No. 686,646. Patented Nov. 12, 1901.

G. ANSALDO.

MARINE TORPEDO.

(Application filed Sept. 16, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig:1.

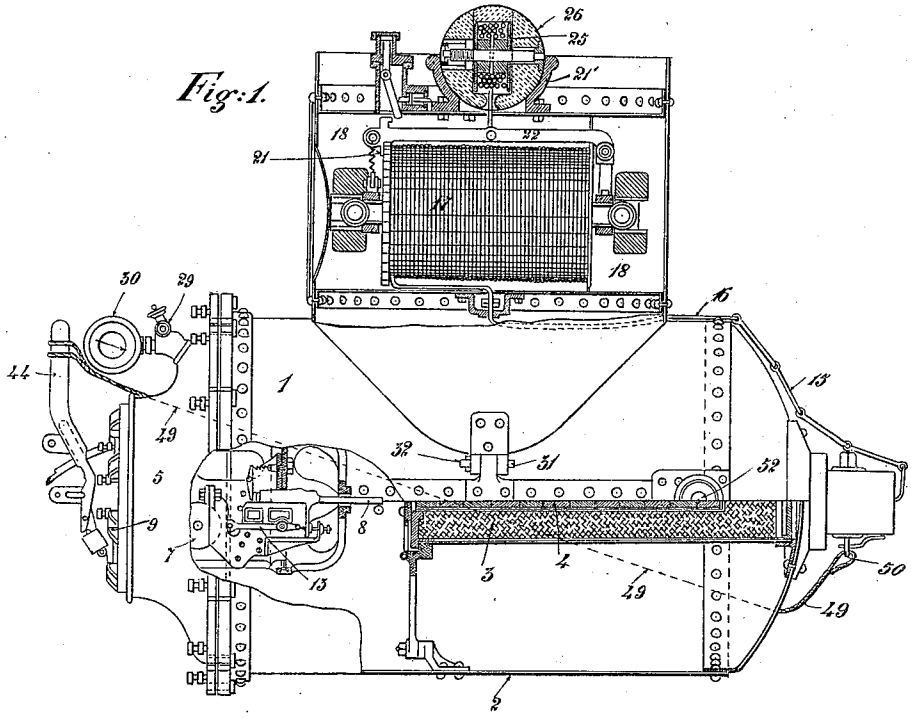
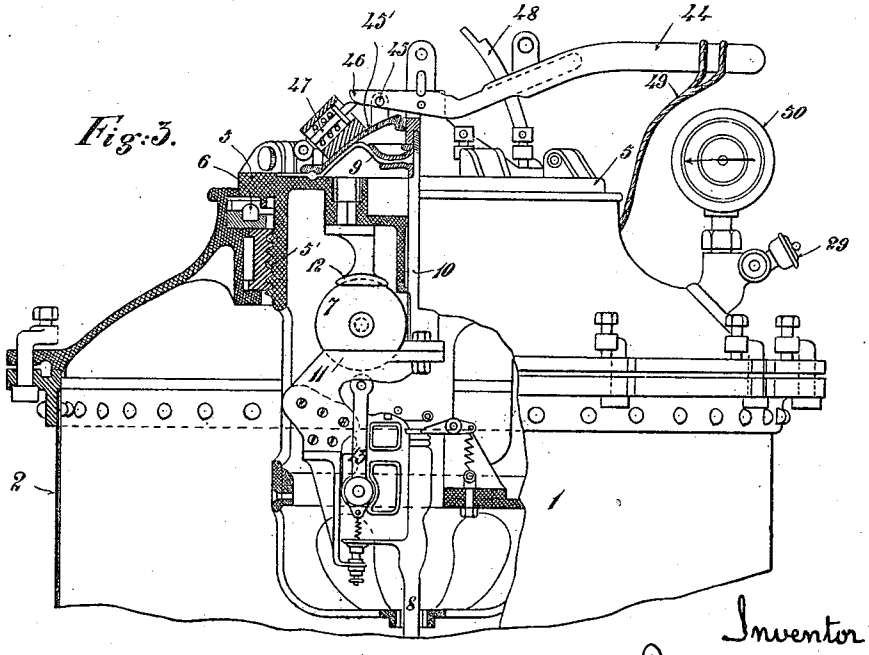


Fig:3.



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Fig. 2.

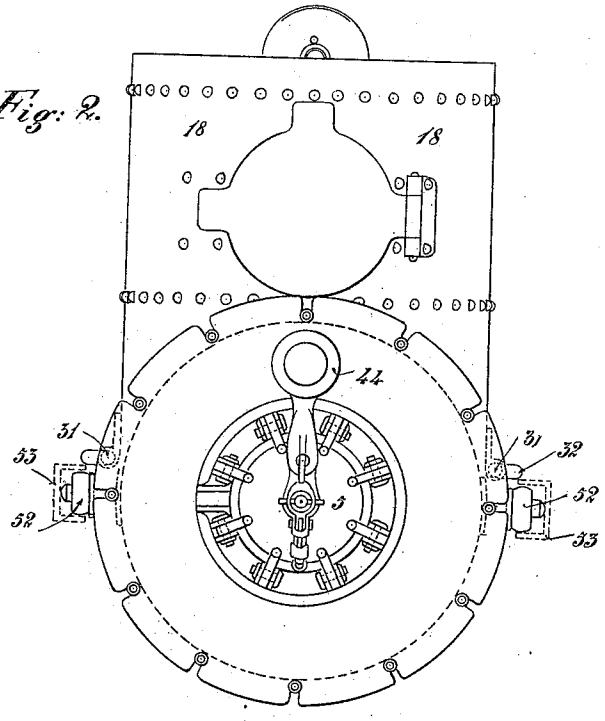
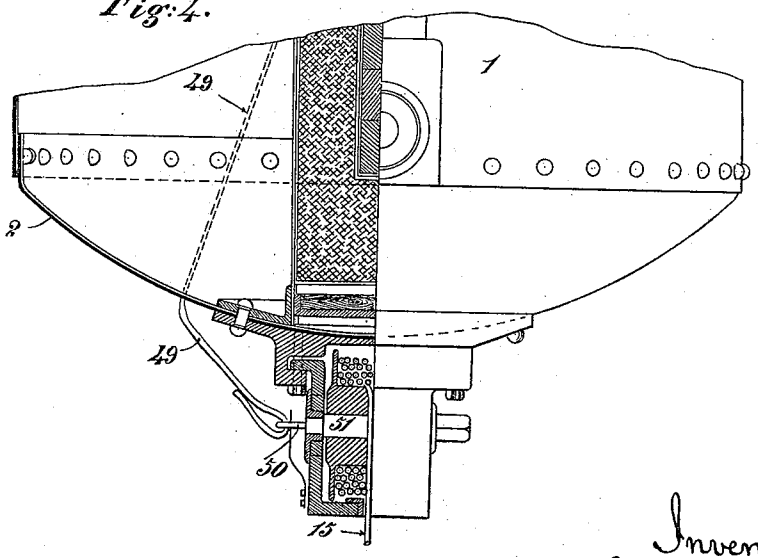


Fig. 4.



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(No Model.) 4 Sheets—Sheet 3.

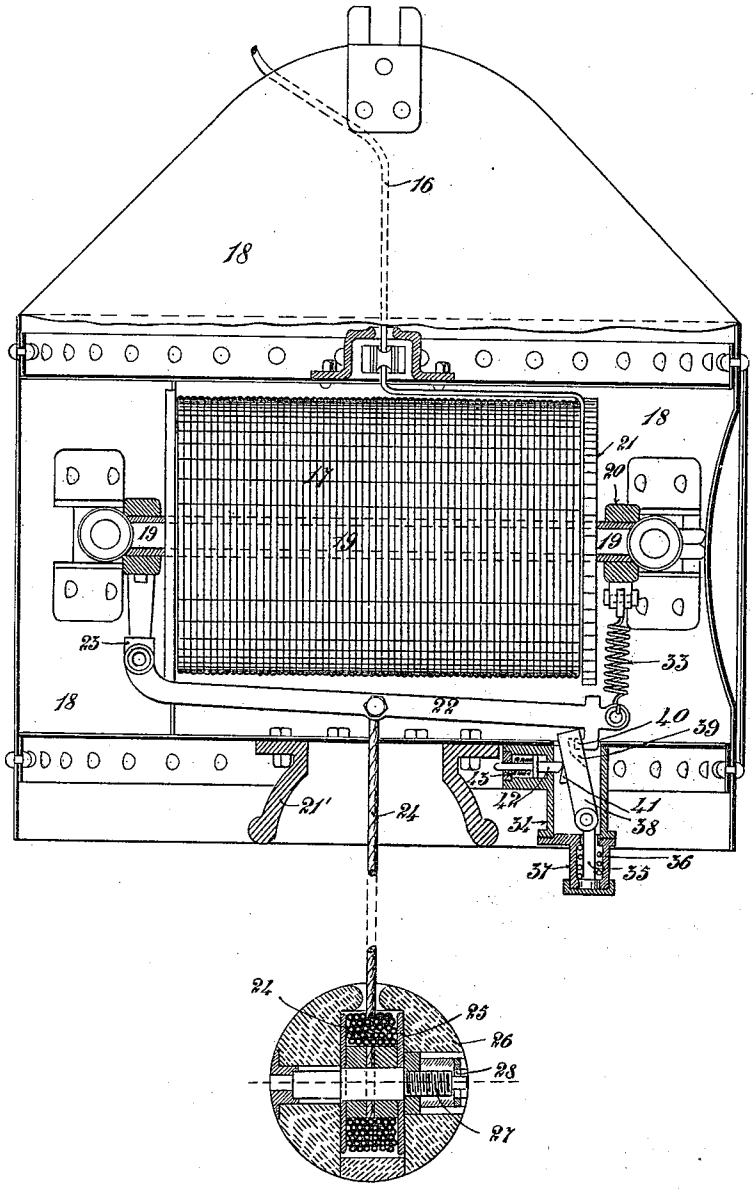


Fig. 3.

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(No Model.) 4 Sheets—Sheet 4.

Fig: 6.

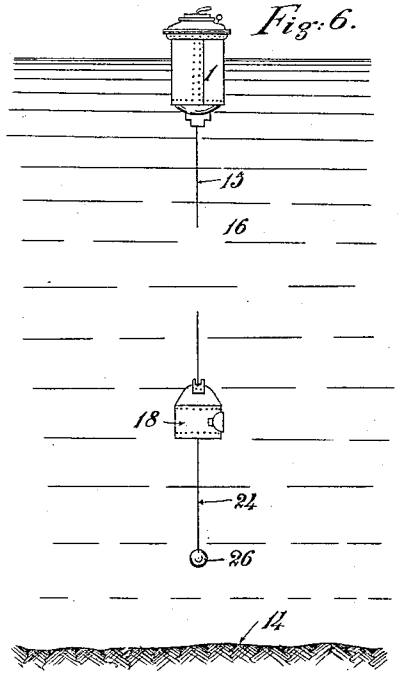


Fig: 7.

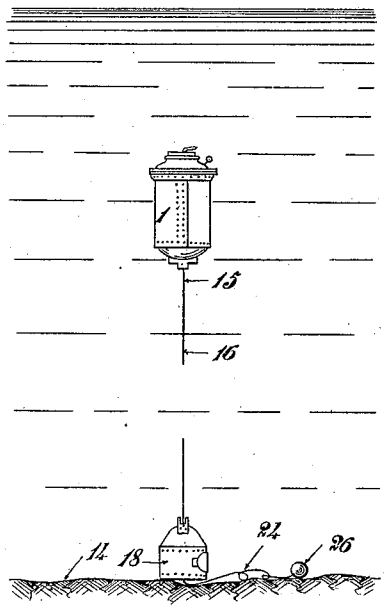


Fig: 8.

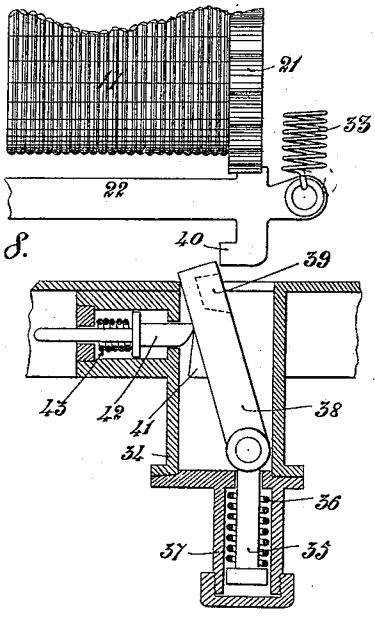
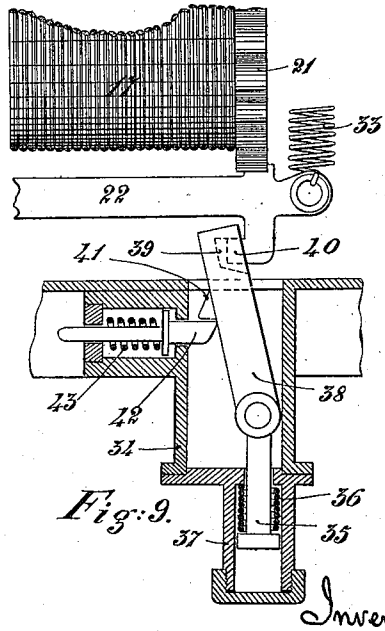


Fig: 9.



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UNITED STATES PATENT OFFICE.

GIO ANSALDO, OF GENOA, ITALY.

MARINE TORPEDO.

SPECIFICATION forming part of Letters Patent No. 686,646, dated November 12, 1901.

Application filed September 16, 1899. Serial No. 730,728. (No model.)

To all whom it may concern:

Be it known that I, GIO ANSALDO, a subject of the King of Italy, residing at Genoa, Italy, have invented a new and useful Marine Torpedo; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to submarine mines which, after having been discharged from a vessel very similar to a torpedo-boat, anchor automatically on the bottom of the sea and being thus placed at a predetermined distance defend coast cities or other coast places against a night attack by a hostile fleet. This submarine mine, which is provided with an anchor and a lead, after being discharged is guided upon rails, and its construction is such that as soon as it leaves these guiding-rails the anchor and lead are released from the body of the mine by some releasing mechanism and drop ahead of the same, while the lead moves away from the anchor for a predetermined length—namely, as far as the distance below the water-level at which it is desired to anchor the mine—so that when the said weight strikes the bottom the winding off of the anchor-rope is stopped and the mine settles under water at a distance corresponding to the length of the lead-line and is anchored there. This apparatus enables a defining force to close a harbor or to effect a sea blockade during the night and unobserved by the enemy.

In the accompanying drawings, which illustrate the invention, Figure 1 is a side view, partially sectional, of my submarine mine provided with the anchor and lead as the same appears upon a torpedo-boat before being discharged. Fig. 2 is an end view of the complete mine shown in Fig. 1. Figs. 3 and 4 show detail views, on a larger scale, of the cover and bottom of the submarine mine; Fig. 5, a detail view, on a larger scale, of the anchor and lead at the moment that the anchor itself commences to be submerged. Fig. 6 shows diagrammatically the arrangement of the various parts of the entire system during the sinking, and Fig. 7 the position of these same parts after the anchoring of the mine. Figs. 8 and 9 show details.

The submarine mine which forms the subject of my invention consists of three separate parts—to wit, first, a torpedo, with its priming and safety apparatus; second, an anchoring device, and, third, a lead.

When placed in position for launching from a vessel, the mine appears as shown in Figs. 1 and 2, the torpedo 1 being placed on one side, supported by wheels 52 and rails 53, laid on the vessel. The anchor 18 has a saddle-shaped top which straddles the torpedo when the anchor is placed upon it upside down, as shown in Figs. 1 and 2. The lead 26, which is preferably spherical, rests loosely in a cup 21′, secured to the bottom of the anchor. When the mine is launched, these three parts separate, the torpedo floating in an upright position, the anchor turning over right side up and depending from the torpedo by means of a cable 16, and the lead rolling out of its cup and falling to a predetermined depth below the anchor, all as shown in Fig. 6. The anchor-cable pays out until the lead strikes bottom, when the cable is automatically stopped, and the weight of the anchor pulls the torpedo under until the anchor settles upon the bottom. The torpedo then remains floating submerged below the surface a distance predetermined by the length of the lead-line.

The receptacle 1, which constitutes the torpedo proper, contains the explosive-shell and the priming devices and is charged with compressed air at any suitable pressure, preferably about one and one-half atmospheres. On one end of the receptacle are mounted the automatic safety devices for preventing the shell from being exploded before the mine is submerged and while it is being taken up again into a vessel. This receptacle consists of a cylindrical or otherwise suitably-shaped hollow metallic body 2, upon the outside wall of which the other contrivances are arranged in such a manner that the center of gravity of the whole device is so located that it does not allow of an inclination from the vertical exceeding thirty degrees without exploding the charge, even supposing that the mine be anchored in a stream with a current of six geographical miles per hour. The charge is similar to that of breech-loading arms—namely, the shell 3, Fig. 1, inserted first, then the fuse 4, and then the fulminating-mercury. After the charging has been completed the

receptacle is closed by means of the covering-piece 5, which is locked, preferably, by metallic screw-threads 5′, engaged by slightly rotating said covering-piece around its axis. A safe and tight closure is effected by means of the rubber packing 6. Depending from the inside of the covering-piece 5 is a cup-shaped plate 12. At the center of the covering-piece is a guide for the rod 10, which slides freely in the guide and carries at its upper end beside the covering-piece a flexible metallic diaphragm 9, whose periphery is clamped watertight to the outer surface of the covering-piece. The inner end of the rod 10 carries a bracket 11′, in which is a cup-shaped depression 11, corresponding with the cup-shaped plate 12. A heavy metallic weight, preferably a ball 7, is held between the cups 11 and 12 and is connected by a rod 13 with the trigger of the revolver 8 or similar firing mechanism secured to the bracket 11′. As long as the mine is outside of the water the compressed air inside the receptacle presses upward the hydrostatic flexible plate 9, and consequently the rod 10, which carries the lower seat 11 of the ball 7 and the revolver 8. Thereby the ball 7 is clamped between the plates 11 12, and thus held in the safety position by these plates 11 12, so that it could not be displaced even by the heaviest shock. When the torpedo has been sunk under water to the desired depth, Fig. 7, the water column on the plate 9 depresses it, and consequently moves inward the rod 10 and seat 11 of the ball 7, so that the ball 7 is no longer held clamped in the safety position by the stationary cup-plate 12. The relative construction of the ball 7 and the plates 11 12 is such that when they are thus separated the ball is free to move laterally, but not far enough to be removed from its seat. The simple impact of a wave or the steady flow of a stream will not affect the ball; but it will be suddenly and forcibly removed from its normal position only by the direct shock of a solid body—for instance, the keel of a vessel. In that case, however, the ball 7 rises upon the periphery of the depression in the plate 11 and lifts the rod 13, through the intermediary of which it trips the trigger of the revolver. This causes the revolver to be discharged not only once, but as many times as the receptacle or mine is struck by the keel of a vessel.

In order to cause an explosion, the first shot of the revolver might suffice, yet it is preferable that more than one shot can be fired in order to insure the explosion of the torpedo should one of the shells in the revolver be defective or retard the bursting of the mine. In the latter case this arrangement has the advantage that a certain time is won during the forward motion of the ship and the successive shocks of the keel against the mine, whereby the explosion can be made to occur at a more effective part of the vessel—for instance, amidships. A chain 15 leads from the bottom of the receptacle 2, preferably from a drum 51, secured to the receptacle, as hereinafter set forth. The chain is connected with the anchor rope or cable 16, wound around the drum 17. The drum 17 is placed inside the hollow anchor 18, Fig. 5, and turns around the axle 19. The anchoring device consists of a cylindrical body the longitudinal axis whereof runs parallel with the longitudinal axis of the receptacle when the two are assembled ready for launching. The cable-drum is supported in a seat which is adjustable in guiding-pieces, so that the drum can easily be removed from the anchor 18.

In order to regulate the speed of the rotation of the drum, a brake 20 is arranged upon the drum-shaft 19, and, besides, there is provided a cog-wheel 21 at one of the ends of the drum, into which enters a tooth on a detent-lever 22. One of the ends of said lever 22 is connected with the seat 23 of the drum of the anchor-cable. The other end, which is provided with the locking-tooth, is operated upon by a spiral spring 33, which presses it against the cog-wheel. The lead-line 24, which is wound around a drum 25, placed inside the hollow ball 26, is secured to the lever 22. While the line unwinds the drum 25 can rotate freely around its axle; but I prefer to provide means for determining beforehand the length of cable which shall unwind, and thereby regulate the depth to which the torpedo shall sink below the surface. To this end I employ a screw 27, rotating with the axle of the drum 25. A nut 28 is in mesh with this screw, but cannot rotate therewith by reason of guides in the ball 26, with which it engages. The rotation of the screw will therefore carry the nut along the guides; but as soon as the nut meets with an obstacle it will be stopped and will thereby prevent any further rotation of the screw, and hence stop the unwinding of the lead-line. By adjusting the position of the nut on the screw before the mine is launched the depth to which it will sink can be very accurately determined. This depth depends upon the draft of the vessel which it is desired to destroy.

Before going on to describe the invention in detail I shall for clearness sake proceed to state how the mine works.

The mine 1 is first loaded and closed tightly. This being done, air is forced into the receiver through the nozzle 29 until the desired inside pressure is attained, which can easily be seen from the gage 30. This pressure brings the firing device automatically to the safety position. The mine can then be safely laid upon one side, so that it can be moved by means of rollers 52 upon rails 53. The peculiar construction of these rails should be noted here. They are of C-shaped iron and by their shape possess the advantage that even when the sea is very high and the ship rolls heavily the mine cannot derail, since the wheels run between the upper and lower flanges of the channel-iron. The anchor 18 is placed upside down astride upon the re-

ceptacle 1 and attached thereto by means of coacting perforated lugs 31, Figs. 1 and 2, through which are passed pins 32, having laterally-projecting heads, as shown. Then after the desired length of the line or cable 24 has been unwound and fixed by set-screws 27 the lead 26 is put in its seat. Of course the chain 15 is connected with the cable 16 and the lead-line 24 with the lever 22. The entire system presents now the appearance illustrated in Figs. 1 and 2, and after it has been thus arranged the mine is thrown out. At the moment that the apparatus leaves the rails the pins 32 are drawn out by a projecting piece fixed to the end of the rails, and the anchor 18 is thereby released from the receptacle or torpedo, so that these parts fall into the water separately. The torpedo remains floating on the water, and the anchor, whose cable cannot further unwind because the lever 22 prevents the stop-wheel 21 from rotating, depends from the same; but as soon as the lead 26 by the unwinding of the line coiled up inside thereof has dropped for a determined distance lower than the anchor, Figs. 6 and 7, it will overcome the resistance of the spiral spring 33 and pull down the lever 22 through the intermediary of the cable 24, whereby the said lever will be removed from the stop-wheel 21 and the anchor and the lead, Fig. 6, will sink by the fact that the cable 16 can again unwind. At the moment that the lead 26 reaches the bottom of the sea 14 the locking-tooth of the lever 22 will be forced into the space between the teeth of the stop-wheel 21 by the spiral spring 33, and the unwinding of the cable is stopped. Then by a continued sinking of the anchor 18 the torpedo, which up to the present time was floating on the surface of the water, will be pulled downward for a distance corresponding to that which existed at the moment between the anchor and the bottom of the sea.

In case the torpedo should be anchored in such comparatively shallow water that the entire length of the anchor-cable is not needed I provide a safety device for locking the anchor-cable drum as soon as the anchor reaches bottom, and thus prevent any further unnecessary unwinding of the cable. To this end the lever 22 is provided with a hook 40, Figs. 5, 8, and 9, which can be engaged with a locking-bolt 38 of the safety device, located in a case 34, secured upon the anchor 18. The locking-bolt 38 is provided with a recess 39, into which the hook 40 of the lever 22 engages, Fig. 5, while the latter is pulled down during the automatic anchoring by means of the weight of the lead 26. The effect thereof is that when the lever 22 returns to its position of rest, which is also the position which locks the drum of the anchor-cable, Fig. 9, the locking-bolt 38, which is flexibly connected with the rod 35, is carried up by the lever, compressing the spring 36 in the casing 37, while a tongue 41, fixed to the locking-bolt 38, slides past a locking-pin 42, upon which the spiral spring 43 exercises its pressure until said pin catches the locking-bolt 38 below the tongue 41, thereby preventing a return motion of the locking-bolt 38 and of the lever 22, whose tooth is now in engagement with the stop-wheel 21. This locks the anchor-drum and prevents the lead from exerting any further influence, as well as preventing a further unwinding of the anchor-cable 16. The advantage thereof will easily be understood, as should it be desirable to raise the anchor to the surface by pulling the cable 16 no unwinding of the cable around the drum 17 can take place.

In order to bring the mine into a condition of safety when under water, the lever 44, Fig. 3, which is fulcrumed on the bolt 45, is turned upward by means of a hook or the like operated as a drag by an operator in the vessel and engaging with the eye at the end of the lever. (Shown in Fig. 2.) It will be observed that the rod 10 has a slot in its upper end through which passes a pin on the lever 44. The slot permits the rod to be moved inwardly by the pressure on the diaphragm 9 without affecting the lever. A bridge 45′ spans the diaphragm to support the fulcrum 45 and incidentally guide the upper end of the rod 10. When the diaphragm is depressed, the upper end of the slot lies close to the pin on the lever 44, so that when said lever is raised it will simultaneously raise the rod 10 and the seat 11 of the ball 7, so that the latter will remain caught between the seat 11 and the counter-plate 12. The shorter arm 46 of the lever 44 will operate against the locking-pin 47, which is under spring-pressure and will be pressed into its casing. When the movement of the lever is complete, its short arm passes by the locking-pin 47 and is locked thereby. The long arm of the lever 44 is made in two parts telescoped together. A rod 48, pivoted to the covering-piece 5, passes through registering holes in said two portions and fastens them together. When the lever is raised high enough to enable it to engage with a shoulder formed by the cut-away portion of the upper end of the rod, the lever will be locked in this raised position, holding the ball 7 firmly clamped. At the same time the two parts of the lever-arms become unfastened and the outer part can be drawn to the surface by the hook in the hands of the operator. Secured to this part of the lever is a cord 49, the lower end of which is fastened to a locking-pin 50, which prevents the drum 51 from rotating. On the drum is wound a cable attached to the upper end of the chain 15. As soon as the operator gets hold of the cord 49 he can pull out the locking-pin 50 and free the drum 51. The torpedo at once rises, unwinding the cable on the drum 51. When the torpedo reaches the surface of the water, it can be hoisted on board, and then the anchor and lead can be raised by means of the cables attached thereto.

By removing the locking-bolt 38, Figs. 5, 8, and 9, before letting the torpedo sink it will be possible to bring the latter to the surface and out of operation by using the force exercised by the towboat upon the anchor 18. In this case when lifting the anchor 18 the lead 26 will commence to operate, whereby the strap 22 will drop and the anchor-cable 16 unwind, while the torpedo, on account of the compressed air which it contains, will reach the surface in a safe condition, as the outside pressure of the water will no longer keep the hydrostatic plates pressed inward, so that the ball 7 will be clamped in the safety position by the internal air-pressure operating on the plate 9.

Having now described my invention, what I claim is—

1. A submarine mine, comprising a buoyant torpedo, an anchor normally arranged above said torpedo, and a lead normally arranged above said anchor, and flexible cables connecting said parts.

2. A submarine mine, comprising a buoyant torpedo, an anchor, a lead, winding-drums in the anchor and lead, and flexible cables wound on said drums and attached to the torpedo, anchor and lead.

3. A submarine mine, comprising a buoyant torpedo, an anchor normally arranged above said torpedo and a lead normally arranged above said anchor all connected by flexible cables and constructed to fit together for launching.

4. A submarine mine, comprising a cylindrical torpedo, an anchor adapted to fit on top of said torpedo when laid upon its side, and a flexible cable connecting said torpedo and anchor.

5. A submarine mine, comprising a cylindrical torpedo, an anchor adapted to fit on top of said torpedo, a seat secured to the bottom of said anchor, a lead fitting said seat, and flexible cables connecting said torpedo and anchor and said anchor and lead.

6. In a submarine mine, the combination with a torpedo, of an anchor, a drum in said anchor, and a flexible cable wound on said drum and connected with said torpedo.

7. In a submarine mine, the combination with a torpedo, of an anchor, a drum in said anchor, and a flexible cable wound on said drum and connected with said torpedo, and means for checking the unwinding of said cable when the anchor reaches bottom.

8. In a submarine mine, the combination with a torpedo, of an anchor, a drum in said anchor, and a flexible cable wound on said drum and connected with said torpedo, a spring-actuated detent-lever adjacent to the drum, and weight suspended from said lever below the anchor.

9. In a submarine mine, the combination with a torpedo, of an anchor, a drum in said anchor, and a flexible cable wound on said drum and connected with said torpedo, a toothed stop-wheel on the drum, a detent-lever to engage with said stop-wheel, a weight to keep the lever out of engagement with said stop-wheel until the weight reaches the bottom, and a locking device to lock the lever in engagement with the stop-wheel.

10. In a submarine mine, the combination with a torpedo, of an anchor, a drum in said anchor, a cable wound on the drum and connected with the torpedo, a spring-actuated detent-lever to lock said drum, a weight suspended from said lever, a hook on the lever, a spring-bolt adapted to be engaged by the hook, and a spring-catch for locking said bolt when raised by the lever.

11. In a submarine mine, the combination with a torpedo, of an anchor, a flexible cable connecting them, a lead containing a drum, a line wound on the drum and secured to the anchor, and means for regulating the amount of line that can unwind from said drum.

12. In a submarine mine, the combination with a torpedo, of an anchor, a flexible cable connecting them, a lead containing a drum, a line wound on the drum and secured to the anchor, and means for regulating the amount of line that can unwind from said drum, consisting of a device for automatically stopping the drum when a predetermined length of lead-line has been unwound.

13. In a submarine mine, the combination with a torpedo, of an anchor, a flexible cable connecting them, a lead containing a drum, a line wound on the drum and secured to the anchor, and means for regulating the amount of line that can unwind from said drum, consisting of a screw on the axle of the drum, a nut meshing with said screw, and guides for preventing said nut from rotating with the screw when the line is unwound from the drum.

14. In a submarine mine, a torpedo provided with a receptacle having a portion movable by fluid-pressure, and priming mechanism controlled by said movable portion.

15. In a submarine mine, a torpedo provided with a receptacle comprising a flexible plate movable by fluid-pressure, and priming mechanism controlled by said plate.

16. In a submarine mine, a torpedo comprising a receptacle provided with a removable closing-piece, a flexible plate forming part of said closing-piece, and priming mechanism carried by said closing-piece and controlled by the movement of said plate.

17. In a submarine mine, a torpedo comprising a receptacle provided with a removable closing-piece, a flexible plate forming part of said closing-piece, priming mechanism attached to said plate, and a firing device released by the inward movement of the plate.

18. In a submarine mine, a torpedo comprising a receptacle provided with a removable closing-piece, a flexible plate forming part of said closing-piece, a revolver attached to said plate, and a firing device for said revolver released by the inward move-

ment of the plate and actuated by gravity when the torpedo is inclined.

19. In a submarine mine, the combination with a torpedo, of a revolver, a weight connected with the trigger of said revolver, and means for clamping said weight and for automatically releasing it by the increasing pressure of the water as the torpedo sinks.

20. The combination with a torpedo, of a revolver, a ball connected with the trigger of said revolver and means for automatically clamping said ball when the torpedo is out of the water, and for automatically releasing it when the torpedo sinks.

21. The combination with a torpedo, comprising a flexible plate, of a revolver carried by said plate, a ball connected with the trigger of said revolver, and a cupped plate attached to the revolver and adapted to clamp and release said ball.

22. The combination with a torpedo, of means for locking the firing mechanism before the torpedo is raised out of the water, and a safety device operative from the outside of said torpedo for actuating said locking means.

23. The combination with a torpedo, of a firing device comprising an actuating-weight, means for freeing the weight when the torpedo sinks, and means operative from the outside for clamping the weight before the torpedo is raised.

24. The combination with a torpedo, of a flexible plate, a firing device carried thereby, a ball for actuating the firing device, a clamp for the ball connected with the plate, a rod projecting through the plate, and a lever for raising the rod and clamping the ball at will.

25. The combination with a torpedo, of a flexible plate, a firing device carried thereby, a ball for actuating the firing device, a clamp for the ball connected with the plate, a rod projecting through the plate, and a lever for raising the rod and clamping the ball at will.

26. The combination with a torpedo, of a drum, an anchoring-cable wound on the drum, a locking-pin for said drum, a lever made in two separate parts, and a connection between one of said parts and the locking-pin.

27. The combination with a torpedo, of a drum, an anchoring-cable wound thereon, a locking-pin for said drum, a safety device for the firing mechanism, a two-part lever for operating said safety device, and a connection between a separate part of said lever and said locking-pin.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GIO ANSALDO.

Witnesses:
ERNST OTTME,
CH. BUCHLI.