

June 16, 1925.

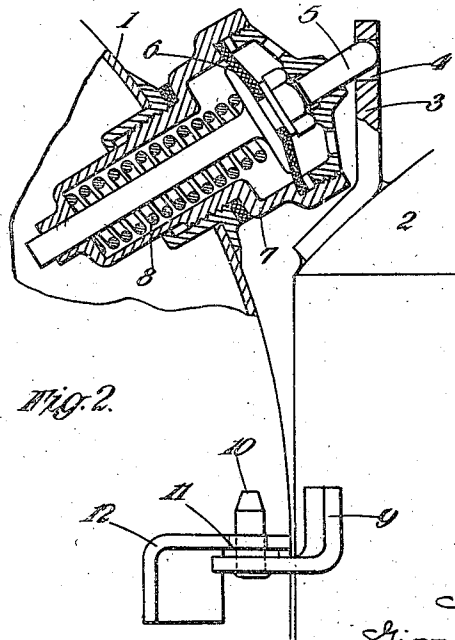
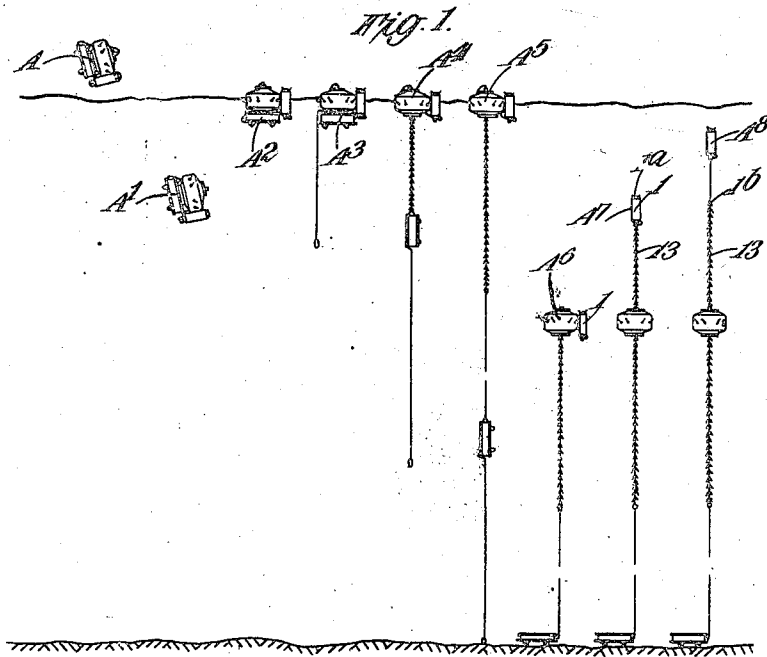
1,542,543

G. E. ELIA

SUBMARINE MINE

Filed Dec. 1, 1924

2 Sheets-Sheet 1



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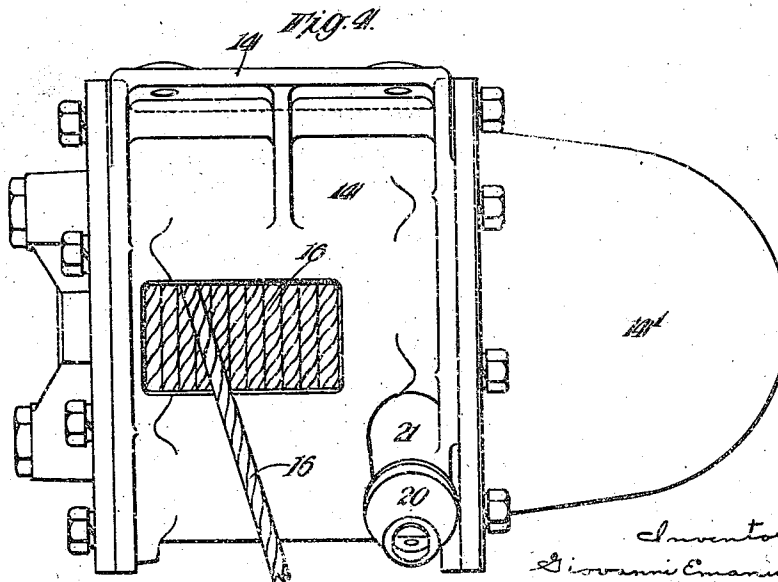
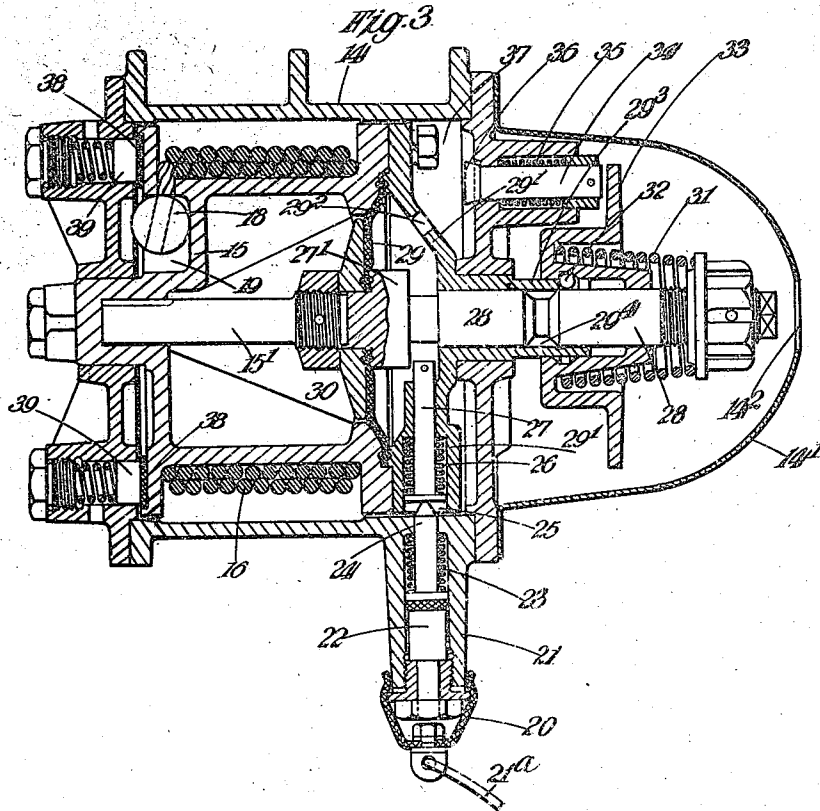
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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SUBMARINE MINE.

Application filed December 1, 1924. Serial No. 753,144.

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.

10 This invention relates to submarine mines.

In certain classes of submarine mines, especially those intended for use against submarines, or both against submarines and surface craft, the flotation chamber, which contains the explosive charge, is adapted to be anchored at a considerable depth below the surface of the water and, in order to increase the effective range of the mine, it has been proposed to provide the mine with auxiliary firing gear including or constituted by a line or cable which is supported by a buoy or float or by an auxiliary mine located above the flotation chamber. The said buoy or auxiliary mine may itself be provided with horn batteries and contact devices such as those of the Herz battery type or such contact devices in the float may be adapted when struck to fire the main mine or both the main and the auxiliary mine. The line by which the buoy or auxiliary mine is connected to the flotation chamber, is or may also be provided with contact devices which, when struck by a passing body, effect the explosion of the main charge within the flotation chamber. At the present time the aforesaid buoy or auxiliary mine is connected to the flotation chamber by a predetermined length of line which is allowed to unwind freely immediately after launching of the mine and during its descent to the sea bed. Owing, however, to various causes, such as disturbances set up during the sinking of the anchor to the sea bed which interfere with the paying out of the predetermined length of mooring cable for the flotation chamber, the buoy or auxiliary mine which is connected to the flotation chamber may either become incorrectly anchored at such a depth below the surface as to be ineffectual against surface craft or against a submarine travelling at a short distance below the surface, or else it may ascend to the surface of the water and betray the presence of the submarine.

55 According to one feature of the present

invention and in cases where accurate anchoring of the flotation chamber can be relied upon, the buoy or auxiliary mine (hereinafter termed the auxiliary mine) is normally secured to the flotation chamber or main mine by means of a suitable delay action device such as a soluble plug or a hydrostatic release until after the mine has been launched and the flotation chamber itself has been anchored at the predetermined distance below the surface, the buoy or auxiliary mine being then released from the flotation chamber and the line connecting it to the flotation chamber being allowed to uncoil or pay out until the auxiliary mine has ascended to a predetermined depth below the surface.

According to another feature of the present invention the final depth of submersion of the auxiliary mine is determined in an accurate manner by means which act independently of the flotation chamber or main mine, whether the latter has been anchored at the correct depth of submersion or not and whether or not the auxiliary mine is allowed to separate from the flotation chamber or main mine immediately after launching, or normally held in contact therewith, as explained above, by means of a delay action device until after the flotation chamber has been anchored. To this end the line, or a portion of the line, which connects the buoy to the flotation chamber or main mine may be carried upon a drum or reel and means such as a hydrostat may be provided on the auxiliary mine, or on the cable, or on a casing adjacent to the auxiliary mine, which, when the auxiliary mine has ascended to the predetermined depth below the surface, stop the continued paying out of the line. The said line may be carried on a drum which is located on, or within the auxiliary mine itself, on the mooring rope contiguous to the auxiliary mine, or on, or within, or contiguous to the flotation chamber or main mine, and the hydrostat may be adapted to lock the drum or otherwise to stop the paying out of the line directly or it may be associated with an auxiliary line which it releases and which serves to stop the paying out of the line in a similar manner to that proposed in connection with certain classes of submarine mines for anchoring the flotation chamber at a predetermined depth below the surface, or any of the other methods

proposed for this purpose in connection with the anchorage of flotation chambers may also be used for accurately anchoring the auxiliary buoy. Alternatively the line may be carried upon paying out gear located either within the flotation chamber, within the auxiliary mine itself or supported adjacent to the auxiliary mine or to the flotation chamber, and a hydrostat may be provided which is adapted to release or actuate a source of power such as a mechanical or compressed air motor, or to complete a battery circuit for actuating an electric motor, thereby rotating (for example through worm gearing) a drum on which the line is wound or actuating a device to which one end of the line is connected. The hydrostat is set so that it comes into operation at a predetermined depth below the surface, and on the prime mover being actuated the line is either wound in or unwound to the required extent to secure the final anchorage of the auxiliary mine at the proper depth below the surface.

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:—

Figure 1 is a diagrammatic view showing the sequence of operations of the main mine and the auxiliary mine.

Figure 2 is a detail view showing a form of hydrostat release which normally maintains the auxiliary mine in contact with the main mine or flotation chamber.

Figure 3 is a sectional view showing the paying out gear for the last section of the line which determines the final depth of submersion of the auxiliary mine, and

Figure 4 is an outside view of Figure 3.

Referring to Figure 3, 14 is a casing which is located within or attached to the auxiliary mine. 15 is a drum rotatably mounted upon a shaft 15¹ and 16 is a length of auxiliary line wound upon the drum 15, the line in the example shown being 30 feet in length. 29 is the diaphragm of a hydrostat and 29¹ is a flange bolted to one of the end plates of the drum 15 and provided with openings 29² through which water has access to the diaphragm 29. 28 is the spindle of the hydrostat which extends through the sleeve 29³ of the flanged part 29¹. 32 is a ball locking device and 29⁴ is a recess in the spindle 28 of the hydrostat which co-operates with the ball locking device, the function of which will hereinafter be described. 14¹ is a casing which encloses the front part of the hydrostat and the adjacent parts, the said casing being provided with an opening 14² through which water has access to the diaphragm 29 of the hydrostat through the openings 29². The flange 29¹ is provided with projections 37,

37 which co-operate with a spring-controlled plunger 34, 35, 36 which acts as a locking device as hereinafter described. 30 is an air chamber behind the hydrostatic diaphragm 29, and 27 is a spindle which is located within a recess in the flange 29¹ and which projects in front of a boss 27¹ on the spindle 28 and normally locks the hydrostat against movement until the auxiliary mine has separated from the main mine or flotation chamber: 38 is a friction disc which is pressed into contact with one end of the drum 15 by means of spring pressed plungers 39, 39, so as to control the rate at which the auxiliary line 16 is paid out. 24 is a spindle which engages within a recessed part 25 of the flanged sleeve 29¹ so as normally to lock the drum 15 against rotation, and 22 is a soluble plug to which water is admitted after the auxiliary mine has separated from the flotation chamber or main mine so that it dissolves by the action of the sea water and releases the locking spindles 24 and 27. 33 is a flanged disc mounted upon the sleeve 29³ and spindle 28 which co-operates with the spring controlled plunger 34, 35, 36 to effect the locking of the drum 15 when the auxiliary mine has reached the set depth of submersion, the said disc being controlled by a spring 31 in the manner hereinafter described.

The sequence of operations will first be described with reference to the diagrammatic view shown at Figure 1.

A (Figure 1) illustrates the mine after it has been launched and before it strikes the water. A¹ shows the mine after it has sunk to a certain depth below the surface, and A² shows the complete mine after it has risen to the surface. At the position shown at A³ the plummet is released and the plummet line descends to the depth corresponding to the required depth of submersion of the main line. At the position shown at A⁴ the sinker has been released and is in the act of descending leaving both the main and the auxiliary mines on the surface until (position A⁵) the plummet touches the sea bed when the mooring drum in the sinker is automatically locked. At position A⁶ the main mine or flotation chamber is shown at the set depth of submersion and at this point the auxiliary mine 1 is released in any suitable manner, for example by a hydrostatic release or alternatively by a soluble plug, a suitable form of hydrostatic release being hereinafter described, and ascends freely (position A⁷) to a position some distance below the depth at which it is to be anchored. At position A⁷ a length of mooring cable is still retained on a drum carried within the auxiliary mine 1, and after a sufficient time has elapsed to allow the main mine to settle down in position the afore-said auxiliary drum within the auxiliary

mine 1 is released and the auxiliary mine continues to ascend until the set depth is reached (position A⁶) whereupon the auxiliary drum is locked, for example by a hydrostatically operated device.

2 (Figure 2) is the main mine or flotation chamber which may be of any suitable construction and which is provided with a projecting flanged part 3 having an opening 4 adapted to be engaged by a plunger 5. The plunger 5 is connected to a hydrostatic diaphragm 6 located within a casing 7 secured to the auxiliary mine 1. The area of the diaphragm 6 as also the strength of the hydrostat spring 8 is such that the plunger 5 is withdrawn from engagement with the opening 4 in the flange 3 at or slightly above the depth at which the flotation chamber or main mine 2 is anchored (position A⁶). The auxiliary mine is also connected to the main mine by a bracket 9 attached to the main mine and carrying an upright pin 10 which engages within an opening 11 in a bracket 12 attached to the auxiliary mine 1. In view of this arrangement and on the depth being reached for which the hydrostat has been set (position A⁶) the pin 5 will be withdrawn out of engagement with the bracket 3 and the auxiliary mine 1 will rise, thus withdrawing the bracket 12 from engagement with the pin 10 carried by the bracket 9. Instead of attaching the auxiliary mine to the main mine by a hydrostatic release as aforesaid a soluble plug may also be used and in such cases the soluble plug will be adapted to dissolve only after the main mine has been anchored at the predetermined depth below the surface (position A⁶). The auxiliary mine 1 is of the type which in addition to acting as a buoy which supports the auxiliary contact devices 13, 13, the mine 1 is itself furnished with contact devices 1^a which, on being struck, serve to explode the mine.

Referring more particularly to Figures 3 and 4, one end of the auxiliary line 16 which is wound upon the drum 15 is connected as shown at 1^b to the cable which carries the auxiliary contact devices 13, 13, the other end of the line being secured by means of a ball 18 located within a cavity 19 in the drum 15. The drum 15 is normally locked and remains locked until the hydrostat 6 has released the auxiliary mine 1 from the main mine and the auxiliary cable with the contact devices 13 has unwound to the position shown at A⁷. When the auxiliary mine 1 leaves the main mine 2 owing to the actuation of the hydrostatic release 6 a rubber cover 20 attached by a short line 21 to the main mine is pulled off the end of a projecting member 21 containing the soluble plug 22. Water thereupon has access to the soluble plug 22 and dissolves the same. The dissolution of the soluble plug 22 then allows

a spring 23 to draw down the locking spindle 24 so that it is disengaged from the recess 25 in the flanged sleeve 29¹. The withdrawal of the pin 24 by the spring 23 also allows a spring 26 to retract the spindle 27, thus releasing the spindle 28 of the hydrostat 29. When the auxiliary line 16 has paid out to such an extent as to allow the auxiliary mine 1 to ascend to the set depth, the hydrostatic pressure on the diaphragm 29 is reduced to that at which the previously regulated spring 31 has been adjusted, thus allowing the spring 31 to draw out the hydrostatic spindle 28 until the groove 29⁴ formed therein comes opposite the balls 32 of the ball releasing device. The balls 32 are then forced into the groove 29 thus releasing the part 33. On the part 33 being released it is pushed in by the spring 31 and in turn moves forward the locking pin 34, said locking pin 34 being normally maintained by means of a spring 35 in the position shown at Figure 3. On the pin 34 being moved forward its front end 36 engages within the projections 37 on the flanged sleeve 29¹ which is bolted to the drum 15 thus preventing further rotation of the same and so stopping the unwinding of the auxiliary cable 16. The auxiliary mine is then locked at the set depth.

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

1. A submarine mine comprising, a buoyant casing, a flotation chamber, a line attaching said buoyant casing to said flotation chamber, means for securing said buoyant casing to said flotation chamber until the latter has been anchored, means acting thereafter to release the buoyant casing from said flotation chamber, and means for arresting the ascent of said buoyant casing at a predetermined point.

2. A submarine mine comprising, a buoyant casing, a flotation chamber, a line attaching said buoyant casing to said flotation chamber, a delay action device for securing said buoy to said flotation chamber until the flotation chamber has been anchored and thereafter releasing the buoyant casing from said flotation chamber so as to allow it to ascend towards the surface and means for arresting the ascent of said buoyant casing at a predetermined point.

3. A submarine mine comprising, a buoyant casing, a flotation chamber, a line attaching said buoyant casing to said flotation chamber, means for securing said buoyant casing to said flotation chamber until the flotation chamber has been anchored, means acting thereafter to release the buoyant casing from said flotation chamber, means for arresting the ascent of said buoyant casing at a predetermined point, and contact devices disposed along the line which connects the buoyant casing to the

flotation chamber, said contact devices serving to explode said flotation chamber on being struck.

4. A submarine mine comprising, a buoy, 5
a flotation chamber, a line attaching said 10
buoy to said flotation chamber, means for securing said buoy to said flotation chamber until the flotation chamber has been anchored, means acting thereafter to release 15
the buoy from said flotation chamber, means for arresting the ascent of said buoy at a predetermined point, said buoy being provided with contact devices which serve to effect the explosion of said flotation chamber 20
on the buoy being struck by a passing vessel.

5. A submarine mine comprising, a buoy- 25
ant casing, a flotation chamber, a line attaching said buoy to said flotation chamber, means for securing said buoy to said 30
flotation chamber until the flotation chamber has been anchored, means acting thereafter to release the buoy from said flotation chamber, means for arresting the ascent of 35
said buoy at a predetermined point, and contact devices on said buoy and on said line which serve to effect the explosion of said flotation chamber on being struck by a passing vessel.

6. A submarine mine comprising a buoy, 30
a flotation chamber, a line attaching said buoy to said flotation chamber, a hydrostatically controlled device normally holding said buoy in contact with said flotation 35
chamber so that said flotation chamber and said buoy constitute a single launching unit, said device acting at a predetermined depth

to release the buoy from the flotation chamber and allow it to ascend and means for 40
arresting the ascent of said buoy at a predetermined point.

7. A submarine mine comprising a flotation chamber, a buoy, a length of line attaching said buoy to said flotation chamber, 45
a device normally holding said buoy in contact with said flotation chamber so that said flotation chamber and said buoy constitute a single launching unit, means which, on the flotation chamber being anchored, allow a portion of said line to unwind, and 50
means acting thereafter to release an auxiliary length of line so as to allow the buoy to ascend to a set depth after the flotation chamber has settled down in the anchored position. 55

8. A submarine mine comprising a flotation chamber, a buoy secured to said flotation chamber by a length of line, a device normally holding said buoy in contact 60
with said flotation chamber so that said flotation chamber and said buoy constitute a single launching unit, means which, on the flotation chamber being anchored at the set depth of immersion, allow a portion of the line connecting the buoy to the flotation 65
chamber to unwind freely, means for releasing an auxiliary length of line so as to allow the buoy to ascend to a further extent after the flotation chamber has settled down in the anchored position and hydro- 70
statically controlled means for stopping the paying out of the auxiliary length of line when the buoy has ascended to the set depth.

GIOVANNI EMANUELE ELIA.