K. O. LEON.

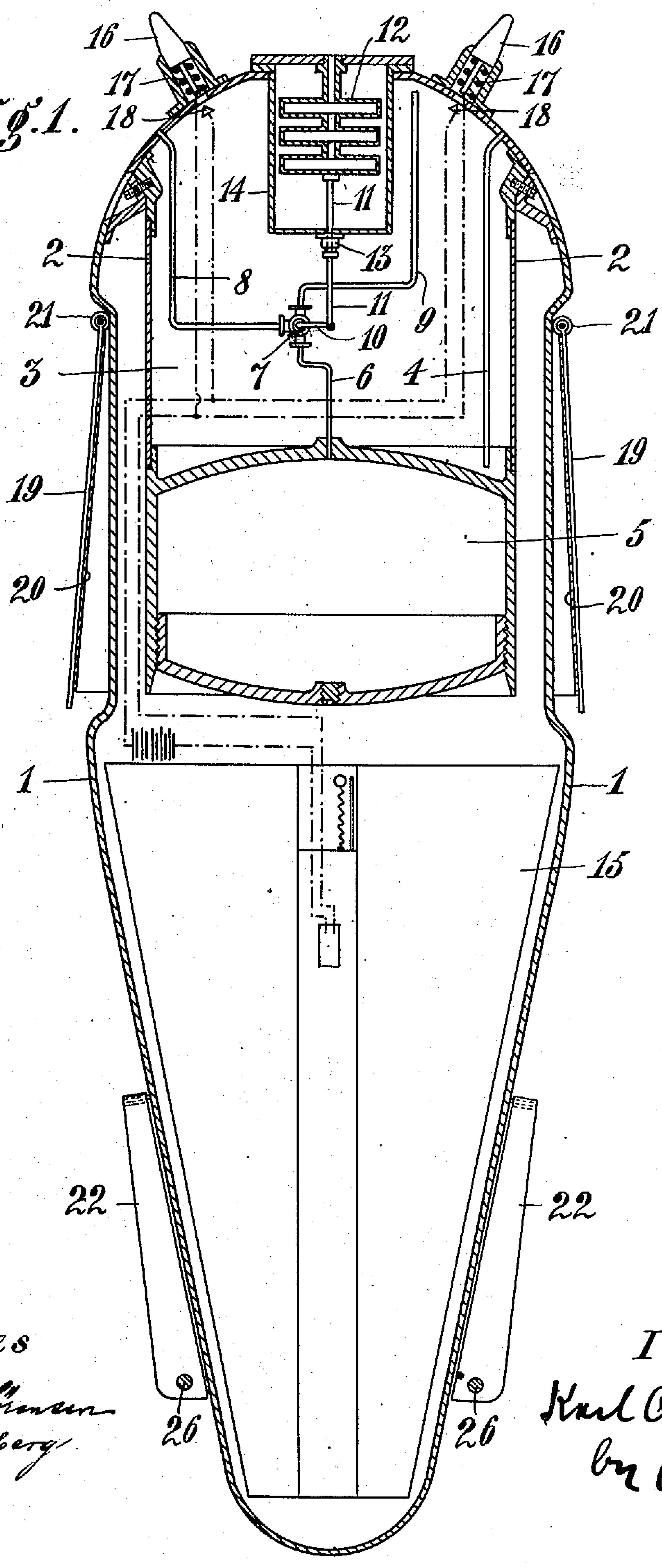
SUBMARINE MINE, TORPEDO, AND THE LIKE.

APPLICATION FILED APR. 16, 1907.

952,450. Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

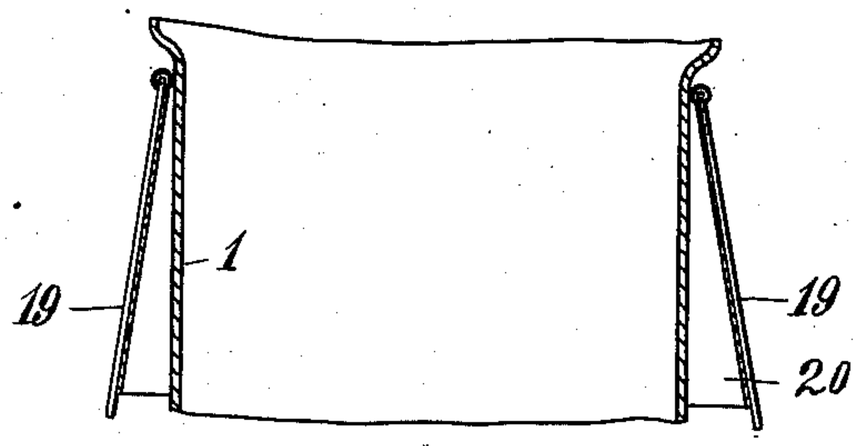


Fig. 3.

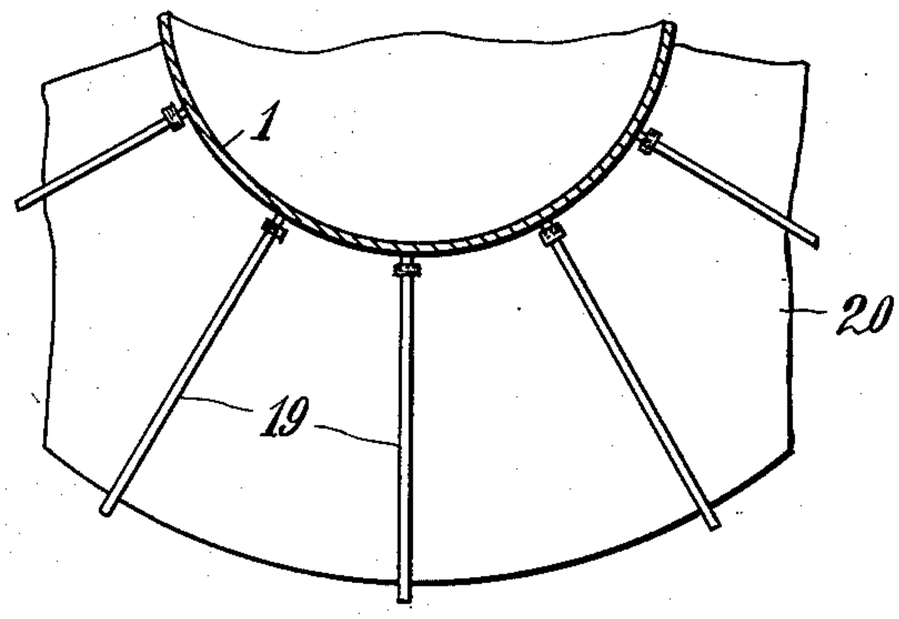
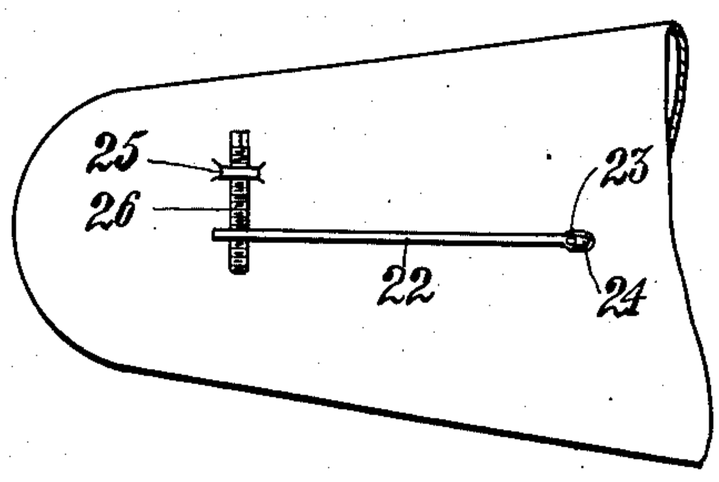


Fig. 4.



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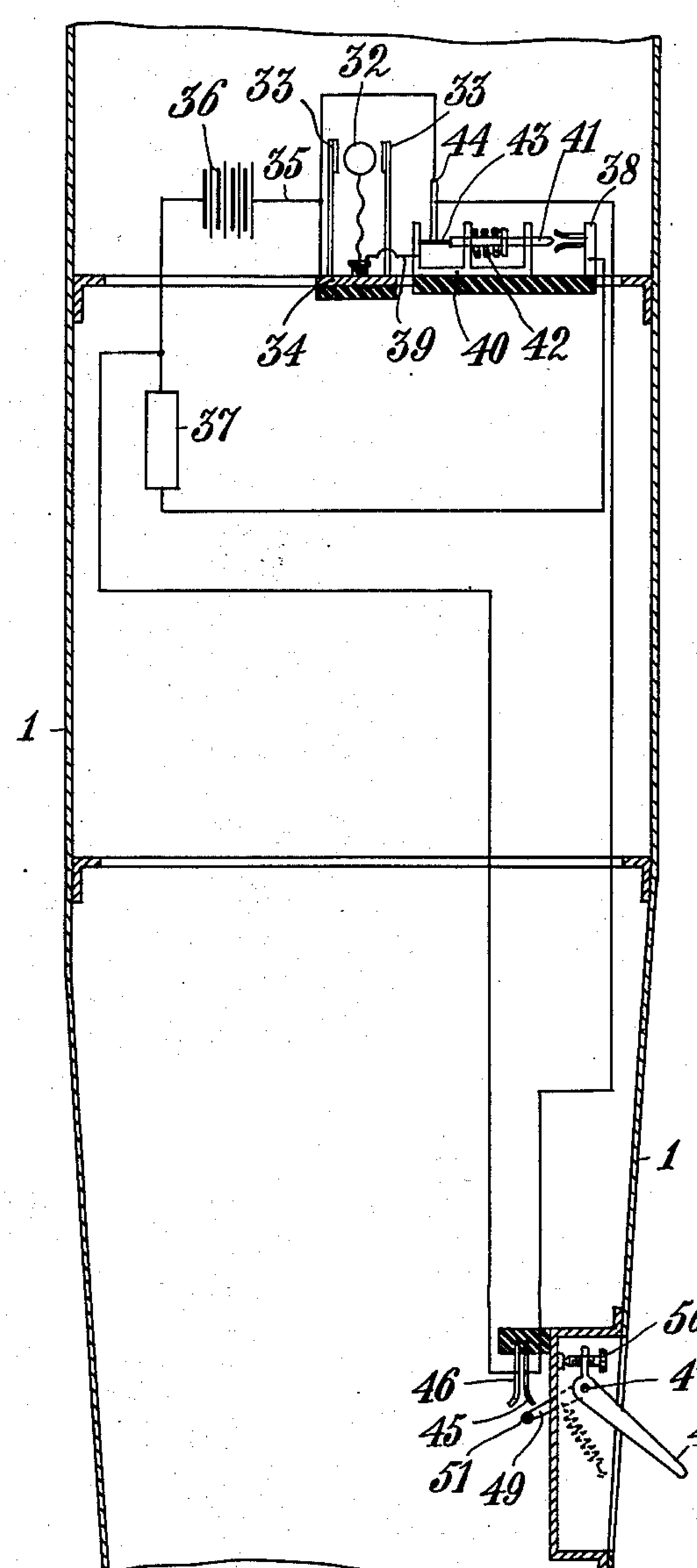
3 SHEETS—SHEET 3.

Fig. 5.



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SUBMARINE MINE, TORPEDO, AND THE LIKE.

932,450. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed April 16, 1907. Serial No. 368,498.

To all whom it may concern:

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

This invention relates to submarine mines.

The object of the invention is to enable mining to be performed under the armor-deck of war-vessels safe from the fire of an enemy.

Another object of the invention is to provide a mine which cannot be discovered and destroyed by the enemy.

A further object is to cause the mine to sink after a predetermined length of time.

Further objects of the invention will hereinafter appear.

The invention consists, chiefly, in constructing the mine in such a manner as to allow of it being shot from a submarine tube, in the same manner as a torpedo is usually ejected, and in providing means for causing the mine to oscillate within predetermined depths of submersion, when the forward movement of the mine has ceased.

The invention, further, comprises the construction and combination of parts hereinafter particularly described.

In the drawings, Figure 1 is a diagram illustrating a central longitudinal section of a torpedo mine embodying my invention, most of the elements not forming part of the invention being omitted. The mine is shown in Fig. 1 in the position which it takes up when it is at rest. Figs. 2 and 3 are section and plan views, respectively, of a parachute attached to the shell or casing of the mine for the purpose of moderating its vertical movements. Fig. 4 shows a steering plane situated at the rear part of the shell or casing for regulating the direction of movement of the mine during its travel through the water. Fig. 5 is a central longitudinal section of a part of the mine illustrating diagrammatically the shock-apparatus and its circuits, means for preventing premature explosion of the mine, and means for making the firing circuit ready for action, after the mine has been ejected.

Referring to the drawings, the shell or casing 1 of the mine illustrated has substantially the form of a torpedo so as to allow the ejecting of the mine through a submarine tube. Located in the upper (anterior) part of the mine is the depth-regulating chamber 3 bounded by a suitable cylindrical wall 2. The lower part of the chamber 3 communicates, through a tube 4 or otherwise, with the water surrounding the mine. The tube 4, suitably, extends from the upper (anterior) part of the depth-regulating chamber toward the bottom thereof. Situated beneath the depth-regulating chamber is a high-pressure chamber 5 having strong walls, so as to be able to serve as a receptacle for highly compressed air or other gas, such as carbonic acid. Extending from the high-pressure chamber 5 is a pipe or tube 6 ending in a three-way-cock 7 situated within the depth-regulating chamber. The pipe or tube 6 is shown screwed into the one (lower) nozzle of the three-way-cock. Leading from the two other nozzles are pipes or tubes 8, 9, one 8 of the same extending through the shell or casing of the mine and communicating with the space outside the mine, whereas the other 9 opens into the upper part of the depth-regulating chamber. The openings provided in the plug of the cock are arranged in such a manner that the said plug in one position forms a passage between the tubes 6 and 9 and in another position forms a passage between the tubes 8 and 9. The plug is provided, at one end, with a crank 10 operated by a rod or link 11 connected, at its upper end, to a kind of bellows 12 or any suitable device adapted to be operated by water pressure. The rod 11 is shown to pass through a stuffing-box 13 situated in the bottom of a drum or cylinder 14 inclosing the bellows 12. When the water pressure increases, the bellows 12 extend and cause the rod 11 to move downward, whereas, when the water pressure decreases, the bellows contract and move the rod 11 upward. It is, however, to be understood that I do not limit myself to the use of the pressure-operated device shown in the drawing nor to the use of the arrangement for transmitting motion illustrated, since any means suitable for the purpose may be employed.

Located in the lower (rear) part of the mine is the detonator or explosive charge 15.

The mine is balanced in such a manner as to take up, when it is at rest, the vertical position shown in Fig. 1, in which the depth-regulating chamber 3 becomes the upper part and the detonator the lower part of the mine. In case the depth of immersion of the mine is too small, water enters the depth-regulating chamber from without through the tube 4 and fills a part of the said chamber so that the mine grows heavier and slowly sinks. The air or gas confined within the depth-regulating chamber escapes through the tubes 9 and 8, said tubes communicating with each other through the cock 10 at low water pressure. As the water pressure increases, the bellows 12 extend and push the rod 11 and, thereby, the crank 10 downward. If the mine sinks below the normal depth of immersion, the cock 7 shuts off the connection between the tubes 8 and 9 and opens the connection between the tubes 6 and 9 so that a part of the highly compressed air or gas confined in the high-pressure chamber 5 is allowed to rush out into the upper part of the depth-regulating chamber and drive out a greater or less part of the water which is in the lower part of the said chamber, said water being caused to rise through the tube 4 and escape. On account thereof, the mine again becomes lighter and rises, whereby the bellows 12 contract and move the rod 11 upward so that the communication between the tubes 6 and 9 is shut off and the communication between the tubes 8 and 9 is reëstablished. The mine is thus caused to keep itself at a certain depth of immersion or to ascend a short distance above and descend a short distance below a certain normal position.

The desired depth-regulation can, obviously, be attained otherwise than above described. However, I prefer to make use of a chamber into which water from without can enter and increase the weight of the mine, in case the latter has come too near the surface of the water, and to combine with the mine a device operated by water pressure, said device being used to control the inflow of water into the water chamber of the mine by putting the upper part of the said chamber into communication with a high-pressure chamber or receptacle for compressed air or gas, or with the space outside the mine, respectively, according as the mine is to be raised or lowered.

The exploding of the mine can be performed in any suitable manner. In the embodiment illustrated in Fig. 1 the mine is shown provided, at its top, with horns 16 each supported by a spiral spring 17, said horns being adapted, when pressed inwardly by the mine striking an object, to close a contact and, thereby, cause the electric circuit of a firing battery to be closed. It is, however, obvious that a common shock-apparatus may be used, if desired. In Fig. 5 I have shown such a shock-apparatus comprising an elastically supported contact piece 32 adapted to strike one or the other of a number of fixed contact pieces 33 surrounding the same. The contact pieces 33 are electrically connected to a plate 34 connected, by a wire 35, to one pole of a battery 36 whose other pole is connected, through a fuse 37, to a forked contact piece 38. The central contact piece 32 is connected, by a wire 39, to an electrically conductive frame 40 carrying one end of a movable contact pin 41. The latter is actuated by a spring 42 tending to move the contact pin 41 into contact with the shanks of the forked contact piece 38. This is, however, prevented by a string 43 attached to the frame 40 and to the contact pin 42, said string having such a length as to keep the pin 41 out of contact with the forked contact piece 38. Connected to the wire 35 from the battery 36 is a time-fuse 44 located near the string 43 so as to burn through the latter a predetermined time after the time-fuse has been ignited. Situated in the lower part of the mine are two contact fingers 45, 46 insulated from each other, one 45 of said fingers being connected to the time-fuse 44 and through the latter to one pole of the battery 36, while the other finger 46 is connected to the other pole of the said battery. Pivotally mounted near the contact fingers 45, 46 is a spindle 47 situated in a cavity in the mine casing and passing through a water-tight stuffing-box (not shown) into the mine, said spindle having attached to it one outer arm 48 and one inner arm 49. The spindle 47 is kept by a spring and a set screw 50 in a position in which the arm 48 projects outside the cylindrical surface formed by the outer side of the middle part of the mine casing. When the mine is ejected, the arm 48 is pressed inwardly, whereby a pin 51 situated at the end of the other arm 49 enters between the two contact fingers 45 and 46. Thus, when the mine is ejected, a circuit is closed from the battery 36 through the time-fuse 44, contact finger 45, pin 51, and contact finger 46 back to the battery 36. An electric current thus flows through the time-fuse 44 so that, a predetermined length of time after the mine has been ejected, the string 43 is burned through and the contact pin 41 is moved by the spring 42 into contact with the forked contact piece 38, thus putting the latter in electric connection to the central contact piece 32 of the shock apparatus. If the mine is then exposed to a shock, a circuit is closed from battery 36 through the shock apparatus, wire 39, frame 40, contact pin 41, contact piece 38 and fuse 37 back to the battery. The fuse 37 ignites the detonator and causes the mine to explode. Obviously, a clock-work or the like may be used, if de-

sired, for closing the auxiliary contact 41, 38 a predetermined length of time after the mine has been ejected and thus prevent premature or unintentional exploding of the mine.

It is obvious that, when the pressure within the high-pressure chamber has decreased to a value equal to the sum of the atmospheric pressure and the water pressure, no further depth-regulation will take place, but the mine will slowly sink. The sinking of the mine is facilitated, if the gas confined within the high-pressure chamber is of such a nature as to be easily absorbed in water. The time the mine keeps itself floating is, to a great extent, dependent on the size of the high-pressure chamber and on the initial pressure therein, but it is also dependent on other factors, such as on the cross-sectional area of the exhaust pipe for the gas and on the presence or absence of means for moderating the violence of the vertical movements of the mine.

If it be desired that the mine shall have a long floating time, it may sometimes be convenient to attach an umbrella or the like to the shell of the mine, said umbrella being kept pressed against the shell, when the mine is inserted into the torpedo tube, while it opens when the mine has been ejected and serves as a kind of parachute. The umbrella shown in Figs. 1 to 3 consists of ribs 19 pivotally attached to the shell, said ribs carrying a cover 20 (Fig. 3) of textile or other suitable material. The opening of the umbrella can be performed by springs 21 (Fig. 1). If the cover is made of a gas-tight fabric, holes should be provided in the upper part thereof to allow for the escape of air that might otherwise be inclosed below it, so that the floating power of the mine is not increased above the desired value.

In order to cause the torpedo mine to move, after ejection, in the desired direction it may be found appropriate to arrange a number of steering planes 22 (Figs. 1 and 4) at the rear (lower) part of the mine. These steering planes may suitably be adjustable in order to make it possible to regulate the movement of the torpedo mine. In the embodiment illustrated the steering planes are carried, at their fore ends, by bolts or pins 23 entering into oblong slots 24 in the planes, said planes being provided, at their rear ends, with threaded holes, each adapted to receive a screw 26 carried by a suitably pivoted sleeve or ring 25. The steering planes may thus be placed at a desired angle to the longitudinal axis of the torpedo mine by simply turning the screws 26 in one or the other direction.

It is not always desirable to check, by umbrellas or otherwise, the vertical movements of the mine. On the contrary, it may for certain purposes be desirable to cause the mine to perform relatively rapid and large vertical movements, for instance if the mine is to be used for attacking war-vessels having torpedo nets hung down around the ship. A mine adapted for use in such a case may be obtained by making the cross-sectional area of the passage between the high-pressure chamber and the depth-regulating chamber sufficiently large. If sufficiently large vertical movements are imparted to the mine, the latter will obviously have a greater chance of passing below torpedo nets so as to be able, by the aid of currents in the water, to damage even moored vessels.

The mine described may be used in various ways. It may be laid out in the ordinary way but is preferably ejected through a torpedo tube in the same manner as a common torpedo. Such a torpedo mine may act an important part as a means of defense, for instance for a weaker fleet chased by a stronger one or for single ships which are caused to flee in order to save themselves from being overtaken by a chaser. If a war-fleet is provided with means for ejecting such torpedo mines, it may, by forming a line extending transversely to the direction of movement and ejecting, from time to time, such torpedo mines from the several ships toward a chasing hostile fleet, form behind itself a mine field making all further pursuing impossible. The invention may also obtain an important application for offensive purposes, for instance in compassing a fleet lying in a port in order to prevent it from escaping. The compassing fleet may, to this end, approach the inlet of the port with a number of iron-clads as near as the batteries on the shore will admit and eject one or more rows of torpedo mines toward the inlet, which torpedo mines will thus form a mine field rendering the escape of the invested fleet very difficult and dangerous in case the said fleet should hazard an attempt to break out, for instance at night, when the guard-keeping offers difficulties. Of great importance is that these torpedo mines are not visible during ejection nor afterward since the same, though freely floating, keep themselves at a predetermined depth of immersion. Since they are, therefore, very dangerous, they should preferably be constructed in such a manner as to sink after a predetermined length of time, so as not to remain a source of danger to other ships in the vicinity, friend as well as foe.

Though I have described a specific means of regulating the depth of immersion of a mine, it is to be understood that I do not limit myself to any particular construction, but I consider any form of mine adapted to be shot through a torpedo tube and provided with means for causing the mine to remain floating for a desired length of time at a

desired depth beneath the water surface to fall within the spirit and scope of this invention.

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

1. The combination with a free floating mine, of means for causing the mine to oscillate within predetermined depths of submersion, substantially as and for the purpose set forth.

2. The combination with a mine adapted to be launched through torpedo tubes and balanced so as to take up a perpendicular position, when it comes to rest, of means for causing the mine to oscillate within predetermined depths of submersion, substantially as and for the purpose set forth.

3. The combination with a floating mine adapted to be launched with a forward movement through the water, of means for steering the mine during its travel through the water, and means for causing the mine to oscillate within predetermined depths of submersion, substantially as and for the purpose set forth.

4. The combination with a mine adapted to be launched through torpedo tubes, of means for causing the mine to oscillate within predetermined depths of submersion, and means for moderating the downward movements of the mine, substantially as and for the purpose set forth.

5. The combination with a mine adapted to be launched through torpedo tubes, of means for exploding the mine, when the latter is exposed to a shock, means for preventing premature explosion of the mine, and means operated by internal gas pressure and outer water pressure for causing the mine to oscillate within predetermined depths of submersion, until the gas pressure has decreased to a certain predetermined value at which the mine will sink, substantially as and for the purpose set forth.

6. The combination with a mine, of means for admitting water into it when the depth of immersion of the mine is less than a predetermined normal, and means for driving water out of the mine when the depth of immersion is greater than the predetermined normal.

7. The combination with a mine, of a chamber situated in the shell thereof, means for admitting water into said chamber when the depth of immersion of the mine is less than a predetermined normal, and means for driving water out of the chamber when the depth of immersion of the mine is greater than the predetermined normal.

8. The combination with a mine, of a high pressure chamber, a depth regulating chamber, means for admitting water into the latter mentioned chamber when the depth of immersion of the mine is less than a predetermined normal, and means for admitting gas from the high pressure chamber into the depth regulating chamber and thereby driving water out of the depth regulating chamber when the depth of immersion of the mine is greater than the predetermined normal.

9. The combination with a mine, of a high pressure chamber, a depth regulating chamber, a device operated by water pressure, means for admitting water into the depth regulating chamber when the water pressure upon the pressure operated device is less than a predetermined value, and means connected to the pressure operated device for admitting gas from the high pressure chamber into the depth regulating chamber and thereby driving out the water therein when the water pressure upon the pressure operated device is greater than a predetermined value, substantially as and for the purpose set forth.

10. The combination with a mine, of a high pressure chamber, a depth regulating chamber communicating with the space outside the mine, a conduit between said chambers, a valve situated in the said conduit, and a pressure operated device connected to the said valve in such a manner as to cause the valve to open or shut the communication between the two chambers according as the water pressure upon the pressure operated device increase or decreases beyond certain limits, the communication between the depth regulating chamber and the space surrounding the mine being such as to admit water into the said chamber, when the communication between the pressure chamber and the depth regulating chamber is shut off, substantially as and for the purpose set forth.

11. The combination with a mine having a shell in the form of a torpedo, of means for admitting water into the shell when the depth of immersion of the mine is less than a predetermined normal, and means for driving water out of the shell when the depth of immersion of the mine is greater than a predetermined normal.

12. The combination with a mine, of a chamber containing a highly compressed gas absorbable in water, a depth regulating chamber connected thereto, means for admitting the water into the latter mentioned chamber when the depth of immersion of the mine is less than a predetermined normal, and means for admitting gas from the high pressure chamber into the depth regulating chamber and thereby driving water from said chamber when the depth of immersion of the mine is greater than the predetermined normal.

13. A floating shell having means for increasing and decreasing its buoyancy to maintain it approximately at a definite level

for a predetermined time, including mechanically controlled means to admit water after the expiration of said predetermined time.

14. A floating shell having means to store a predetermined amount of energy, means through which said energy may be applied to expel ballast, and means operatively related thereto to admit ballast indefinitely after said energy has become exhausted or has decreased to a certain amount.

15. A floating shell having means to store a predetermined amount of gas under pressure, means whereby said gas may expel water from the shell, means to admit water into the shell, and mechanically operated means to release the gas and admit the water alternately and continuously until the gas is exhausted or the pressure thereof has decreased to a certain amount.

16. A floating shell having a chamber in which to store a predetermined amount of gas under pressure, means whereby said gas may expel water from the shell, means to admit water into the shell, a valve controlling both of said means, and a device in operative relation with said valve and controlled by external pressure, whereby the gas is released from said chamber intermittently to maintain the shell from sinking below a normal level until said gas is exhausted whereupon the mine will sink.

17. A submarine mine comprising a container for a water absorbent gas under pressure and connections whereby the mine is automatically maintained at a predetermined depth.

18. A floating shell containing a predetermined amount of gas under pressure and means for applying said gas to keep the shell afloat for a predetermined time.

19. The combination with a drift mine, of means for causing the mine to oscillate during a predetermined length of time within predetermined depths of submersion.

20. The combination with a drift mine, of means for causing the mine to oscillate within predetermined depths of submersion and to sink after a predetermined length of time.

21. The combination with a mine, of means operated by internal gas pressure and outer water pressure for causing the mine to oscillate within predetermined depths of submersion until the gas pressure has decreased to a certain predetermined value at which the mine will sink.

22. The combination with a mine adapted to be launched through a submarine tube and balanced so as to take up a perpendicular position when it comes to rest, of means for steering the mine during its travel through the water, and means for causing the mine to oscillate, after stopping, within predetermined depths of submersion.

23. The combination with a mine, of means for causing the mine to oscillate within predetermined depths of submersion, and means for moderating the downward movements of the mine.

24. The combination with a mine adapted to be launched through a submarine tube, of means for exploding the mine when it is exposed to a shock, means for preventing premature explosion of the mine, and means operated by internal gas pressure and outer water pressure for causing the mine to oscillate within predetermined depths of submersion until the gas pressure has decreased to a certain predetermined value.

25. A free drifting submarine shell having means to store a predetermined quantity of energy, means through which said energy may be made to do work to make the shell move up to a certain depth in the water, and means for so controlling the application of said energy to the work as to keep the shell at a predetermined depth for a predetermined time.

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

KARL OSKAR LEON.

Witnesses:

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