K. O. LEON.

SUBMARINE MINE.

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913,524.

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Fig. 1.

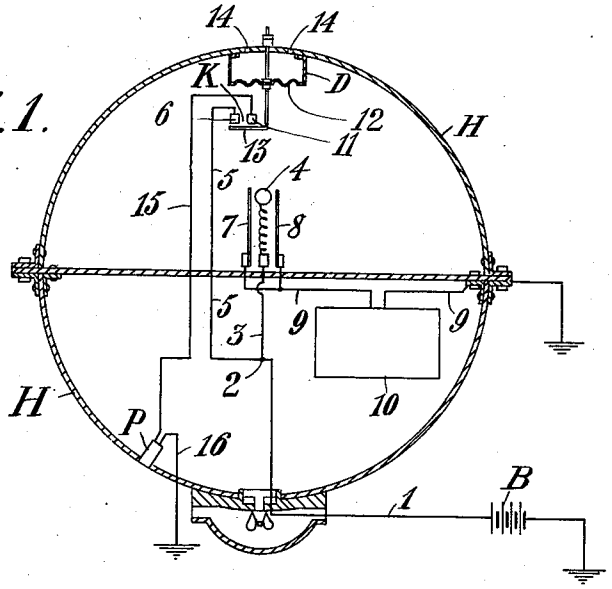
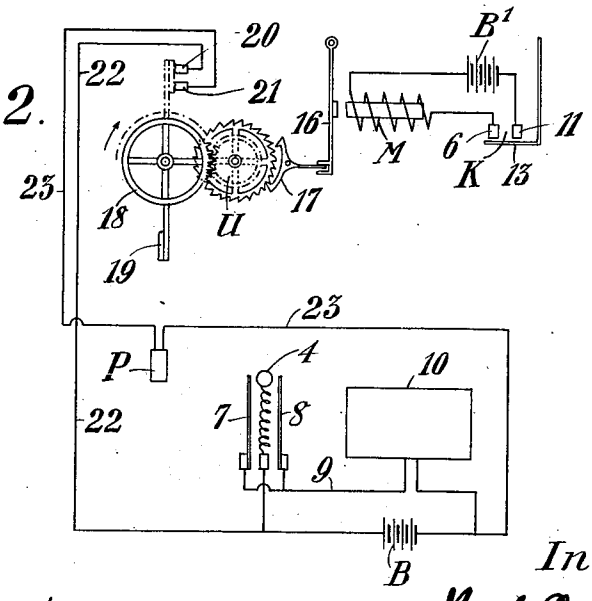



Fig. 2.




Witnesses

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# UNITED STATES PATENT OFFICE.

KARL OSKAR LEON, OF STOCKHOLM, SWEDEN.

## SUBMARINE MINE.

No. 913,524. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed November 16, 1906. Serial No. 343,684.

*To all whom it may concern:*

Be it known that I, KARL OSKAR LEON, a subject of the King of Sweden, and resident of 38 Riddaregatan, Stockholm, Sweden, have invented new and useful Improvements in Submarine Mines, of which the following is a specification, reference being had to the drawing accompanying and forming a part hereof.

This invention relates to submarine mines. It sometimes happens that such mines break themselves loose from their anchoring places and wander in the sea, in which case they become very dangerous to war-vessels as well as to the neutral navigation. This is especially the case in such mines in which the firing battery is inclosed within the casing of the mine proper, on account of these mines maintaining, after breaking their connections, their formidable character of easily exploding at the smallest shock or thrust. The same is obviously the case in mines in which the shock or thrust causes the formation of a firing battery, for instance through the bursting of a brittle tube or other vessel containing the electrolyte. In certain submarine mines the firing battery has, therefore, been placed outside the mine casing so that the connection of the mine with the battery is broken in case the mine tears itself from its anchoring place. Experience has, however, shown that this measure is not always sufficient, since it often happens that the battery, after the mine has become free, is, by the conducting wire extending from the body of the mine, dragged along with the mine, in which case the danger is obviously the same as if the battery were placed within the mine casing.

The object of the present invention is to provide means for sinking or destroying escaping submarine mines so as to avoid the danger connected with freely wandering mines.

The invention consists, chiefly, in providing means for opening the shell or casing of the mine, as soon as it rises to the water surface, so as to admit water into the said shell or casing and cause the mine to sink. The preferred arrangement for opening the said shell or casing consists in providing means for bursting it, either wholly or partially, but other means might as well be employed, for instance a valve, or the like, adapted to be opened, when the mine rises to the water surface. Suitably the shell or casing is provided with one or more comparatively small holes, said holes being filled with plugs adapted to be burst, when the mine becomes loose and ascends.

The invention further consists in the combination and arrangements of parts hereinafter described and specifically pointed out in the claims.

In the drawing, the invention is schematically illustrated.

Figure 1 shows the invention embodied in a submarine mine having the firing battery situated outside the mine casing. Fig. 2 shows an arrangement comprising a relay circuit and a clock-work for closing the mine-destroying circuit a predetermined, short time after the mine has escaped from its anchor and risen to the surface of the water.

Referring to the drawing, the battery B (Fig. 1) is connected with one pole to the water and with its other pole through a conducting wire 1 to the mechanism inclosed within the mine casing H. At the point 2 the conductor 1 divides into two branches, one of which 3 is connected to the vibrating contact 4 of the known shock apparatus, while the other branch 5 is connected to a contact piece 6 forming part of an additional or mine-destroying contact device K. When a vessel or other external object strikes the mine casing, the contact 4 is caused to vibrate so as to touch one or more of a number of contact springs 7, 8, thereby closing a circuit for the battery B through the conducting wire 1, wire 3, contact 4, spring 7 or 8, respectively, wire 9, detonator 10, and wire 9 to the mine casing H and thence through the water back to the battery B. The current from battery B passing through the detonator 10 then fires the mine.

The contact device K serves to cause the mine to sink, in case the mine should escape and rise to the water surface carrying the battery B with it, said contact device then closing a circuit through a fuse or the like within a plug P inserted into a hole in the mine casing and containing an explosive sufficient to burst the plug and allow the water to enter into the mine casing and sink the mine when the circuit is closed through the fuse.

In the form of embodiment of the invention illustrated in the drawing the contact device K consists of two contact pieces 6 and 11 coöperating with a contact finger 13

attached to the bottom 12 of a box D secured to the mine casing. Openings 14 lead through the mine casing H into the interior of the box D. The bottom 12 will yield more or less according as the water pressure thereon increases or decreases. When the mine floats at the proper depth beneath the water surface, the bottom 12 of the box D is kept depressed by the water pressure, so that the contact finger 13 does not touch the contact pieces 6 and 11, whereas, if the mine rises to the water surface, the pressure upon the bottom 12 of the box D is decreased to such an extent that the contact finger 13 makes contact with the contact pieces 6 and 11 and closes a circuit from the battery B through wire 1, wire 5, contact piece 6, contact finger 13, contact piece 11, wire 15, bursting-plug P, wire 16, mine casing and water, back to the battery B. The mine, in getting loose from its anchor, is thus opened for the entry of water, as soon as it rises to the water surface, in case the conducting wire from the firing battery B is not torn.

On account thereof that the explosive charge of the detonator 10 usually consists of gun-cotton or other substance, which easily explodes at a shock, the danger of an explosion taking place, when a vessel violently strikes the mine, is however, not wholly excluded, even if the firing battery is left, when the mine escapes from its anchoring place. In order to, at all events, burst the plug P, when the mine rises to the water surface, the contact piece 6 may, therefore, be connected to one pole of a separate plug-bursting battery placed within the mine casing, the other pole of said battery being connected to water.

In laying down the mine, the box D is suitably filled with a fluid under pressure and the openings 14 closed by plugs or the like, said plugs having strings or the like attached thereto, so that the plugs can be withdrawn when the mine has been laid down.

In the arrangement shown in Fig. 2 the firing battery B is placed within the mine casing, which further contains an auxiliary battery B′, whose circuit is closed by the contact 13, when the mine rises to the water surface. Interposed in the circuit of the battery B′ is an electro-magnet M which, when supplied with current, attracts an armature 16 serving to normally prevent the escapement 17 of a clock-work U from motion. When the escapement is released, a spring or a weight (not shown) is made active, so that the wheel 18 is turned in the direction of the arrow. The wheel 18 carries a contact finger 19 which, after a predetermined length of time, takes up the position shown by dotted lines and thereby forms a bridge between two contact pieces 20, 21 each connected through a conductor 22, 23 respectively to one pole of the firing battery B. The explosive charge or detonator 10 and the shock apparatus 4, 7, 8 are shown arranged in the same manner as before. When the contact device 19, 20, 21 is closed, the plug P inserted in the mine casing is burst, causing the filling of the mine with water so as to sink.

The arrangement shown in Fig. 2 can obviously be employed either when the firing battery is placed within or outside the mine casing. In the latter case a particular plug-bursting battery can be placed within the mine casing, as before stated.

The armature 16 is suitably arranged in such a manner as to check the escapement 17 and prevent it from further motion, as soon as the electro-magnet M is deprived of current, by which the laying down of the mine is considerably facilitated.

In tidal waters the described arrangement can suitably be combined with means for maintaining the mine at a constant depth below the water surface, as described in my application for Letters Patent Serial No. 343,685, filed Nov. 16, 1906.

In order to close the plug-bursting circuit, when the mine rises to the water surface, it is, obviously, possible to employ other means than those shown and described and I, therefore, desire it to be understood that I do not limit myself to any particular construction or constructions but consider any device influenced by water pressure in such a manner as to close the plug-bursting circuit, when the mine escapes and rises to the water surface, to fall within the scope of my invention. The contact closing device shown in the drawing (a diaphragm 12 actuated by water pressure and carrying a contact finger 13 in operative relation to two contact pieces 6 and 11) is merely shown by way of example for elucidating the invention.

Obviously, if desired, I may employ two or more bursting-plugs connected in circuit in such a manner as to be burst simultaneously. In using two bursting-plugs, said plugs are suitably placed at two diametrically opposite points of the mine casing so that one of the two openings made finds itself below and the other above the water surface, by which the air inclosed within the mine casing is allowed to escape and leave space for water.

By connecting the contact piece 11 (Fig. 1) or 21 (Fig. 2) respectively to the conductor 9 leading to the detonator 10 it is, obviously, possible to make the whole mine explode, when it rises to the water surface, but on account of this arrangement being thought to involve a certain risk I preferably employ special bursting-plugs for partially opening or bursting the mine casing.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a submarine mine, the combination

with the mine casing, of a device actuated by water pressure, and means, controlled by the said device, for opening the mine casing, when the mine rises to the water surface, substantially as and for the purpose set forth.

2. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means, included in the said circuit, for opening the casing, when the circuit is closed, and means for closing the said circuit, when the mine rises to the water surface, substantially as and for the purpose set forth.

3. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means, included in the said circuit, for opening the casing, when the circuit is closed, and a device actuated by water pressure in such a manner as to close the said circuit when the water pressure falls below a predetermined value, substantially as and for the purpose set forth.

4. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit for opening the casing, when the circuit is closed, a normally barred clock-work, means for releasing the said clock-work, when the mine rises to the water surface, and means operated by the clock-work for closing the electric circuit a predetermined length of time after the clock-work is released, substantially as and for the purpose set forth.

5. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit for opening the casing, when the circuit is closed, a normally barred clock-work, an auxiliary battery, conductors leading from the said auxiliary battery and forming a normally open auxiliary circuit, an electromagnet included in the said auxiliary circuit, means operated by the said electro-magnet for releasing the clock-work when the auxiliary circuit is closed, means operated by the clock-work for closing the electric circuit of the first battery a predetermined length of time after the clock-work is released, and means for closing the auxiliary circuit, when the mine rises to the water surface, substantially as and for the purpose set forth.

6. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means, included in the said circuit, for opening the casing, when the circuit is closed, a normally barred clock-work, an auxiliary battery, conductors leading from the said auxiliary battery and forming a normally open auxiliary circuit, an electro-magnet included in the said auxiliary circuit, means operated by the said electro-magnet for releasing the clock-work when the auxiliary circuit is closed, means operated by the clock-work for closing the electric circuit of the first battery a predetermined length of time after the clock-work is released, and a device actuated by water pressure in such a manner as to close the auxiliary circuit when the water pressure falls below a predetermined value, substantially as and for the purpose set forth.

7. In a submarine mine, the combination, of a casing inclosing the explosive charge, said casing having a hole, a plug filling up the said hole, and means for bursting the said plug, when the mine rises to the water surface, substantially as and for the purpose set forth.

8. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, said casing having a hole, a plug filling up the said hole, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit, for bursting the plug, when the circuit is closed, and means for closing the said circuit, when the mine rises to the water surface, substantially as and for the purpose set forth.

9. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, said casing having a hole, a plug filling up the said hole, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit for bursting the plug when the circuit is closed, and a device actuated by water pressure in such a manner as to close the said circuit when the water pressure falls below a predetermined value, substantially as and for the purpose set forth.

10. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, said casing having a hole, a plug filling up the said hole, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit for bursting the plug when the circuit is closed, a normally barred clock-work, means for releasing the said clock-work, when the mine rises to the water surface, and means, operated by the clock-work, for closing the electric circuit a predetermined length of

time after the clock-work is released, substantially as and for the purpose set forth.

11. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, said casing having a hole, a plug filling up the said hole, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit for bursting the plug when the circuit is closed, a normally barred clock-work, an auxiliary battery, conductors leading from the said auxiliary battery and forming a normally open auxiliary circuit, an electromagnet included in the said auxiliary circuit, means operated by the said electromagnet for releasing the clock-work when the auxiliary circuit is closed, means operated by the clock-work for closing the plug-bursting circuit a predetermined length of time after the clock-work is released, and means for closing the auxiliary circuit, when the mine rises to the water surface, substantially as and for the purpose set forth.

12. In a submarine mine, the combination of a detonator, a casing inclosing the said detonator, said casing having a hole, a plug filling up the said hole, an electric battery, conductors leading from the poles of the said battery and forming a normally open electric circuit, means included in the said circuit for bursting the plug when the circuit is closed, a normally barred clock-work, an auxiliary battery, conductors leading from the said auxiliary battery and forming a normally open auxiliary circuit, an electro-magnet included in the said auxiliary circuit, means operated by the said electro-magnet for releasing the clock-work when the auxiliary circuit is closed, means operated by the clock-work for closing the plug-bursting circuit a predetermined length of time after the clock-work is released, and a device actuated by water pressure in such a manner as to close the auxiliary circuit when the water pressure falls below a predetermined value, substantially as and for the purpose set forth.

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

KARL OSKAR LEON.

Witnesses:
CARL FRIBERG,
AUG. SÖRENSEN.