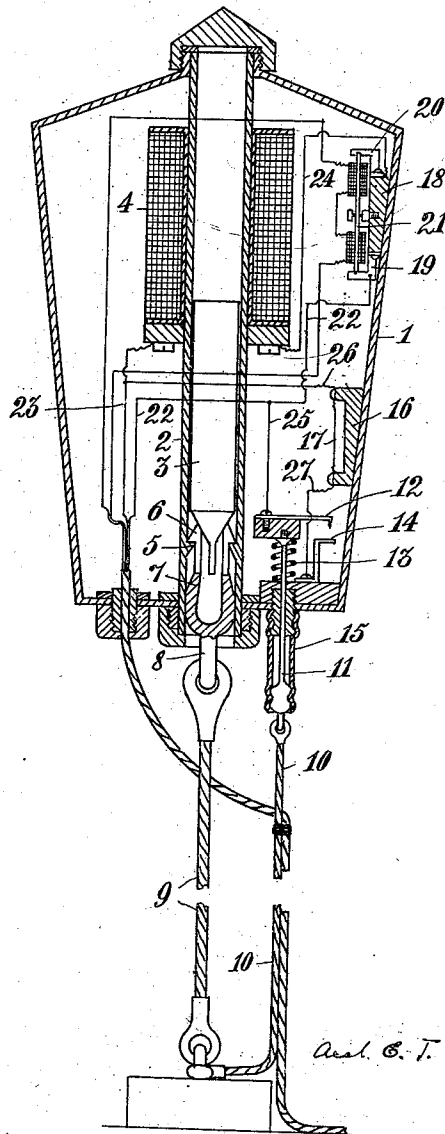


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SUBMARINE MINE.
APPLICATION FILED JULY 31, 1908.

953,191.

Patented Mar. 29, 1910.



Witnesses.

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To all whom it may concern:

Be it known that I, AXEL EDWIN THEODOR BERGSTRÖM, a subject of the King of Sweden, and resident of Stockholm, in the Kingdom of 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 improvements in submarine mines.

The object of the invention is to enable mines moored at comparatively large depths to automatically disengage themselves and rise toward the water surface, when an iron vessel or a vessel made of or containing a material adapted to influence a magnet or the like passes over or in the vicinity of the mine.

A further object of the invention is to cause the mine to automatically explode, without shock, as soon as it has arrived sufficiently near the water surface.

The invention consists, chiefly, in that the mine is provided with means adapted to release a catch, when a vessel passes above or in the vicinity of the mine, so that the mine is free to ascend toward the water surface.

The invention further comprises means for automatically exploding the mine, when it has ascended sufficiently near the vessel, said means suitably comprising a contact device included in the exploding circuit, one contact of said device being connected to the mooring by a line or the like of a suitable length, so that, when the mine has ascended, after release, to a certain distance from the bottom, said contact is brought into its circuit-closing position and causes the mine to explode.

The invention further comprises the construction and combination of parts herein after particularly described.

The mine is, suitably, moored at such a depth that even the most deep-drawing vessels cannot strike the mine, which is of great importance during peace as well as during war, for instance in mining harbors or the like. When using the systems of mining hitherto employed, there is great danger in touching at such harbors, whereas, according to the present invention, the naval com-

merce may freely proceed in spite of the mining.

In the drawing, I have shown a central vertical section of a mine embodying the invention.

Referring to the drawing 1 is the casing of the mine. Placed centrally within the said casing is a tube 2, suitably of brass or other non-magnetic material. Situated within the tube 2 is a movable core 3 of soft iron. Placed above the said core, at the outer side of the tube 2, is a winding 4. When the said winding is supplied with current, it attracts the iron core 3 so that the latter moves upward. Carried by an annular flange 5 at the inner side of the tube 2 are a number of hooks 6 projecting from a connecting part 7 inserted into the lower part of the tube 2, said connecting part being formed, at its lower side, with an eye 8. Attached to the said eye is the upper end of a short mooring line 9 by which the mine is retained at a relatively short distance from the bottom of the sea. The hooks 6 tend to move, by elasticity, toward the center of the tube 2 but are retained in the position shown in the drawing by the weight of the iron core 3 the lower end of which is conical in shape. When the iron core is lifted, the hooks 6 spring inwardly so as to disengage the flange 5, whereby the mine, on account of its floating power, ascends so far as the longer line 10 allows. The latter is shown attached, at its upper end, to a rod 11 or the like, said rod passing water-tightly through the bottom of the mine casing and carrying, at its upper end, an insulating contact spring 12 held by a spring 13 in a raised position in which it is out of contact with the contact spring 14. A sleeve 15 of india rubber serves to tighten against water without preventing the rod from moving longitudinally. When the mine has ascended so far as the longer line 10 allows, the rod 11 is retained while the body of the mine makes a small movement by which the spring 14 is brought into contact with the spring 12.

Placed at an insulating part 16 within the mine is a fuse 17 which is caused to glow and ignite the detonator when supplied with current of a certain strength.

In order to enable the mine to automatically disengage itself, when a vessel passes in the vicinity of the mine I provide two contact springs 19, 20 placed at an insulating part 18 at the inner side of the mine casing. Suspended between the said springs is a magnetic needle 21 or the like, said needle being insulated and normally kept, by a spring (not shown) or otherwise, in a position in which it is out of contact with the springs 19, 20. In the embodiment shown the needle is of soft iron and provided with windings whereby the needle is magnetized in such a manner that the ends thereof will be of opposite polarity. When a vessel passes over the mine, or in the vicinity thereof, the magnetic needle 21 is caused to take up the vertical position shown in the drawing in which it provides an electric connection between the contact springs 19 and 20.

Extended from land or from another suitable place is an electric cable following the line 10 and passing into the mine casing. One of the conducting wires 22 in the cable is connected to the contact spring 19, and another conducting wire 23 is connected to one end of the winding 4, the other end of which is connected, by a conducting wire 24, to the contact spring 20. Leading from the conducting wire 22 is a conductor 25 connected to the contact spring 12, and leading from the conducting wire 23 is a conductor 26 connected to one end of the fuse 17, the other end of which is connected by a conductor 27 to the contact 14.

When a vessel passes over or in the vicinity of the mine, the magnetic needle 21 is attracted so as to take up the position shown in the drawing in which it forms a bridge between the contacts 19 and 20. If current is supplied to the outer conductors, it flows from the current source through conductor 22, contact spring 19, magnetic needle 21, contact spring 20, conductor 24, winding 4, and conductor 23, back to the current source. On account thereof, the iron core 3 is attracted by the solenoid 4 so that the connecting part 7 is released and the mine ascends. When the mine has ascended so far as the line 10 allows, contact is made between the contact springs 12 and 14 by which a circuit is closed from the current source through conductors 22 and 25, springs 12 and 14, conductor 27, fuse 17, and conductors 26 and 23 back to the current source. The fuse is, thereby, caused to glow and ignite the detonator. During the ascent of the mine, it moves toward the vessel on account of the magnetism of the core 3 so that explosion will take place close up to the vessel or as near the same as possible.

In the drawing, the magnetic needle 21

has the form of a pin of soft iron surrounded by windings so that it may be magnetized by weak currents from land, but obviously a permanent magnet may be used, if desired.

It is obvious that the invention is not limited to the embodiment shown and described which may be varied in several ways without departing from the spirit of the invention.

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

1. The combination with a submarine mine, of a mooring, a catch serving to normally retain the mine in inoperative position, and means for releasing the catch adapted to be operated by an iron vessel passing in the vicinity of the mine.

2. The combination with a submarine mine, of a mooring, a catch serving to normally retain the mine in inoperative position, a normally open electric circuit, a magnetically operated contact device included in the said electric circuit, said contact device being adapted to close the circuit, when an iron vessel passes in the vicinity of the mine, and means controlled by the electric circuit for releasing the catch, when the electric circuit is closed.

3. The combination with a submarine mine, of a mooring, a catch serving to normally retain the mine in inoperative position, means for releasing the catch adapted to be operated by an iron vessel passing in the vicinity of the mine, and means for automatically exploding the mine, when it has ascended a predetermined distance.

4. The combination with a submarine mine, of a mooring, a catch serving to normally retain the mine in inoperative position, means for releasing the catch adapted to be operated by an iron vessel passing in the vicinity of the mine, a normally open electric circuit, means included in the said circuit for exploding the mine, when the circuit is closed, a contact device adapted to close the said circuit, and a flexible connection between the mooring and the contact device serving to close the latter, when the mine has ascended to a position in which the connection is stretched.

5. The combination with a submarine mine, of a mooring, a catch serving to normally retain the mine in inoperative position, a normally open electric circuit, a magnetically operated contact device included in the said electric circuit, said contact device being adapted to close the circuit, when an iron vessel passes in the vicinity of the mine, means controlled by the electric circuit for releasing the catch, when the electric circuit is closed, a normally open exploding circuit, means included in the

said circuit for exploding the mine, when
the circuit is closed, a contact device adapt-
ed to close the said circuit, and a flexible
connection between the mooring and the
5 contact device serving to close the latter,
when the mine has ascended to a position
in which the connection is stretched.

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

AXEL EDWIN THEODOR BERGSTRÖM.

Witnesses:

AUG. SÖRANSEN,

KARL RUNCSEKOG.