

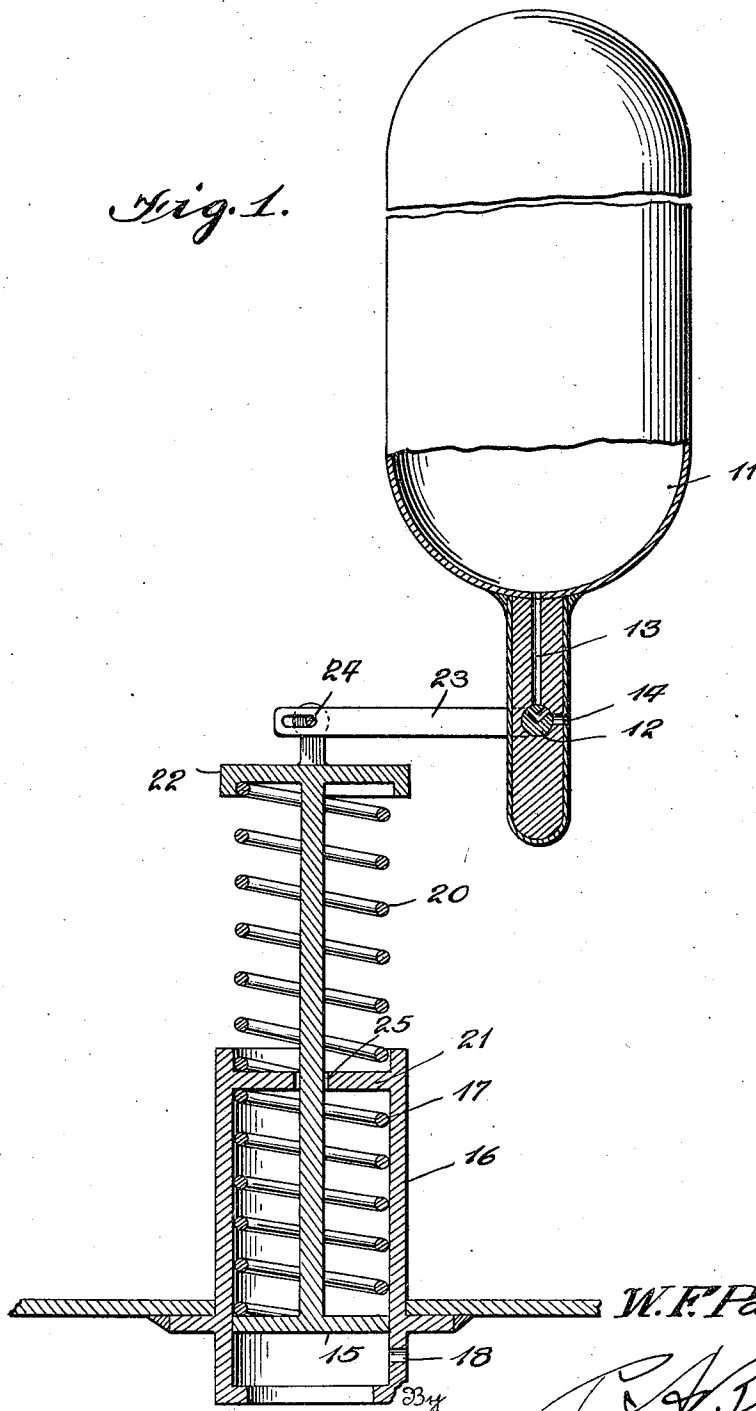
Jan. 30, 1923.

W. F. PALMER,
MINE.
FILED APR. 19, 1921.

1,443,431.

2 SHEETS—SHEET 1.

Fig. 1.



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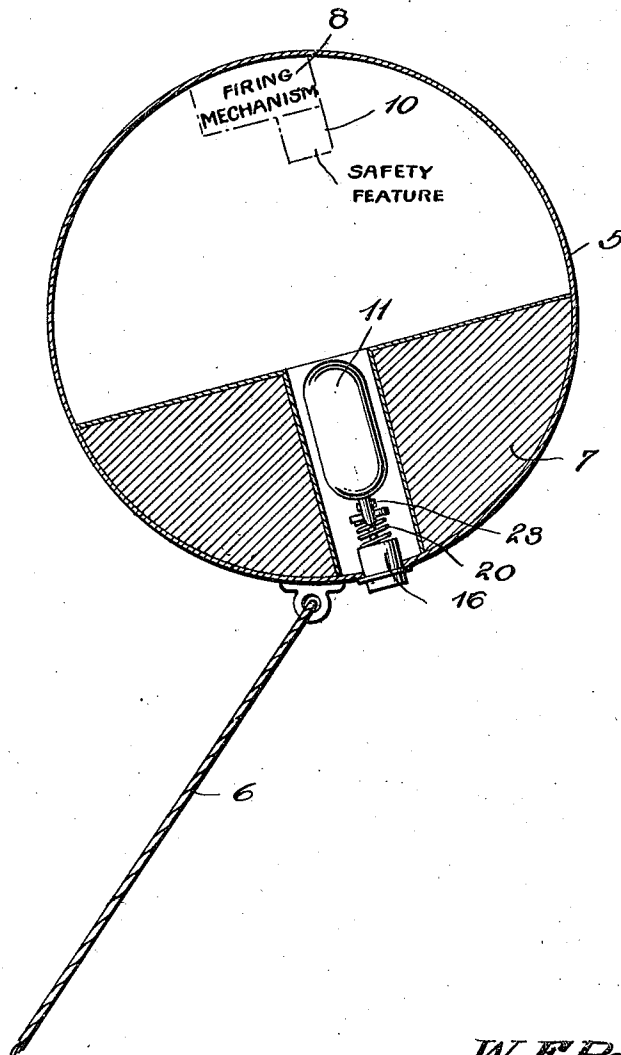
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2 SHEETS—SHEET 2.

Fig. 2.



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Attorney

UNITED STATES PATENT OFFICE.

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

MINE.

Application filed April 19, 1921. Serial No. 462,741.

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 Mines, of which the following is a specification.

This invention relates to improvements in submarine mines.

One of the objects of the present invention is to provide an improved mine case which will not collapse under hydrostatic pressure with means for preventing countermining pressure.

A further object is to provide a mine case by the use of which it is possible to plant a mine of the type that goes to the bottom before rising to its correct depth in depths of water even exceeding 5,000 feet.

A further object is to make it possible to construct a mine case of thinner material than is now used and to do away with internal reinforcements.

A further object is to provide a mine case that will be absolutely water tight.

A further object is to construct a simple and practical mechanism of the above character adapted to be put into operation by internal means, safety switches and other internal mechanisms thereby eliminating the necessity of expensive mine case openings.

Other objects will be in part obvious and in part hereinafter pointed out.

In the accompanying drawings wherein is shown one of various possible modifications of the present invention and in which similar reference characters denote corresponding parts,

Figure 1 is a semi-diagrammatic sectional elevational view showing such parts as are necessary to understand the invention.

Figure 2 is a semi-diagrammatic sectional elevation through the center of the mine.

Referring now to the drawings in detail, a mine case 5, of general spherical shape is adapted to be anchored by means of cable 6 in the usual well-known manner. An explosive charge is indicated at 7 adapted to be fired by the firing mechanism 8 provided with the customary safety features 10. These elements form no part of the present invention and are merely shown graphically. Within the mine case a small cylinder 11 adapted to contain some liquefied gas is placed at a convenient position and is pro-

vided with a normally closed valve 12, as shown more clearly in Figure 2. This valve when open or as when rotated about an angle of 45° will connect the passages 13 and 14 and permit an escape of the gas from the cylinder 11. This valve is open when the mine is submerged by means of hydrostatic pressure acting against a piston 15 moving within a cylinder 16. As the piston is actuated a spring 17 is compressed within the cylinder and the escaping gas builds up the pressure within the mine casing accordingly. When the internal pressure exceeds the exterior hydrostatic pressure by any predetermined amount, the piston 15 returns to normal position thereby closing the valve 12. When the internal pressure exceeds the external hydrostatic pressure by more than the desired excess, the piston 15 will take up a position in the cylinder 16 below an orifice 18 thereby relieving the internal pressure by the escape of gas therethrough. Such movement compresses a second spiral spring 20 between the head 21 of the cylinder 16 and a plate 22 to which the actuating lever 23 of the valve 12 is loosely connected in any desired manner as by the slot and pin construction 24.

The safety switches, safety features and arming devices previously operated by hydrostatic pressure can by this method be operated by the internal vapor pressure thereby accomplishing, among others, all of the objects and advantages herein set forth.

Carbon dioxide is suggested as a possible liquid. By its use no injury to personnel, to the explosive charge, or metal parts of the mine, could be expected. It is soluble in water and would not therefore disclose the location of the mine. At 0° F. its vapor pressure in pounds per square inch is 308; at 15° F., 391; at 30° F., 488.8; at 45° F., 606; at 60° F., 744; and at 75° F., 906. These values are assuming a saturated atmosphere and under such conditions the mine could be submerged to 1700 feet and be subjected to no greater strain than normally exists above the surface of the water. The amount of carbon dioxide required would be small and the assembly compact and light in weight. If the pressures above listed are too high or too low, it is possible either to use one of a number of other fluids or to vary the amount of fluid used. The choice of substance used would depend on

its action on explosives, steel, bronze, and rubber; its solubility in water, cost, vapor pressure and critical temperature.

The operation of the device is substantially as follows:

The mine casing with its anchor is launched in the usual manner, and, as with many types now in general use, sinks to the bottom whereupon the casing is released from its anchor and automatically rises to a position a predetermined distance below the surface of the water thereby to engage the under side of a passing boat. Naturally as the mine sinks to great depths, the hydrostatic pressure on the mine casing is very great. This hydrostatic pressure automatically actuates the piston, and the valve 12 is opened allowing the escape of gas which builds up the pressure within the mine casing greater than the external pressure by any predetermined amount. This, of course, eliminates the necessity of extra strong mine cases. When the mine is released from its anchor the excess pressure moves the piston in the opposite direction thereby shutting off a further flow of gas from the cylinder 11 and permitting the excess pressure to pass through the opening 25 in the cylinder head 21 and thence out through the opening 18 on the exterior of the mine casing.

It will thus be seen that the present invention provides a simple and practical apparatus which may be inexpensively manufactured and assembled.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various applications without omitting certain features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claim.

What I claim is:

In a mine case, in combination, a tank adapted to contain a gas under high pressure, said mine case having an opening in which a cylinder and piston are mounted, the piston being open to the action of hydrostatic pressure, said tank having a valve permitting the outflow of gas, means between the valve and the piston adapted to open said valve when said piston is moved inwardly under hydrostatic pressure thereby to equalize the internal and external pressures on the mine case, spring means associated with the piston for holding the same outwardly in substantially normal position, said cylinder having an outlet in its side to permit the escape of gas from the interior of the mine when the internal pressure exceeds the external hydrostatic pressure.

Signed at Washington, District of Columbia, this 16th day of March, 1921.

WAYNE F. PALMER.