G. E. ELIA.

DEVICE FOR AUTOMATICALLY ANCHORING SUBMARINE MINES AT A PREDETERMINED DEPTH INDEPENDENTLY OF THE BOTTOM OF THE SEA.

APPLICATION FILED OCT. 1, 1914.

1,167,278.

Patented Jan. 4, 1916.

4 SHEETS—SHEET 1.

Fig. 1.

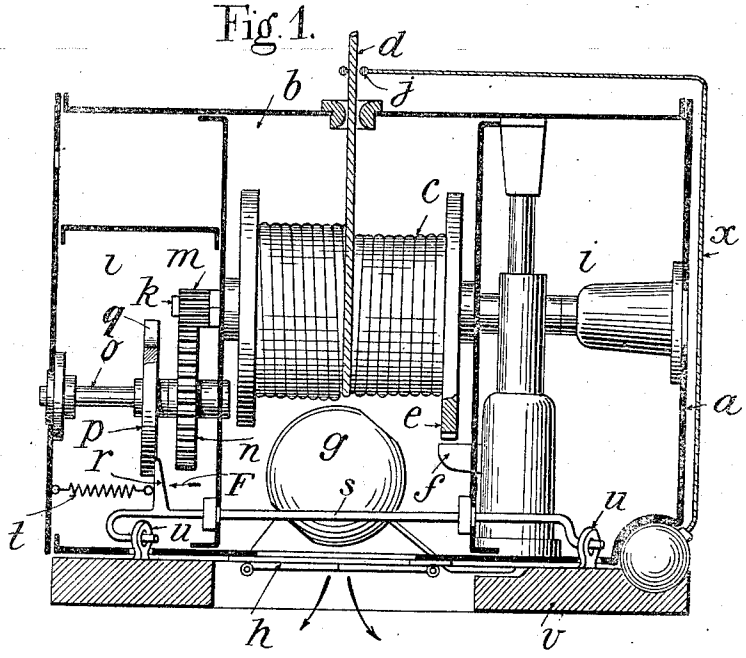
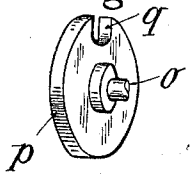


Fig. 1a



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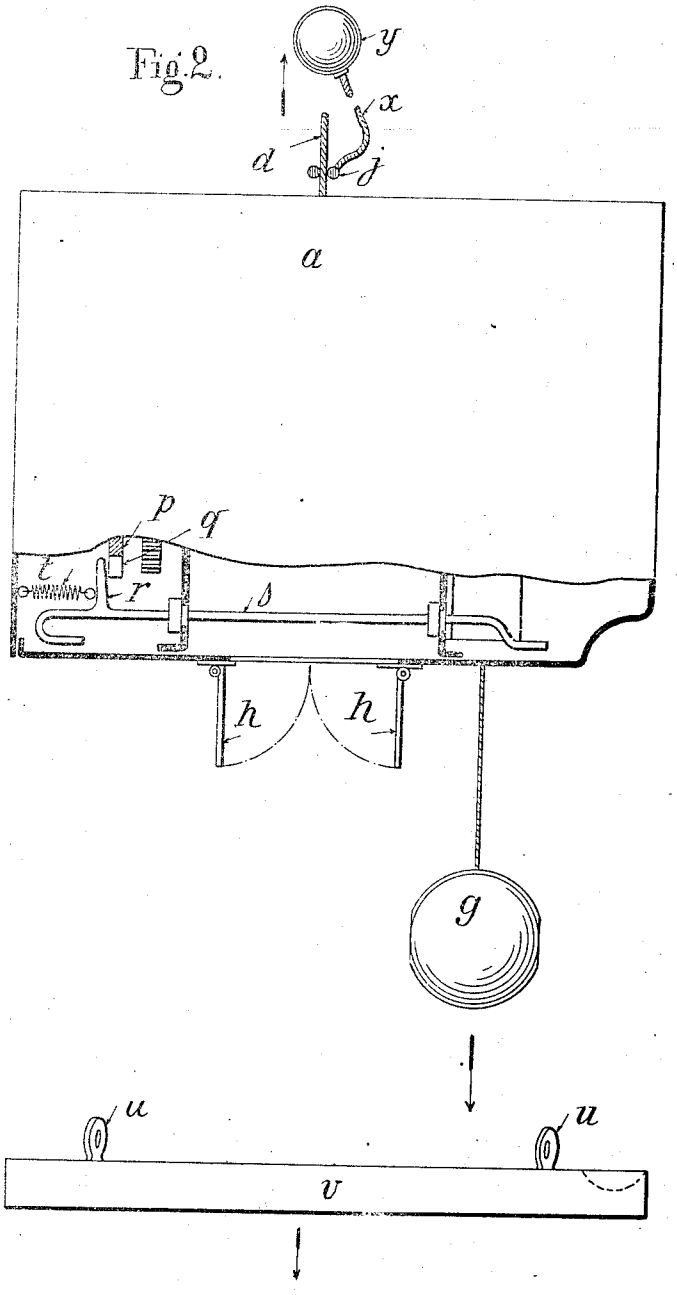
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

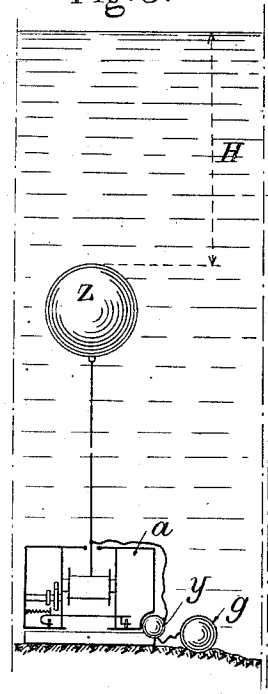
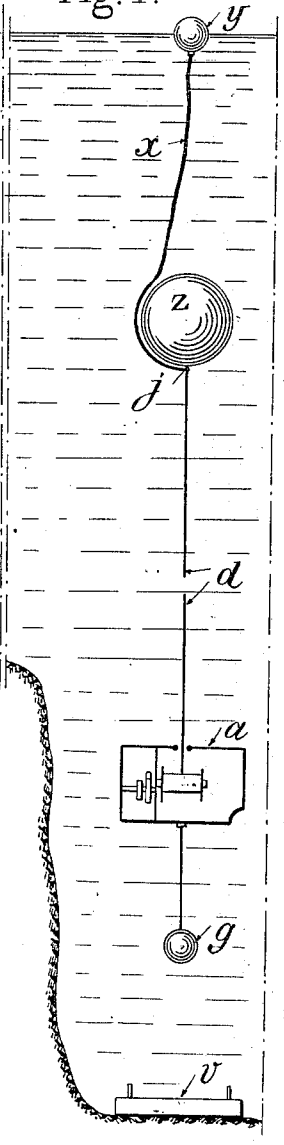


Fig. 4.



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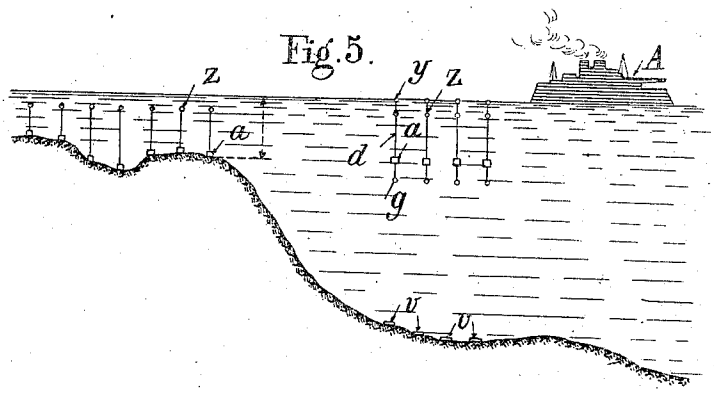
4 SHEETS—SHEET 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

GIOVANNI EMANUELE ELIA, OF PARIS, FRANCE, ASSIGNOR TO VICKERS LIMITED, OF LONDON, ENGLAND.

DEVICE FOR AUTOMATICALLY ANCHORING SUBMARINE MINES AT A PREDETERMINED DEPTH INDEPENDENTLY OF THE BOTTOM OF THE SEA.

1,167,278. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed October 1, 1914. Serial No. 864,414.

To all whom it may concern:

Be it known that I, GIOVANNI EMANUELE ELIA, a subject of the King of Italy, and residing at Hotel de Crillon, Place de la Concorde, Paris, France, gentleman, have invented certain new and useful improvements in and relating to devices for automatically anchoring submarine mines at a predetermined depth independently of the bottom of the sea, of which the following is a complete specification.

This invention relates to a device for automatically anchoring submarine mines at a predetermined depth independently of the bottom of the sea.

The submarine mines proper are generally provided with a mooring anchor resting on the bottom of the sea so that the use of these mines is limited to shallow waters, the length of the cable wound on the drum of the anchor hardly ever exceeding 100 meters as a rule: these mines therefore are not adapted for use on the high seas so that it has already been proposed for great depths to use mines floating between the surface and the bottom and maintained at a predetermined depth by devices controlled by the height of the water of submersion. These devices, however, have the drawback of being insensitive while having a complicated construction. Furthermore, it has already been proposed to provide the usual submarine mines having a mooring anchor, with a device enabling them to be used as floating mines but the transformation of these mines into floating mines necessitates a certain time which considerably decreases the advantages thus realized.

The anchoring device forming the object of this invention permits of realizing the automatic transformation of anchored mines into floating mines when the depth of the sea exceeds the length of the mooring cable contained in the anchor so that soon after the launching the submarine mine places itself automatically at a predetermined depth whatever the depth of the sea may be.

The accompanying drawing illustrates by way of example, a construction embodying the invention.

Figure 1 illustrates in section, an anchor according to the invention: Fig. 1ª is a detail: Fig. 2 is an external view of this anchor, partly in section, showing the members in another position: Figs. 3 and 4 show diagrammatically the various positions which the mine assumes according to the depth of the sea: Fig. 5 is a diagram showing the disposition of a number of mines located by a mine-laying ship.

In the construction illustrated in Fig. 1, the anchor comprises a casing *a*, for instance, made of sheet metal and preferably not fluid-tight, provided with an inner chamber *b* in which a drum *c* for the mooring cable *d*, is located. This drum is formed on one of its cheeks with teeth *e* of usual construction, adapted to be engaged by a locking pawl *f* to which the sounder *g* is connected in the known manner. This sounder is maintained in the idle position illustrated in Fig. 1, for instance, by means of the doors *h* or in any other suitable manner. Upon the end of the shaft *k* of the drum *c* a pinion *m* or preferably a worm is provided, engaging with a toothed wheel *n* keyed upon the axis *o* of a disk or plate *p* (Figs. 1 and 1ª) formed at one point of its periphery with a notch or the like *q*. In its normal position shown in Fig. 1, this disk *p* serves as an abutment for the tappet *r* integral with the locking rod *s* which a spring *t* tends constantly to draw in the direction indicated by the arrow F in Fig. 1. This rod is suitably curved or bent at its ends so as to penetrate the lugs *u* integral with a heavy mass *v* which constitutes an overload for the anchor, and is thus suspended from the latter through the medium of the rod *s*. On the mooring cable *d* a ring *j* is adapted to slide, to which a cable *x* is secured the length of which corresponds to the depth of immersion of the mine, and is secured at its other end to a float *y* of small size which when mounted is located as illustrated in Fig. 1 in a recess formed in the casing *a* of the anchor. It is retained in this recess by the mass *v*.

The operation is as follows: When the mine is laid in shallow water, secured to the mooring cable wound on the drum of the anchor, the length of this cable being generally 100 meters, the anchor *a* rests as shown in Fig. 3 on the bottom of the sea, the depth of immersion H of the mine being determined in the usual manner by the length of the sounding cable. In the case where the mine is laid in the usual manner, the anchor

a having its weight increased by the mass *v* and the water penetrating its interior, rests on the bottom of the sea the unwinding movement of the drum being stopped, as usual, when the sounder reaches the bottom. When the mine is launched at sea at a point where the depth of the water is greater than 100 meters, the sounder drops and liberates the pawl *f* from the teeth *e* of the drum *c* as in the preceding case but as nothing stops its fall, the mooring cable *d* is entirely unwound. During the rotation of the drum, the pinion or worm *m* rotates the gear wheel *n* and the disposition of the parts is calculated in such a manner that when the mooring cable is entirely unwound, the notch *q* of the disk *p* is located opposite the tappet *r* of the locking rod *s*. The spring *t* then acts so as to displace this locking rod in the direction indicated by the arrow F in Fig. 1 so that this rod is disengaged from the lugs *u* thus liberating the heavy mass *v* which drops freely as shown in Fig. 2. The float *y* liberated by the drop of *v*, rises to the surface of the water as illustrated in Fig. 4; the weight of the anchor and of its sounder is preferably slightly greater than the buoyancy of the mine *z* so that the total buoyancy of the elements is only that of the float *y*. The latter therefore maintains the parts in the position illustrated in Fig. 4, the mine *z* remaining at a distance from the level of the water equal to the length of the free cable *x*. In this connection it must be pointed out that the float *y* being of a small size, it follows therefrom that owing to the movements of the sea this float remains almost constantly immersed and is practically always at a distance of a few centimeters below the surface of the sea thus rendering it invisible. The mine *z* is provided with a suitable firing device and on being struck by a moving ship when the parts occupy the positions illustrated in Fig. 4, the mine is unable to move laterally owing to the anchor *a* which offers a resistance to the water. The mine, therefore, will rotate owing to contact with the said ship and will thus be exploded.

By using this device it is possible to operate as follows as indicated diagrammatically in Fig. 5: When a mine laying ship A leaves a port in order to form a barrier of submarine mines, it lays mines first of all in shallow waters these mines resting with their anchors on the bottom of the sea as shown in the left hand portion of Fig. 5, as long as the depth does not exceed 100 meters, that is to say the normal length of the mooring cable wound on the drum of the anchor of each mine. If the depth increases at the point where the mines are to be laid, the ship continues to locate them according to the diagram which enables the desired effect to be obtained. Each of these mines laid in greater depths assumes the position illustrated in the right hand half of Fig. 5 and shown in detail in Fig. 4; when the 100 meters of cable have been unwound, the mass *v* drops down thus liberating the float *y* which rises along the mooring cable sliding upon the latter through the medium of its ring *j* which bears on the lower part of the mine. The anchor *a* fills gradually with water and the mines laid successively assume the disposition indicated on the right of Fig. 5, their depth of immersion being controlled by the length of the cables in each case. The following are the advantages: This disposition permits of realizing automatically the maintenance of the submarine mines at the desired depth of immersion whether the mine is retained by an anchor resting on the bottom of the sea or is floating therein, the anchor being modified automatically in accordance with the requirements of each case. It is therefore possible to lay a group of mines in front of a moving squadron of men-of-war whatever the depth of the sea may be without it being necessary to effect any manipulation of the anchors at the time of launching the submarine mines.

In the above construction, the mine is retained in the position in which it has been laid by increasing automatically the total buoyancy of the mine and its accessories by decreasing the weight of the anchor; this increase of buoyancy may also be effected by preserving the launching disposition of the anchor and providing a float of suitable dimensions which would be inflated by the formation of a suitable gas at the moment the anchor remains suspended from its mooring ring. For instance, it may be possible to provide in the float a charge of calcium carbid in proximity to a tube containing water which could be broken at the desired moment. The various elements may also be disposed in such a manner as to increase the buoyancy of the mine and its anchor by preventing a decrease of the buoyancy which takes place in the present mines when the anchor is filled with sea water. In this case it would be sufficient to convert the anchor into a fluid-tight casing provided with cocks or suitable members intended to permit of the introduction of water. In this case before the launching of the mine, these members would have to be shut off when the bottom of the sea is supposed to be at a greater depth than the length of the mooring cable.

The construction of the various parts may differ from that illustrated. The liberation of the locking rod *s* may be effected in any suitable manner, provided that this release is produced at the end of the unwinding of the mooring cable. The overload of the anchor may be effected in any manner other than by the heavy mass *v*. It

is obvious that it would be also possible to control the position of the various parts in such a manner as to provoke the release of the overload mass after the unwinding movement of any desired fraction of the mooring cable, and the device controlling this quantity of unwinding might also be readily accessible from the exterior of the anchor so as to permit of this adjustment at any time.

The invention is applicable to all kinds of submarine mines fired mechanically, electrically, chemically or otherwise.

What I claim is:

1. A device for automatically anchoring submarine mines at a predetermined depth, comprising an anchoring device carrying a float and provided with means for reducing the weight thereof to permit it to be supported by the float, whereby provision is made for converting a mine adapted to be anchored on the bottom of the sea into a floating mine.

2. A device for automatically anchoring submarine mines at a predetermined depth independently of the bottom of the sea, comprising an anchoring device carrying a float and provided with a detachable weight and means for releasing the weight when the anchoring device reaches a predetermined depth.

3. A device for automatically anchoring submarine mines at predetermined depth, comprising an anchoring device provided with a detachable weight, a float retained in inoperative position by the weight, and means for releasing the weight and thereby the float when the anchoring device reaches a predetermined depth.

4. A device for automatically anchoring submarine mines at a predetermined depth, comprising an anchoring device provided with a detachable weight, a float retained in inoperative position by the weight and having a cable the length of which is equal to the depth at which the mine is to be immersed and slidable on the mooring cable of the anchoring device, and means for releasing the weight when the anchoring device reaches a predetermined depth.

5. In an anchoring device for submarine mines, a casing, a drum mounted in the casing, a mooring cable on the drum, a weight at the bottom of the casing, means detachably engaging the weight, to hold it to the casing, and means for releasing the holding means from the weight when the mooring cable has been unwound from the drum.

6. In an anchoring device for submarine mines, a casing, a drum mounted in the casing and having a pinion on one end of its shaft, a mooring cable on the drum, a shaft mounted in the casing and provided with a gear wheel meshing with the pinion of the drum and with a weight at the bottom of the casing, a notched disk, and a sliding and spring pressed rod having detachable engagement with the weight and provided with an arm projecting up at one side of the notched disk.

7. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor carrying a float and connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, and a weight on the anchor adapted to be automatically released and dropped therefrom when the anchor reaches such predetermined depth, whereby the buoyancy of the whole mine and its accessories are increased and the mine prevented from being drawn to the bottom of the sea.

8. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, a weight on the anchor adapted to be automatically released and dropped therefrom when the anchor reaches such predetermined depth, and a float adapted to be released from the anchor when the said weight is dropped to add buoyancy to the mine.

9. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor carrying a float and connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, a cable attaching the mine to the anchor, a device in the anchor for unwinding the cable as the anchor sinks during mooring, a weight carried by the anchor, and means controlled by the said device to automatically release and drop the weight when the anchor reaches a predetermined depth.

10. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, a cable attaching the mine to the anchor, a device in the anchor for unwinding the cable as the anchor sinks during mooring, a weight carried by the anchor, means controlled by the said device to automatically release and drop the weight when the anchor reaches a predetermined depth, a float carried by the anchor and released therefrom simultaneously with the weight, and means

connecting the float with the cable and permitting the float to assume a position above the mine and approximately at the surface of the sea.

11. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, a cable attaching the mine to the anchor, a device in the anchor for unwinding the cable as the anchor sinks during mooring, a weight carried by the anchor, means controlled by the said device to automatically release and drop the weight when the anchor reaches a predetermined depth, a float carried by the anchor and released therefrom simultaneously with the weight, a ring slidable along the cable and adapted to be arrested by the mine, and a cable connected with the ring and with the float, whereby the latter can float above the mine at approximately the surface of the sea.

12. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor carrying a float and connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, a cable connected with the mine, a drum in the anchor from which the cable unwinds, a weight carried by the anchor, a locking element connecting the weight with the anchor, and means for automatically releasing the locking element to permit the weight to drop when the cable is unwound to a predetermined point.

13. The combination of a submarine mine adapted to float at a predetermined depth below the surface of the sea, an anchor connected with the mine and adapted to rest on the bottom of the sea in depths less than a predetermined depth and to float at depths greater than such predetermined depth, a cable connected with the mine, a drum in the anchor from which the cable unwinds, a weight carried by the anchor, a locking element connecting the weight with the anchor, means for automatically releasing the locking element to permit the weight to drop when the cable is unwound to a predetermined point, a float normally positioned between the weight and anchor and automatically released when the weight drops from the anchor, and means for connecting the float with the cable and permitting the float to occupy a position above the mine and close to the surface of the sea.

In testimony whereof I have hereunto set my hand at Rome this ninth day of September 1914.

GIOVANNI EMANUELE ELIA.