

Mar. 20, 1923

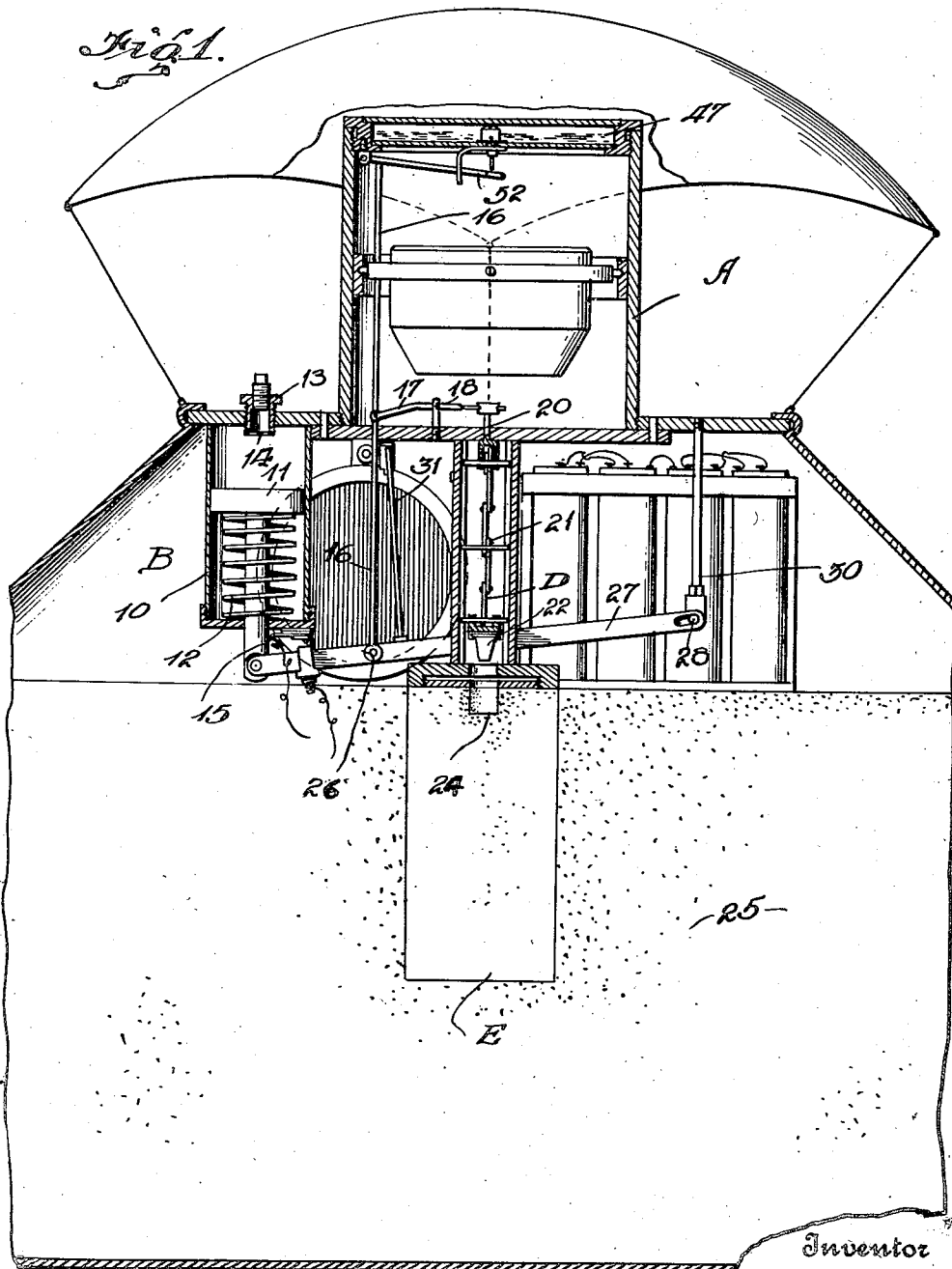
1,448,976

W. F. PALMER

SUBMARINE MINE

Filed Nov. 17, 1919

5 sheets-sheet 1



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Fig. 2.

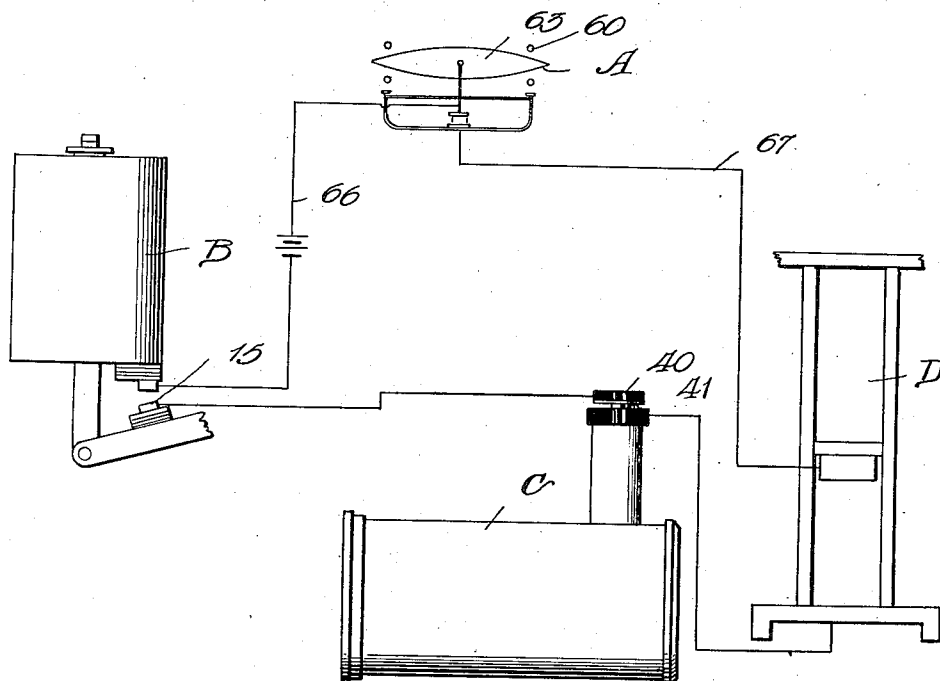


Fig. 3.

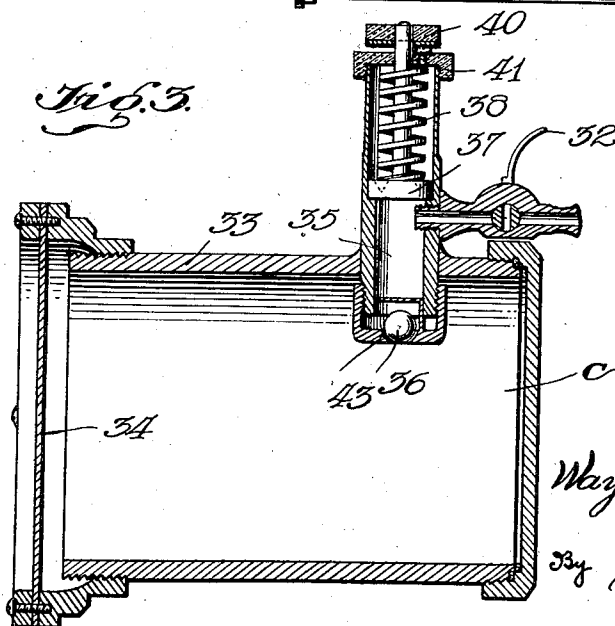
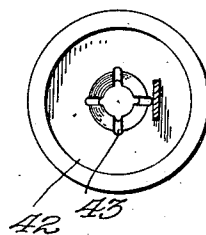


Fig. 4.



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Fig. 5.

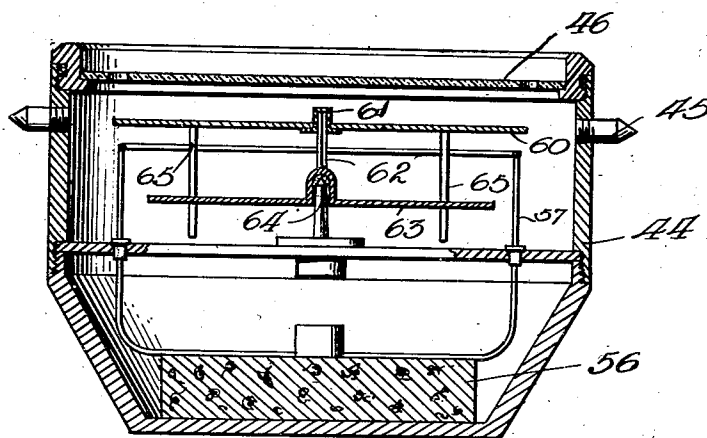
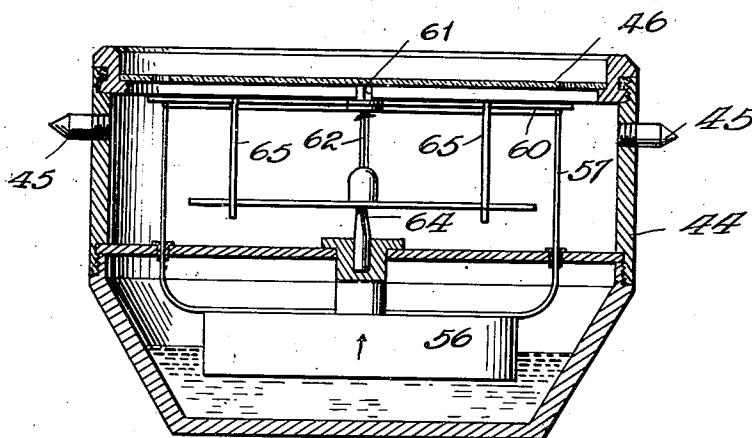


Fig. 6.



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Fig. 7.

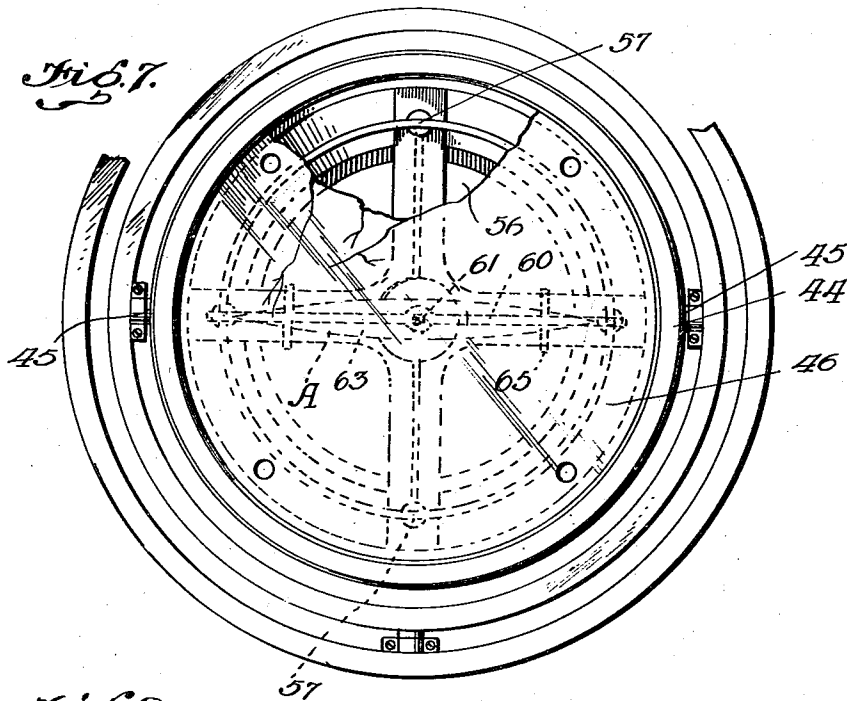
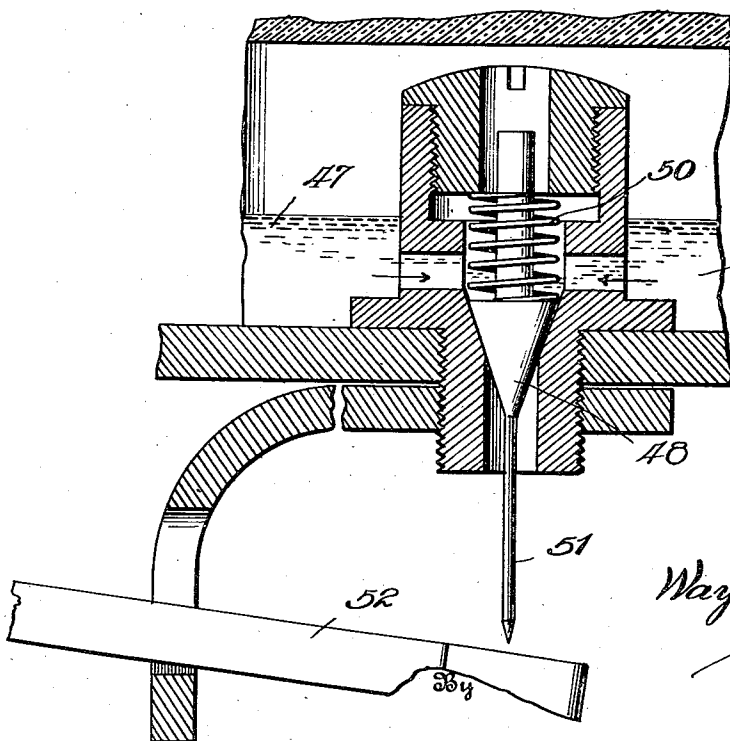


Fig. 8.



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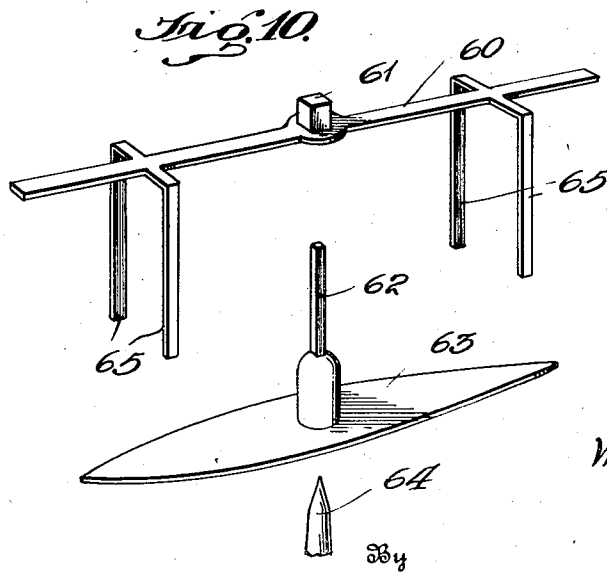
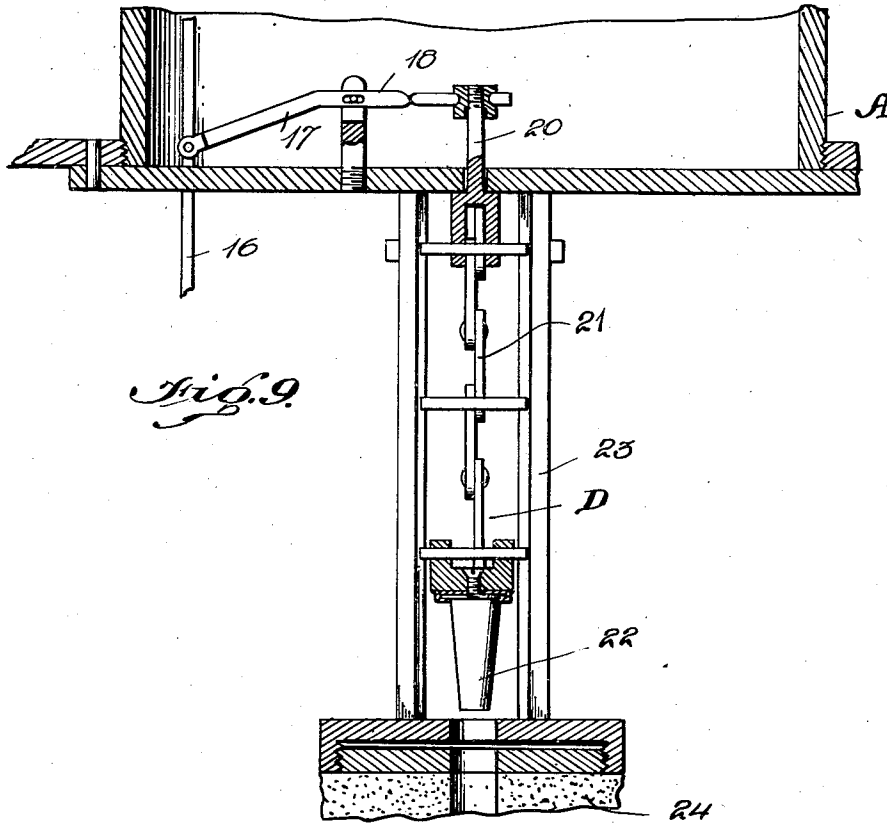
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UNITED STATES PATENT OFFICE.

WAYNE F. PALMER, OF WASHINGTON, DISTRICT OF COLUMBIA.

SUBMARINE MINE.

Application filed November 17, 1919. Serial No. 338,719.

To all whom it may concern:

Be it known that I, WAYNE F. PALMER, a citizen of the United States, residing at Washington, District of Columbia, have invented new and useful Improvements in Submarine Mines, of which the following is a specification.

This invention relates to improvements in submarine mines and more particularly to firing mechanism of the single magnetic needle type particularly adapted for ground mines.

One of the objects of the present invention is to provide a simple and practical firing mechanism for submarine mines which will be reliable and efficient in use and operation.

A further object is to provide a mechanism of the above character which will be safe to handle and launch and free from danger of premature firing for a reasonable length of time after launching.

A further object is to provide a mine of the above character which cannot be counter-mined.

A further object is to provide a simple and compact operating mechanism having relatively few parts which may be inexpensively manufactured and assembled.

A further object is to provide a mine of the above character which, when thrown into the water will light right side up and without a violent jar.

A further object is to provide a mine which will meet the peculiar demands of the offensive mine. Offensive mines must be laid by ships which will penetrate waters under enemy control, and hence, must be of the swift, light, surface type of destroyer, light cruiser, or battle cruiser, or of the submarine mine-laying type. In all of these, reduction of weight and small stowage space is an important factor. In order that the field may be effective, a complete barrage of mines must be laid which cannot be swept. Summarizing the advantages of this mine as an offensive mine, they are:—small and compact—free from heavy anchors—require small stowage space—light in weight—easily carried in large quantities and cannot be swept or salvaged by enemy.

A further object is to provide a mine of the above character giving a much larger radius of action than the contact type.

A further object is to provide a mine of the above character having a delayed action

detonator which will guarantee that some part of any ship influencing the magnetic needle will be within the effective radius of the explosive.

Other objects will be in part obvious and in part hereinafter pointed out in connection with the accompanying drawings showing one of the various possible modifications. In these drawings wherein similar reference characters denote corresponding parts,

Figure 1, is a sectional elevational view of such parts of a complete mine as are necessary to fully understand the invention, showing the parachute for retarding its sinking whereby it lands right side up without jarring.

Figure 2 is a diagrammatic view of the complete system.

Figure 3 is a detail sectional view of the anti-counter-mining feature ready for functioning.

Figure 4 is a detail view of a part of Figure 3.

Figure 5 is a detail sectional view of the magnetic contact device in safety position.

Figure 6 is a view similar to Figure 5 with the parts in armed position.

Figure 7 is a detail plan view of a part of a magnetic firing mechanism.

Figure 8 is a detail sectional view of a part of the setting mechanism.

Figure 9 is a detail sectional view of the primer extender mechanism.

Figure 10 is a detail perspective view of the needle contacts in disassembled position.

Referring now to the drawings in detail and more particularly to Figures 1 and 2, the parts may be preferably described in groups in which A designates the magnetic compass chamber hereinafter described more in detail in connection with Figures 5 and 6. B denotes the setting mechanism adapted to go into operation after the mine is launched wherein a relative upward movement of the plunger takes place to set the compass mechanism A and the anti-counter-mining feature C shown in detail in Figure 3, to actuate the primer extender D shown in Figure 9 by moving the detonator downwardly into operative position with respect to the booster charge E.

The second feature B comprises a cylinder 10 provided with a piston 11 adapted to be urged upwardly by means of spring 12. The upper part of the cylinder is filled with a suitable non-freezing, non-corrosive heavy

liquid such, for example, as glycerine, which on the removal of a stopper or plug 13, which may be soluble in sea-water, if so desired, permits the glycerine or fluid to pass out slowly through a hole 14 as the plunger 11 is urged upward by spring 12. This upward movement accomplishes several functions such as closing the firing circuit at the point 15, setting the needle contacts by relative upward movement of the rod 16 which also causes a lever 17 to move about a slotted pivot 18 producing a downward movement of the primer extender rod 20. This rod 20 is connected with a suitable lazy tong device 21 to move a detonator 22 out of safety chamber 23 into operative relation with booster charge 24 embedded in the explosive portion of the mine 25. The rod 16 being pivotally connected at 26 to a lever 27 having a slotted pivot connection 28 with the stem 30 supported from the mine casing also moves a rod 31 relatively upwards to actuate a pet-cock lever 32 associated with the counter-mining device illustrated in Figure 3. This counter-mining device comprises a chamber 33 completely filled with any non-freezing, non-corrosive liquid and having a diaphragm 34 at one end exposed to sea-water pressure. Connected with the chamber is an auxiliary chamber 35 having a ball valve 36 at the lower part and a plunger 37 normally urged downward by spring 38 to close contacts 40 and 41 at the upper end thereof. The ball 36 is seated in a concave seat 42, Figure 4, provided with small grooves 43 thereby to permit leakage past the ball 36.

Thus, when the mine is launched, the pet-cock 32 is open and as the hydrostatic pressure forces in the diaphragm the liquid flows out of the anti-counter-miner by this pet-cock. When the pet-cock is closed, there remains in the anti-counter-miner a confined liquid free from air.

If the mine is now subjected to a sudden violent hydrostatic pressure, as occurs in counter-mining, this ball 36 permits the non-corrosive, non-freezing fluid within the chamber 38 to move upwardly past the ball and force the plunger 37 relatively upwards and break the contacts 40 and 41. In this manner, if the magnetic firing mechanism should accidentally complete contact due to counter-mining, the circuit would be broken at 40 and 41 and prevent a firing of the detonator.

The magnetic contact device is shown more clearly in Figures 5, 6 and 10. A chamber 44 is mounted on suitable trunnions 45. A receptacle 47, Figure 8, contains a non-corrosive, non-freezing fluid such, for example, as kerosene. This chamber is provided with a needle valve 48 normally urged downwardly by spring 50, a stem 51 is adapted to be engaged by the end

of a lever 52 which is moved upwardly on actuation of the rod 16 as shown in Figure 1. This allows the liquid from 47 to flow downwardly past the valve 48, fall onto the top of chamber 44 and pass into the lower part of chamber 44 where it floats a cork or other buoyant member 56 relatively upwards or to the position shown in Figure 6. This float has a plurality of arms 57 adapted to engage the under side of a non-magnetic member 60 which is provided with a squared recess 61 normally resting on insulated squared post 62 of the magnetic member 63 adapted to be mounted on needle point 64 as shown in Figure 10. Before arming non-magnetic needle 60 and magnetic needle 63 are free to swing with their horizontal axes in the same vertical plane. After arming, the non-magnetic member 60 is raised free from the squared post 62 and is held stationary. The magnetic member 63 is still free to gyrate in response to any magnetic influence. The member 60 has at its opposite ends arms 65 extending downward adapted to be positioned normally at either side of the member 63 but out of contact therewith. These members 60 and 63 are respectively connected with opposite wires 66 and 67 of the electrical circuit shown in Figure 2. Thus, when any magnetic disturbance occurs, as by the relatively close approach of a steel ship, the magnetic member 63 rotates relative to the non-magnetic member 60, causing contact with the arms 65 and a completion of the circuit which fires the detonator and mine.

Classes of ships and even ships within a class will vary in the intensity of their influence on the magnetic needle. This is immaterial, excepting in cases where particularly strong magnetism in a ship may cause the mine to fire while all parts of the ship are still outside of an effective radius of the explosive. All possibility of premature firing may be overcome by any one of the following modifications:—

- (a) Vary the strength of magnetism of the magnetic needle.
- (b) Increase the weight of the magnetic needle.
- (c) Increase the friction of the magnetic needle bearing.
- (d) Use a slow-burning detonator.
- (e) Introduce a resistance into the firing circuit.
- (f) Increase the arc in which the magnetic needle must swing to make contact.

Having thus described the above invention, the operation thereof is substantially as follows:—

When the mine is launched the plug 13 having been removed, unless a soluble plug is used, the glycerine within the cylinder B passes slowly out through the vent by reason of the spring 12 causing a relative upward

movement of the lever 27. This is a delay action to permit the magnetic member 63 to place its axis and that of the non-magnetic member 60 along the magnetic meridian before arming. This upward movement simultaneously completes the circuit 15, opens the needle valve 48, Figure 8, allowing the non-magnetic needle within the chamber 44 to move to armed position as shown in Figure 6. Simultaneously, the counter-mining spill pet-cock is closed and the detonator 22 moves into a position within the booster charge E. As previously explained, a counter-mining operation will break the contact 40 and 41 before the mine can fire by contact with the magnetic members 60 and 63. If, however, a ship or magnetic body of sufficient size to affect the magnets approaches the mine then a turning movement of the member 63 takes place contact is made with the arms 65 of the needle 60 and the circuit through the detonator is completed.

From the above it will be seen a simple and practical mine is provided which will be safe to handle yet will be very reliable and efficient in operation.

What I claim is:—

1. In a submarine mine, in combination, a circuit normally disconnected at a plurality of points, means adapted to close the circuit at all but one point when the mine is launched, means adapted to close the circuit at this point when the mine is approached by a ship surrounded by a magnetic field and means adapted to break the circuit at a normally closed point when the mine is subjected to counter-mining.

2. In a submarine mine, in combination, a circuit normally open at a plurality of points, means adapted to close the circuit when the mine is launched at all but one point, a magnetically effected normally open circuit closer adapted to close on the approach of a magnetic body, a primer extender and means associated with said first mentioned circuit closer adapted to set the magnetic circuit closer and to move the primer from the safe to the armed position.

3. In a submarine mine, in combination, a circuit normally open at a plurality of points, means adapted to close the circuit when the mine is launched at all but one point, a magnetically effected normally open circuit closer adapted to close on the approach of a magnetic body, a primer extender and means associated with said first mentioned circuit closer adapted to set the magnetic circuit closer and to move the primer from the safe to the armed position, and means adapted to prevent counter-mining.

4. In a submarine mine, in combination, a circuit normally open at a plurality of points, means adapted to close the circuit when the mine is launched at all but one

point, a magnetically effected normally open circuit closer adapted to close on the approach of a magnetic body, a primer extender and means associated with said first mentioned circuit closer adapted to set the magnetic circuit closer and to move the primer from the safe to armed position, and means adapted to prevent counter-mining, said last mentioned means including a normally closed circuit closer adapted to be opened by the concussion of counter-mining.

5. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetically effected circuit closer in the circuit and normally open, means adapted to close the circuit at another point when the mine is launched, means adapted to set the magnetic circuit closer when the mine is launched and a counter-mine device associated with said circuit adapted to open the circuit when the mine is subjected to concussion.

6. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetically effected circuit closer in the circuit and normally open, means adapted to close the circuit at all other points when the mine is launched, means adapted to set the magnetic circuit closer when the mine is launched, a counter-mine device associated with said circuit adapted to open the circuit when the mine is subjected to concussion and means associated with said circuit closer operative on launching of the mine to set said counter-mining member.

7. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetically effected circuit closer in the circuit and normally open, means adapted to close the circuit at all other points when the mine is launched, means adapted to set the magnetic circuit closer when the mine is launched, a counter-mine device associated with said circuit adapted to open the circuit when the mine is subjected to concussion, means associated with said circuit closer operative on launching of the mine to set said counter-mining member and a primer extender located in said mine and adapted to be operated on launching of the mine.

8. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetic circuit closer in the circuit and normally open and adapted to be operated by the approach of a ship and means operated on launching the mine adapted to close the circuit at all other points and set said magnetically operated circuit closer.

9. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetic circuit closer in the circuit and normally open and adapted to be

- operated by the approach of a ship and means operated on launching the mine adapted to close the circuit at all other points and set said magnetically operated circuit closer,
- 5 said magnetically operated circuit closer including a floating body, a magnetic needle, a non-magnetic needle and means for admitting fluid as the mine is launched to the receptacle for said floating body.
- 10 10. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetic circuit closer in the circuit and normally open and adapted to be operated by the approach of a ship and
- 15 means operated on launching the mine adapted to close the circuit at another point and set said magnetically operated circuit closer, said magnetically operated circuit
- 20 closer including a floating magnetized body, means for admitting fluid to the receptacle for said floating magnetized body as the mine is launched and means adapted to break the circuit when said mine is subjected to counter-mining whereby the circuit cannot
- 25 be closed by said magnetized circuit closer.
11. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetically operated circuit closer
- 30 and a mechanically operated circuit closer and means whereby said mechanically operated circuit closer goes into operation after the mine is launched to set said magnetically operated circuit closer, said means including
- 35 a lever and a member operated by said lever adapted to set into operation the setting means for said magnetically operated circuit closer.
12. In a submarine mine, in combination,
- 40 a circuit normally open at a plurality of points, a magnetically operated circuit closer, a mechanically operated circuit closer
- and means whereby said mechanically operated circuit closer goes into operation after the mine is launched to set said magnetically operated circuit closer, said means including a lever and a member operated by said lever adapted to set into operation the setting means for said magnetically operated circuit closer and a primer extender adapted to be operated by movement of said lever.
13. In a submarine mine, in combination, a circuit normally open at a plurality of points, a magnetically operated circuit closer, a mechanically operated circuit closer
- 55 and means whereby said mechanically operated circuit closer goes into operation after the mine is launched to set said magnetically operated circuit closer, said means including a lever and a member operated by said lever
- 60 adapted to set into operation the setting means for said magnetically operated circuit closer and a counter-mine device adapted to be set by movement of said lever.
14. In a submarine mine, in combination,
- 65 a circuit normally open at a plurality of points, a magnetically operated circuit closer, a mechanically operated circuit closer and means whereby said mechanically operated circuit closer goes into operation after
- 70 the mine is launched to set said magnetically operated circuit closer, said means including a lever and a member operated by said lever adapted to set into operation the setting means for said automatically operated circuit closer, a counter-mine device
- 75 adapted to be set by movement of said lever and a primer extender connected with said lever whereby as the circuit closes said primer is moved into armed position.
- 80 Signed at Washington, District of Columbia, this twenty-third day of September, 1919.
- WAYNE F. PALMER.