from a reference to Figs. 1 to 4 of the drawings. It will be noted that if the loose length 11 of mooring cable be equivalent to the distance y and the hydrostatic contrivance is adapted to release the said length of mooring cable when the flotation chamber has in its ascent reached a position where it is situated a distance x beneath the surface of the water the final depth of immersion will be approximately $x—y$.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, and a device for arresting the paying-out movement of said gear, said device being so constructed that it will be brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance.

2. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, a device for arresting the paying-out movement of said paying-out gear and a shearable member, said member being sheared and said device being brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance.

3. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring

cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, a device for arresting the paying-out movement of said paying-out gear, a shearable member, said member being sheared and said device being brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance, and a safety contrivance for preventing tension being placed upon said shearable member until the flotation chamber has separated from the anchor to a predetermined extent.

4. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, a toothed wheel forming part of said paying-out gear and a pivoted locking pawl, said locking pawl being brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance.

5. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying out gear for said mooring cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, a toothed wheel forming part of said paying-out gear, a pivoted locking pawl, a shearable member for retaining said pawl in an inoperative position, said member being sheared and said locking pawl being brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance.

6. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, a toothed wheel forming part of said paying-out gear, a pivoted locking pawl, a shearable member for retaining said pawl in an inoperative position, said member being sheared and said locking pawl being brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance, and a safety contrivance for preventing tension being placed upon said shearable member until the flotation chamber has separated from the anchor to a predetermined extent.

7. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring cable, a hydrostatic contrivance which normally holds a length of the mooring cable in a coiled or slack condition, a block on the cable connected to a plunger which is under the influence on the one hand of a spring and on the other hand of a diaphragm forming part of a hydrostatic contrivance which latter normally holds a length of the mooring cable in a coiled or slack condition, and a device for arresting the paying-out movement of said paying-out gear, said device being brought into operation by the sudden pull exerted on the mooring cable due to the release of said coiled or slack length of mooring cable by said hydrostatic contrivance.

8. A submarine mine comprising a flotation chamber, an anchor, a mooring cable connecting said flotation chamber and said anchor, paying-out gear for said mooring cable and means whereby the paying-out of the mooring cable from a drum forming part of the paying-out gear is prevented until the mine has been launched and the anchor has reached the sea bed said means consisting of a cord connected to the flotation chamber and wound upon a drum which is supplementary to the mooring cable drum.

In witness whereof I affix my signature.

GIOVANNI EMANUELE ELIA.