Nov. 6, 1923. 1,473,148

J. H. HAMMOND, JR

SUBMARINE MINE

Original Filed Aug. 9, 1917

Fig. 1

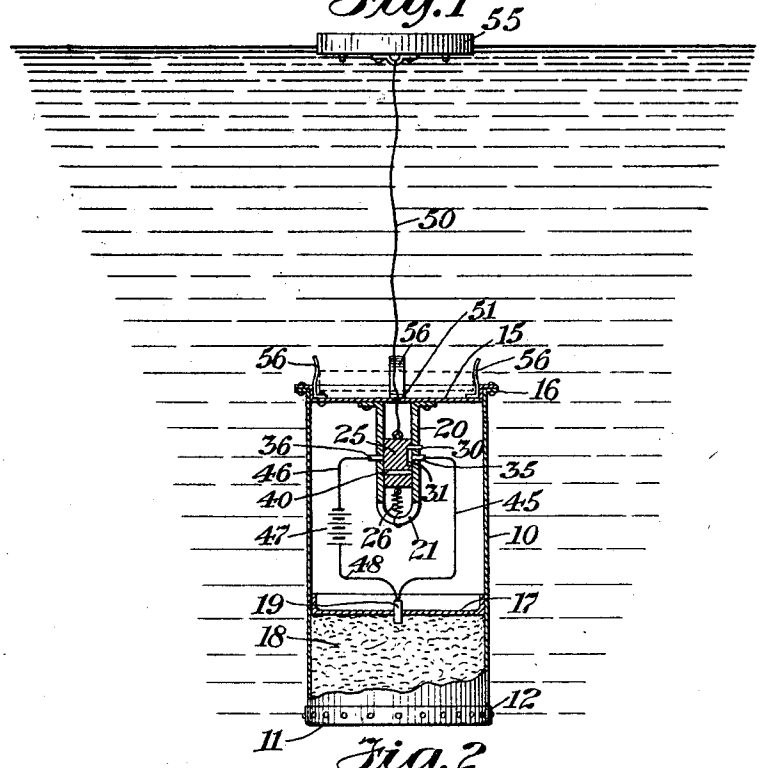
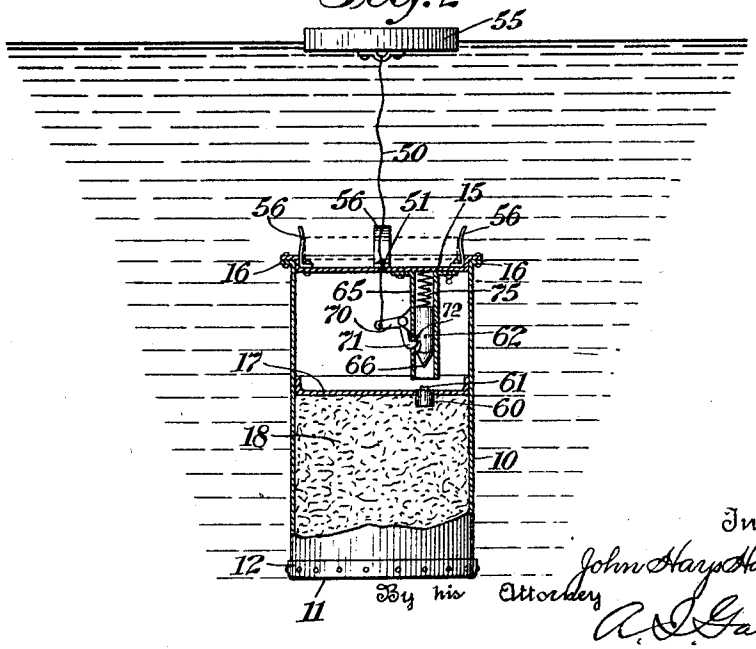


Fig. 2



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UNITED STATES PATENT OFFICE.

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SUBMARINE MINE.

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To all whom it may concern:

Be it known that I, JOHN HAYS HAMMOND, Jr., a citizen of the United States, residing in Gloucester, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Submarine Mines, of which the following is the specification.

Some of the objects of this invention are to provide a submarine mine which may be dropped into the water from an aircraft or other body and which will be exploded when the mine reaches a predetermined depth in the water; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Fig. 1 is a fragmentary side elevation partly in central longitudinal section of a submarine mine constructed in accordance with this invention; and Fig. 2 is a fragmentary side elevation partly in central longitudinal section of a modified form of submarine mine constructed in accordance with this invention.

Referring to the drawings, and particularly to Fig. 1, one embodiment of this invention comprises a submarine mine including a hollow cylindrical body portion or casing 10 which may be made of steel or any other suitable material and which is securely sealed at its lower end by a flat, circular bottom plate 11 provided with a marginal flange 12 fitting snugly around and securely riveted to the lower end of the body portion 10. The upper end of the body portion 10 is also securely sealed by a circular top plate 15 which is marginally secured to a flange 16 surrounding and integral with the upper end of the casing 10. The interior of the casing 10 is divided into two compartments by a transversely extending partition 17 which is marginally secured to the inner surface of the casing 10 in any suitable manner, and the lower compartment of which is filled with any suitable explosive material or mixture 18, and a detonator 19 extends snugly through a central opening provided therefor in the partition 17 and projects into the explosive material 18.

Rigidly secured centrally to the under surface of the top plate 15 and depending downwardly in the casing 10 and coaxially therewith is a rigid cylindrical carrier 20, the lower end of which is open and is spanned by a bridge 21 rigid therewith. Within this carrier 20 fits snugly but slidably a piston 25 preferably made of insulating material, the lower end of which is connected to one end of a spiral spring 26 and the other end of which is connected to the bridge 21 to hold the piston 25 normally against sliding upwardly in the cylinder 20 beyond a predetermined distance. To limit the longitudinal movement of the piston 25 and to hold the piston 25 against rotary movement with respect to the carrier 20, a pin 30 extends tightly through one side of the carrier 20 and engages loosely in a key-way 31 provided therefor in and extending longitudinally of the piston 25.

For firing the detonator 19 to explode the mine when the mine has reached a predetermined depth in the water, two conducting terminals 35 and 36 extend through diametrically opposed openings provided therefor through the opposite walls of the carrier 20, and these terminals are held in fixed positions and are insulated from the carrier 20 by any suitable means. The inner ends of these terminals 35 and 36 are flush with the inner surface of the carrier. Extending diametrically through the lower portion of the piston 25 and insulated therefrom and held in a fixed position with respect thereto is a rod 40 of conducting material which is normally arranged in a plane with the two terminals 35 and 36. The opposite ends of the rod 40 are flush with the exterior surface of the piston and are arranged to be moved simultaneously into sliding contact with the inner ends of the two terminals 35 and 36. The piston 25 is normally held in such a position by the spring 26 that the fixed pin 30 engages against the wall of the upper end of the key-way 31 to hold the piston 25 against downward movement, and so that the conducting bar 40 is spaced below the terminals 35 and 36.

One of the contacts 35 is connected by a conductor 45 to one terminal of the detonator 19, and the other contact 36 is connected by a conductor 46 to one pole of a battery 47 the other pole of which is connected by a conductor 48 to the other terminal of the detonator 19.

For sliding the piston 25 upwardly to close the circuit through the battery 47 and detonator 19 when the mine reaches a pre-

determined depth in the water, the upper end of the piston 25 is secured to one end of a flexible cord or connection 50 which extends upwardly freely through a central aperture 51 provided therefor in the top plate 15. The upper end of the cord 50 is secured to the under surface of a cylindrical float 55 made of cork or any suitable buoyant material. The length of the cord 50 is adjusted in accordance with the depth at which it is desired to explode the mine. The float 55 is preferably made of a diameter slightly less than the diameter of the top plate 15, and the top plate 15 is preferably provided with three or more yielding resilient clips 56 rigidly secured to the top plate 15 in any suitable manner and curving upwardly therefrom and arranged to receive the float 55 and normally hold the float yieldingly in a given position with respect to the casing 10. The clips 56 are so proportioned and constructed that the float 55 may be held by the clips in the position shown in dotted lines in the drawing as the mine is being dropped through the air and until the mine has descended a part of the predetermined distance in the water, whereupon the tendency of the float to rise in the water will cause the float to slide upwardly out of engagement with the clips and to rise to the surface of the water, before the mine has reached its predetermined depth. When the mine has reached a depth approximating its predetermined depth the cord 50 will be drawn taut and as the mine continues its descent, a slight further movement of the mine downwardly will cause the float 55, acting through the cord 50 to cause a relative movement upwardly of the piston 25 with respect to its carrier 20 to bring the conducting rod 40 in alinement with the terminals 35 and 36 and thus close the circuit through the battery 47 and detonator 19 to explode the mine.

In the modified form of this invention shown in Fig. 2 the construction is similar to that hereinbefore described except that instead of having the mine provided with a detonator 19 arranged to be fired electrically by means including an electric circuit, the mine is provided with a detonator 60 provided with a percussion cap 61 arranged to be fired by a firing pin 62 which is arranged to slide longitudinally along an axis extending through the cap 61 in a cylinder 65 which extends longitudinally of the casing 10 and which is rigidly secured at its upper end to the inner surface of the top plate 15 of the casing in any suitable manner, the lower end of the firing pin 62 being sharpened as at 66, and the lower end of the cylinder 65 being open to permit the firing pin 62 to be forced downwardly to cause the sharp end 66 of the firing pin 62 to engage against the cap 61.

The firing pin 62 is normally held in an inoperative position spaced a suitable distance from the cap 61 by means of a bell-crank lever 70 which carries at one end a latch 71 which passes freely through an opening provided therefor in the cylinder 65 and engages against the upper wall of a recess 72 provided therefor in the cylindrical surface of the firing pin 62. One end of the hereinbefore described flexible carrier 50 is secured to the outer end of the bell-crank lever 70 and passes slidably upwardly through the central opening provided therefor in the top plate 15 and is secured at its upper end to the float 55, as hereinbefore described. The firing pin 62 is normally pressed downwardly against the latch 71 by a spiral spring 75 which is arranged within the cylinder 65 and between the upper end of the firing pin and the under surface of the top plate 15.

In the operation of the modified form of this invention shown in Fig. 2 and just described, the float 55 is arranged to be yieldingly held by the spring clips 56 while the mine is being dropped into the water from an aircraft or other support, and after the mine has proceeded downwardly in the water a short distance, the float 55 will be separated from the spring clips 56 and will rise to the top of the water. When the mine has reached the depth determined by the length of the cord 50, a further slight downward movement of the mine will cause the outer end of the bell-crank lever 71 to be moved upwardly relatively with respect to the casing 10 to release the latch 71 from the firing pin 62 and to permit the firing pin 62 to be forced downwardly against the cap 61 to cause the explosion of the mine.

Having thus fully described this invention, I claim:

1. In a submarine mine, in combination a casing, explosive material arranged within said casing, a carrier fixed in said casing, a piston slidably mounted in said carrier, a pair of terminals secured to said carrier, an electric circuit including said terminals, a battery and a fuse arranged to fire said material, a bar of conducting material carried by said piston and arranged to bridge said terminals in one position of said piston, a float detachably carried by said casing and arranged to release upon submergence of said casing, and means connecting said piston and float whereby said piston is moved to firing position when said casing reaches a predetermined depth.

2. In a submarine mine, in combination a casing, explosive material arranged within said casing, a carrier fixed in said casing, a piston slidably mounted in said carrier, a normally open electric circuit including a source of energy, a fuse arranged to fire said material and a contact member se-

cured to said carrier, means carried by said piston arranged to contact with said terminal to close the circuit in one position of said piston, a float detachably carried by said casing and arranged to release upon submergence of said casing and means carried by said piston and float whereby said piston is moved to firing position when the casing reaches a predetermined depth.

Signed at New York city, in the county of New York and State of New York, this 2nd day of August, A. D. 1917.

JOHN HAYS HAMMOND, JR.