July 21, 1925. 1,546,921

G. E. ELIA

SUBMARINE MINE

Filed Dec. 1, 1924 2 Sheets-Sheet 1

Fig. 1.

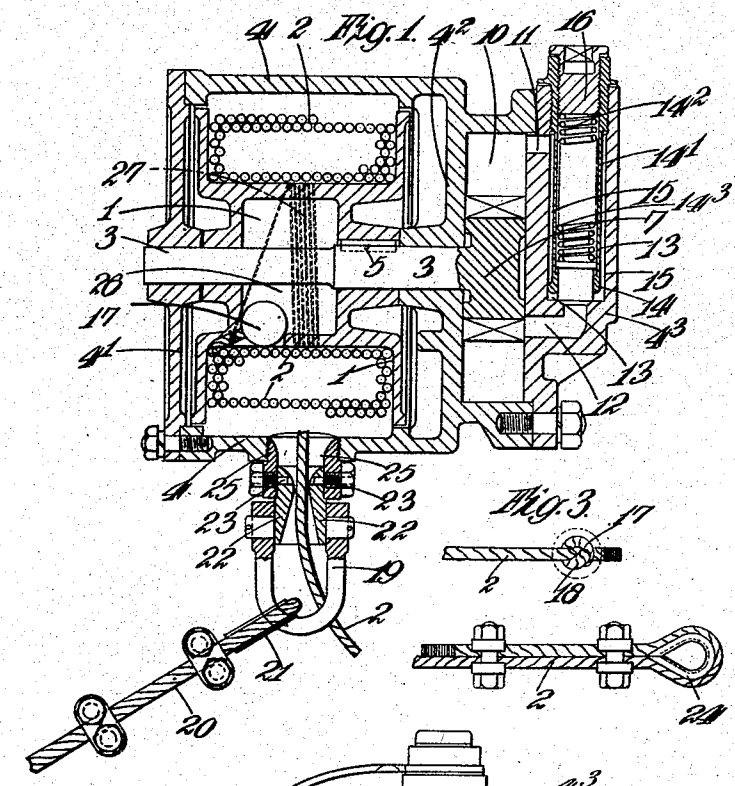
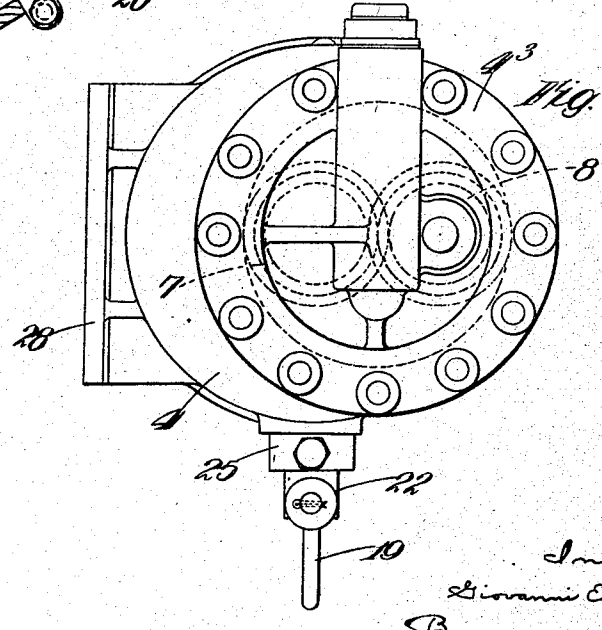


Fig. 3.

Fig. 2.



Inventor
Giovanni Emanuele Elia
By
Pennie, Davis, Marvin & Edmonds
Attorneys

July 21, 1925.

1,546,921

G. E. ELIA

SUBMARINE MINE

Filed Dec. 1, 1924

2 Sheets-Sheet 2

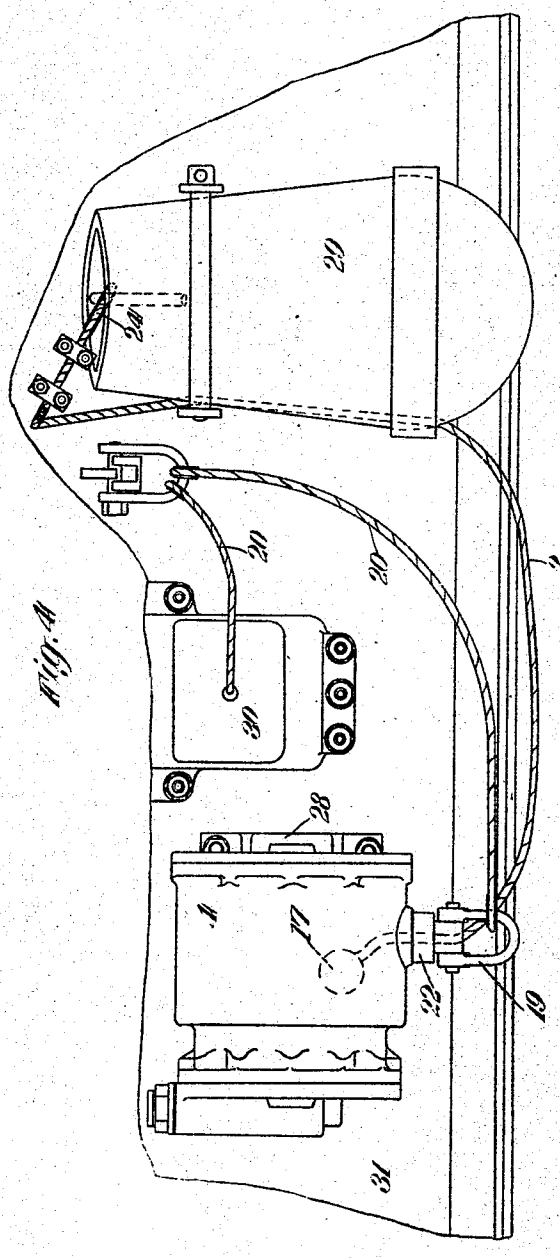


Fig. 4

Inventor
Giovanni Emanuele Elia

By
Pennie, Davis, Marvin & Edmonds
Attorneys

Patented July 21, 1925. 1,546,921

UNITED STATES PATENT OFFICE.

GIOVANNI EMANUELE ELIA, OF WESTMINSTER, LONDON, ENGLAND, ASSIGNOR TO VICKERS LIMITED, OF WESTMINSTER, ENGLAND, A BRITISH COMPANY.

SUBMARINE MINE.

Application filed December 1, 1924. Serial No. 753,143.

To all whom it may concern:

Be it known that I, GIOVANNI EMANUELE ELIA, a subject of the King of Italy, of 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 of the kind which comprises a flotation chamber or mine proper and an anchor or sinker containing a drum on which is wound a mooring cable which connects the anchor or sinker to the flotation chamber, a plummet being provided which is normally adapted to hold a pawl or pawling gear out of engagement with ratchet teeth on the cable drum during the descent of the anchor in the water so as to allow the mooring cable to unwind, and the plummet, on touching the sea bed, being adapted to allow the pawl to engage with the ratchet teeth so as to stop the continued unwinding of the mooring cable, the sinker then drawing the flotation chamber beneath the surface of the water until it assumes the depth predetermined by the length of the line which connects the plummet to the pawl or pawling gear. In certain cases, especially where the mine is adapted to be used against submarines and where the flotation chamber requires to be anchored at a considerable depth below the surface of the water, the plummet line must of necessity be of considerable length and owing to this fact the strain on the plummet line when the plummet is suddenly stopped at the end of a free descent is so great that the line may break, thus rendering the mine useless.

According to the present invention the plummet line is wound upon a drum or reel mounted either within the plummet itself or preferably within the anchor or sinker and means are provided which admit of a uniform unwinding of the plummet line. To this end suitable braking means are provided for the drum or reel, the braking means being, for example, of a similar type to those usually employed for controlling the unwinding or paying out of the mooring cable, e. g. a friction brake, a hydraulic or other liquid brake or an oil pump brake provided with means for regulating the circulation of the fluid so as to control at will the rate at which the plummet line is allowed to pay out.

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 which shows by way of example one embodiment of the invention and in which:—

Figure 1 is a sectional elevation of the improved plummet drum and its braking mechanism.

Figure 2 is an end view thereof, and

Fig. 3 is a detail.

Figure 4 is a fragmentary view showing part of the sinker, the casing for the plummet line, as also the plummet and the connection to the pawling gear.

1 is the drum or reel on which the plummet line 2 is wound. 3 is a shaft which is rotatably mounted in the end plate $4'$ and intermediate plate 4^2 of an enclosing casing 4 which carries the drum or reel 1, the latter being keyed to the shaft 3 by a key 5. Attached to the shaft 3 is a gear wheel 7 which rotates within a compartment 10 formed by the intermediate plate 4^2 and an outer cover plate 4^3, said gear wheel 7 meshing with a second gear wheel 8. The compartment 10 is filled with a suitable liquid, for example, thick castor oil, and the liquid is driven by the gear wheels 7 and 8 in a closed circuit through a suction port 11 and a delivery port 12 communicating with a space 13 in the outer cover plate 4^3. 14 is a spring loaded valve which is mounted within a tubular guide $14'$, which communicates by means of a port 14^3 with a space 15 being left between the guide 14 and the wall of the recess 13 so as to place the suction and delivery ports in communication with one another when the spring loaded valve 14 is forced up from its seating. The spring 14^2 is capable of adjustment by means of a nut 16 so as to vary the brake resistance. To the end of the plummet line a ball 17 is attached, the ball being secured in place, for example, by the method shown

at Figure 3 which consists in forming a knot 18 on the end of the plummet line and locating or casting the ball of zinc or other metal 17 around the same. 19 is a shackle to which an auxiliary length of line 20 is attached by means of a thimble 21, the other end of the line 20 being connected to any usual form of pawling gear 30 located within the anchor. The end of the plummet line 2 which is secured by means of a thimble 24 to the plummet 29 passes through a sleeve 22 which is permanently attached to the shackle 19, the sleeve 22 being detachably secured, by means of shearable pins 23, 23 to an adapter 25 attached to the plummet casing. The drum 1 is formed with a recessed part 26 within which the ball 17 normally lies. 27 is a length of yarn or other material which is connected to the line 2 adjacent to the ball 17 and wound upon the drum 1 so as initially to secure the ball 17 in place within the cavity 26 at the commencement of the winding-on operation of the plummet line 2. The casing 4 containing the plummet line and braking mechaism may be located within or secured to the anchor 31, for example by bolts inserted through a flange 28.

In operation, and when the plummet is released from the sinker in any known or usual manner, the plummet falls and on account of its weight the drum 1 is rotated and the plummet line 2 is unwound. As the drum 1 rotates it also rotates the spindle 3 and drives the gear wheels 7 and 8 and the fluid contained within the space 10 is circulated in a closed circuit. The oil in passing from the delivery side 12 to the suction side 11 has to be forced past the spring loaded valve 14 and as aforesaid and by suitably adjusting the nut 16 to give the requisite brake resistance the drum 1 can be caused to rotate at a regular and moderate speed so as to avoid shock when the plummet reaches the end of its travel. When all the plummet line 2 has been unwound the ball 17 is pulled out of the recess 26 and lodges within the cup shaped cavity at the upper end of the sleeve 22. The continued pull due to the weight of the plummet will thereupon rupture the shear pins 23, 23 so that the sleeve 22 is pulled out of the adapter 25 and the plummet is thereafter connected directly to the pawling gear by the shackle 19 and its connection to the plummet line 2 and auxiliary line 20.

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

1. A submarine mine comprising a sinker, a plummet connected to said sinker by a length of plummet line, a drum upon which said plummet line is wound, means which admit of a uniform unwinding of the plummet line as the plummet separates from the sinker and means whereby the plummet line is allowed to separate completely from said drum for the purpose specified.

2. A submarine mine comprising a sinker, a plummet, a plummet line, pawling gear, one end of said plummet line being connected to said plummet, means which admit of a uniform unwinding of the plummet line as the plummet separates from said sinker and means for establishing a connection between the other end of said plummet line and said pawling gear after the plummet line has become completely separated from said unwinding means.

3. A submarine mine comprising a sinker, a plummet connected to said sinker by a length of plummet line, a drum upon which said plummet line is wound, braking means for regulating the speed at which the plummet line is allowed to unwind from said drum and means whereby the plummet line is allowed to separate from said drum after the plummet line has completely unwound.

4. A submarine mine comprising a sinker, pawling gear in said sinker, a plummet line, a drum upon which said plummet line is wound, braking means for regulating the speed at which the plummet line is allowed to unwind from said drum, and means for establishing a connection between one end of said plummet line and said pawling gear after the plummet line has completely unwound and has separated from said drum.

5. A submarine mine comprising a sinker, a plummet connected to said sinker by a length of plummet line, a drum upon which said plummet line is wound, braking means which admit of a uniform unwinding of the plummet line as the plummet separates from the sinker, means for varying the resistance exercised by said braking means and means whereby the plummet line is caused to separate from said drum after the plummet line has completely unwound.

6. A submarine mine comprising a sinker, pawling gear, a predetermined length of plummet line, a drum upon which said plummet line is wound, braking means which admit of a uniform unwinding of the plummet line as the plummet separates from the sinker, means for varying the resistance exercised by said braking means and means for establishing a connection between one end of said plummet line and said pawling gear after the plummet line has completely unwound and has separated from said unwinding means.

7. A submarine mine comprising a drum, a plummet, pawling gear, a predetermined length of plummet line on said drum one end of said plummet line being connected to said plummet, means which admit of a uniform unwinding of the plummet line from the said drum and means which, after said predetermined length of plummet line has

been completely unwound and the plummet line separates from the drum, establishes a connection between the other end of the plummet line and said pawling gear.

8. A submarine mine comprising a sinker, a plummet, a plummet line, pawling gear, one end of said plummet line being connected to said plummet, a ball at the other end of said plummet line, a plummet casing, a shackle, a connection from said shackle to said pawling gear, shearable pins detachably connecting said shackle to said plummet casing, and means which admit of a uniform unwinding of the plummet line for the purpose specified.

GIOVANNI EMANUELE ELIA.