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2,705,919

FLOODER

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FIG. 1.

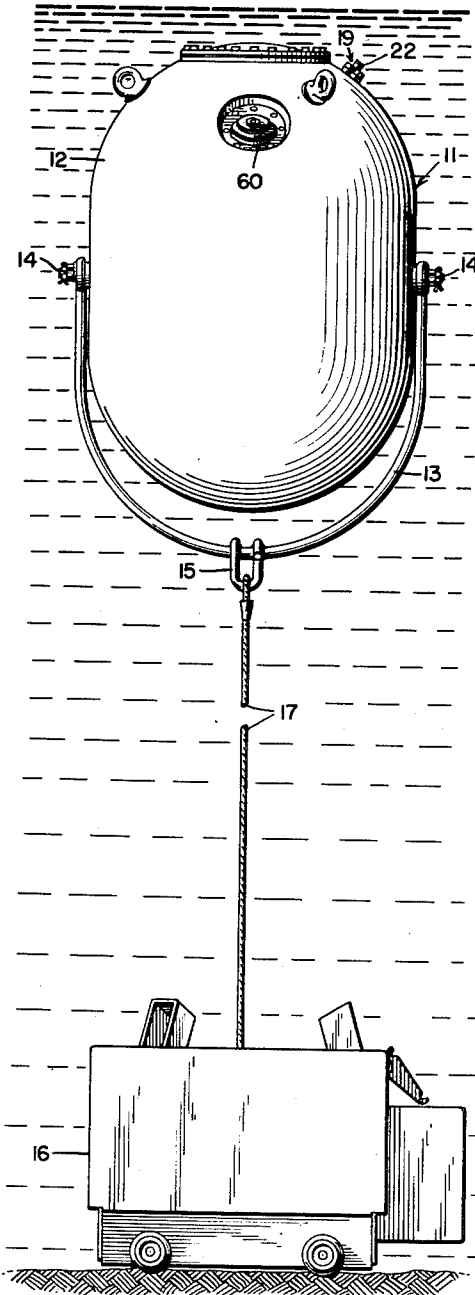
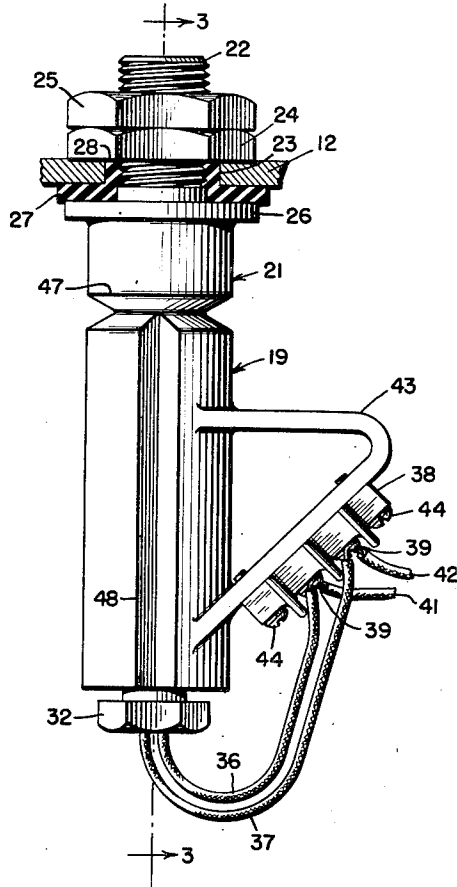


FIG. 2.



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FIG. 3.

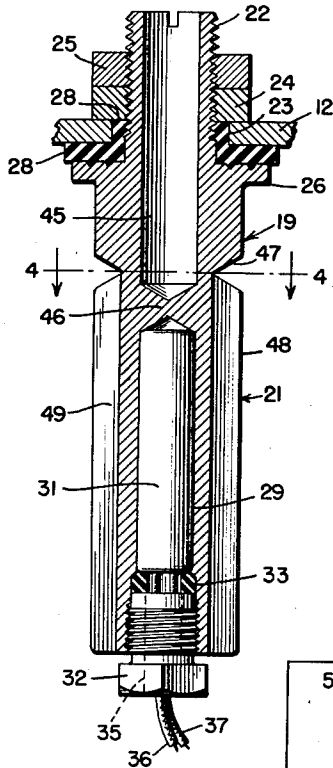


FIG. 4.

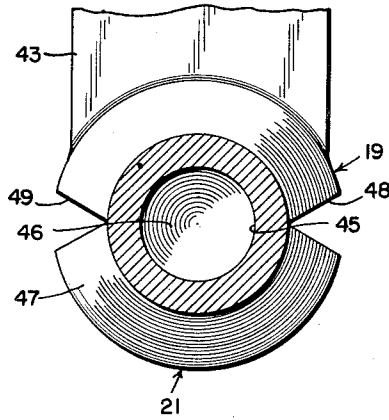
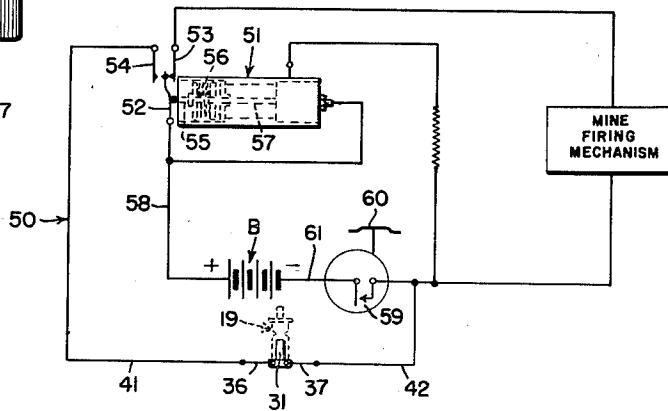


FIG. 5.



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FLOODER

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10 Claims. (Cl. 102—10)

(Granted under Title 35, U. S. Code (1952), sec. 266)

This invention relates to a flooder for a marine mine adapted to float on or beneath the surface of the water in which the mine is caused to sink at the expiration of a predetermined interval of time as a result of water admitted to the interior of the mine.

More specifically, the present invention relates to a flooder for a floating mine in which electroresponsive explosive means are adapted to rupture the flooder as the mine is disarmed thereby to cause the mine to sink within the water.

The present invention provides new and improved means for flooding a floating mine when a predetermined period of time has elapsed after planting the mine in a body of water, the flooder device preferably being operated by a circuit closing device as the mine is disarmed. When the circuit closing device operates, means arranged within the flooder are adapted to fracture a sealed port and permit a sufficient amount of water to enter therethrough to flood the mine casing, thus decreasing the buoyancy of the mine to such an extent as to cause the mine to sink to the bed of a body of water thereby decreasing the possibility of discovery of the mine by the enemy.

One of the objects of the present invention is the provision of a new and improved device for flooding the casing of a floating body in response to an electrical impulse.

Another object is the provision of a flooder for a floating mine in which means responsive to an electrical impulse are employed for fracturing the flooder in predetermined time delayed relation with respect to the planting of the mine in a body of water.

Still another object is the provision of a flooder for a floating mine in which electroresponsive explosive means controlled by the disarming switch of the mine are adapted to rupture a flooder thereby to admit a sufficient amount of water into the mine casing to cause the mine to sink within the water.

A still further object is the provision of a new and improved device for rendering a sub-floating mine or body inactive and sinkable by flooding when a predetermined period of time has elapsed after the mine has been planted in a body of water.

Still other objects, advantages and improvements will be apparent from the following description, taken in connection with the accompanying drawings, of which:

Fig. 1 is a view of a sub-floating moored mine employing the flooder of the present invention;

Fig. 2 is an enlarged elevational view of the flooder of the present invention showing the manner in which the flooder is secured to the mine casing;

Fig. 3 is a sectional view of the flooder taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view of the flooder taken on the line 4—4 of Fig. 3; and

Fig. 5 illustrates diagrammatically a circuit arrangement suitable for use with the device of the present invention for sinking a sub-floating mine as the mine is disarmed.

Referring to Fig. 1 of the drawings there is shown thereon a sub-floating mine indicated generally by the numeral 11, comprising a casing 12 enclosing a floatation chamber and having a mooring bale 13 pivotally secured thereto as at 14 and provided with an eye or shackle 15 to which is attached an anchor 16 by a mooring cable 17.

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The mine casing 12 has enclosed therein a mine firing mechanism, Fig. 5, including an electrical control circuit therefor having incorporated therein a time delay switch mechanism for applying an electrical impulse to the flooder 19 of the present invention in predetermined time delayed relation to the planting of the mine.

The flooder 19 comprises an elongated frangible body or casing 21 having a threaded stem 22 of reduced diameter integrally formed thereon, the stem being disposed in an opening 23 provided in the casing 12 and extending outwardly therefrom thereby to provide means for securing the flooder to the mine casing 12, the securing means including a nut 24 threaded on the stem 22 and into abutting engagement with the casing 12, Figs. 2 and 3. A nut 25 is employed for locking the nut 24 on the stem 22. An arrangement is thus provided whereby the flooder of the present invention may be employed with various types of mines and other floating bodies without extensive modification of the casing, it being merely necessary to provide an aperture within the casing to adapt the casing for mounting the flooder thereon.

Surrounding the stem 22 and clamped between the casing 12 and a flange 26 integrally formed on the body 21 is a compressible gasket 27 composed of any material suitable for the purpose such, for example, as rubber or the like, the gasket having a nipple 28 formed thereon and extending into the opening 23 of the casing 12. The gasket is compressed by the nut 24 thereby to form a water proof joint between the flooder and the casing 12 and prevent moisture from seeping into the mine casing.

A centrally disposed well 29 is formed in the inner end of the body 21 having arranged therein an electroresponsive detonator 31, the detonator being maintained therein by a gland nut 32. Disposed between one end of the gland nut and one end of the detonator is a protecting and cushioning gasket 33 composed of any flexible material suitable for the purpose such, for example, as rubber or the like.

The gland nut 32 is provided with a centrally disposed bore 35, within which are disposed a pair of lead-in wires 36 and 37 for establishing an electrical connection between the detonator 31 and a terminal block 38, the wires being secured to the block by screws 39. The lead-in wires 36 and 37 are respectively connected to a pair of conductors 41 and 42 for providing a firing connection to the detonator as the mine is disarmed, as will be more clearly apparent as the description proceeds. The terminal block 38 is secured to a bracket 43 by screws 44 or the like, the bracket being secured to the flooder body 21 in any suitable manner as by welding the parts together, Fig. 2, or formed integrally therewith.

A centrally disposed well 45 is formed in the outer end of the body 21 and extends a predetermined distance therein, the bores 29 and 45 being separated by a relatively thin wall 46, Fig. 3. A circumferential V-shaped groove 47 is formed in the body opposite the bore 45 and adjacent the bottom of the well 45, the groove being formed in such a manner as to substantially bisect the body 21 and thus weaken the body at the base of the groove. Further weakening of the body 21 is accomplished by the provision of a pair of V-shaped grooves 48 and 49, the grooves being longitudinally disposed therein and extending from the circumferential groove 47 to the lower extremity of the body 21, Figs. 2 and 3.

By this arrangement the body 21 is provided with portions or segments weakened sufficiently to permit fracturing or rupturing thereof when a predetermined amount of pressure is applied thereto internally, the pressure being adapted to be produced when the detonator is fired in response to an electrical impulse received from the contacts of the time delay mechanism. The violent force from the exploded detonator exerts a sufficient amount of pressure on the weakened portions of the body 21 to cause such portions to be blown free from the unweakened or upper portion thereof. It will be understood, however, that the weakened portions of the body are completely severed from the unweakened portions by the explosion at the base of the circumferential groove 47 when the explosion occurs, the body being separated

at a point in advance of the bottom of the well 45. When this occurs the well 45 becomes an open port and a sufficient amount of water will enter the mine casing through the port to cause the mine to sink to the bed of the body of water thereby to increase the difficulty of recovery of the mine by the enemy.

Fig. 5 illustrates diagrammatically a circuit arrangement suitable for use with the present invention, the arrangement including an electrolytically controlled time delayed switch mechanism 51 which may be similar to the arrangement shown and described in the copending application of L. E. Kissinger et al., Serial No. 476,062, filed February 16, 1943, now Patent No. 2,526,670. The switch 51 is adapted to interrupt and/or to close one or more control circuits and is particularly adapted for use as a disarming device for a mine in which the mine is disarmed when a predetermined period of time has elapsed after the mine has been planted in a body of water. Arranged in the circuit generally indicated by the reference character 50 and controlled thereby is the flooder of the present invention.

The mine is disarmed by disengagement of contact spring 52 from the contact 53 as the member 55 is moved outwardly by the spring 56 in response to the severance of the anode 57 by the electrolytic action of the device. As the member 55 continues to move outwardly, contact spring 52 engages contact 54. When this occurs a firing circuit is completed through the detonator from the positive terminal of battery B by way of conductor 58, contacts 52 and 54, conductor 41, detonator lead 36, detonator 31, detonator lead 37, conductor 42, arming clock contacts 59, conductor 61 and thence to negative terminal of battery B thereby to fire the detonator, the force of the explosion being sufficient to fracture the flooder and permit a sufficient amount of water to enter the interior of the mine casing to cause the mine to sink.

The operation of the device when employed for sinking a sub-floating mine will now be described. Let it be assumed by way of example that the mine has been launched in a body of water and the arming clock has been set in operation by a hydrostat 60 to close the contacts 59 thereof and complete the arming cycle, it being understood, however, that the aforesaid switch 51 is included in the arming and disarming circuit. The mine will remain armed for a predetermined period of time controlled by the electrolytic switch 51 and if not exploded by a ship in the meantime the mine is disarmed by the aforesaid switch 51 when the time period has elapsed. When this occurs an electrical impulse is supplied to the detonator 31 of the flooder from battery B by way of circuit 50, including contacts 52, 54 and 59. Thus the detonator is fired and the force of the explosion therefrom will be sufficient to fracture the weakened portions of the flooder body 21 thereby to permit a sufficient amount of water to enter the sub-floating mine and cause the mine to sink to the bed of the body of water.

Although the invention has been described with particularity in connection with a moored floating mine in accordance with the preferred embodiment thereof, it may be used advantageously with mines of the free floating type, it being merely necessary to arrange the time delay mechanism 51 for closure of the control circuit to the flooder within the period of time determined by the requirements of international law and the conditions of use of the device.

Briefly stated in summary, the present invention contemplates the provision of a device for flooding a sub-floating mine in which explosive means responsive to an electrical impulse are employed for fracturing the flooding device in predetermined time delayed relation with respect to the planting of the mine in a body of water thereby to unseal a port and sink the mine.

While the invention disclosed has been described with reference to a particular example thereof which give satisfactory results, it will be understood by those skilled in the art to which the invention pertains, after understanding the invention, that various changes and modifications may be employed without departing from the spirit and scope of the invention and it is intended, therefore, in the appended claims to cover all such changes and modifications.

The invention herein described and claimed may be manufactured and used by or for the Government of the

United States of America for governmental purposes without payment of any royalties thereon or therefor.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A device for flooding a floating marine mine with water comprising a casing secured to the mine and having a plurality of weakened portions, a normally sealed port in communication with said water and extending into said casing and bordering on said weakened portions for admitting a sufficient amount of the water into the interior of the mine to cause the mine to sink when said weakened portions have been fractured and said port is unsealed in response thereto, an electroresponsive detonator enclosed within said weakened portions of the casing and adapted to fracture said weakened portions as the detonator is fired in response to an electrical impulse, and means for establishing an external electrical connection to the detonator over which said impulse is received.

2. A device for flooding a floating mine with water comprising a casing, said casing having plurality of grooves formed therein and a plurality of weakened portions bordering on said grooves, a normally sealed port arranged within said casing in communication with said water and bordering on said grooves and disposed within said weakened portions for admitting a sufficient amount of said water into the interior of the mine to cause the mine to sink when said port is unsealed, said weakened portions being adapted to be fractured sufficiently to unseal said port in response to a predetermined amount of pressure exerted thereon, detonating means responsive to an electrical impulse and enclosed by said weakened portions for producing said pressure as the detonating means is fired, and means for establishing an external electrical connection to the detonating means whereby the detonating means is adapted to be fired by said impulse.

3. In a flooder for a sub-floating marine mine, in combination, a mine casing, a frangible device secured to said casing, a normally sealed port disposed within said frangible device and adapted to admit a quantity of water into the interior of said mine casing sufficient to sink said mine when the device is fractured and said port is unsealed, means for securing said frangible device to the casing, detonating means enclosed within said frangible device and responsive to an electrical impulse for fracturing said device and unsealing said port when detonated, a control circuit including a source of power connected to said detonating means, a normally open switch included in said circuit, and means including an electrolytic device connected to said source of power for closing said switch and applying said impulse to said detonating means when a predetermined period of time has elapsed after the mine has been planted thereby to fire said detonating means.

4. In a flooder for a sub-floating marine mine, in combination, a mine casing, a frangible device secured to said casing, a normally sealed port disposed within said frangible device and adapted to admit water into the interior of the mine casing when the device is fractured and the port is unsealed thereby to cause the mine to sink to the bed of a body of water, an electroresponsive detonator enclosed within said frangible device in alignment with and in spaced relation with respect to said port for fracturing the device and unsealing said port when fired in response to an electrical impulse received thereby, a control circuit including a source of power connected to said detonator, a pair of normally open contacts included in said circuit, and means including an electrolytic device including said circuit and connected to said source of power for closing said contacts and for applying said impulse to the detonator when a predetermined period of time has elapsed after the mine has been planted.

5. In a flooder for a sub-floating marine mine, in combination, a mine casing having a sealed floatation chamber therein, a frangible device secured to said casing adapted to admit water into said chamber when fractured thereby to cause the mine to sink to the bed of a body of water, means including a tubular threaded stem for securing said frangible device to the casing in watertight relation therewith, a normally sealed port disposed within said tubular stem in communication with said water for sealing said chamber and for admitting a sufficient amount of water therein to cause the mine to

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sink to the bed of the body of water when said port is unsealed, a source of power, an electroresponsive detonator arranged within the frangible device and adapted to fracture the device and unseal said port when fired in response to an electrical impulse received from said source of power, a control circuit connected to the source of power and to said detonator, a pair of normally open contacts included within said circuit and adapted to be closed when a predetermined period of time has elapsed after the mine has been planted, and means including an electrolytic switch connected to said source of power for closing said contacts when said predetermined period of time has elapsed thereby to fire the detonator and flood said chamber.

6. In a flooder for a sub-floating marine mine, in combination, a mine casing, a firing mechanism arranged within said casing, a source of electrical power, an arming circuit for said firing mechanism, means hydrostatically controlled for closing said arming circuit from said source of power to said firing mechanism as the mine is planted in a body of water, an electrolytic switch having an anode adapted to be severed by electrolytic action, means controlled by said circuit closing means for initiating said electrolytic action simultaneously with the closing of said arming circuit, a pair of normally closed contacts on said electrolytic switch included in said arming circuit, means for disengaging said normally closed contacts as the anode is severed, a pair of normally open contacts on said switch and adapted to be closed by said last named means as said normally closed contacts are disengaged, a frangible device secured to said casing adapted to admit sufficient water therein to sink the mine when the device is fractured, an electroresponsive detonator arranged within said frangible device for fracturing the device as the detonator is fired, and a firing circuit for said detonator including said arming circuit closing means and adapted to be closed as the normally open contacts are closed thereby to fire the detonator from said source of electrical power.

7. A device for flooding a floating marine mine with water comprising a casing secured to the mine, said casing having a plurality of grooves formed therein and a plurality of weakened portions bordering on said grooves, a normally sealed port in communication with said water and extending a predetermined amount into said casing and bordering on said grooves and weakened portions for admitting the water into the interior of the mine when said weakened portions are fractured and said port is unsealed, and a detonator enclosed within said weakened portions in alignment with and in spaced relation with respect to said port for fracturing the casing at said weakened portions and unsealing said port when the detonator is fired.

8. A device for flooding a floating mine with water after the mine has been planted therein and a predetermined period of time has elapsed comprising a casing, a normally sealed port arranged within said casing in communication with said water and extending into the casing a predetermined amount for admitting a sufficient amount of water into the interior of the mine to cause the mine to sink as said port is unsealed, said casing having a circumferential V-shaped groove arranged thereon and substantially bisecting the casing at a point adjacent said port, said casing having a pair of longitudinally disposed V-shaped grooves arranged thereon in communication with said circumferential groove and extending therefrom to one end of the casing, said grooves providing a plurality of weakened portions on the casing adapted to be fractured sufficiently to unseal said port, an electroresponsive detonator enclosed within said weakened portions in alignment with and in spaced relation with respect to said port for fracturing said weakened portions and

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unsealing the port when fired in response to an electrical impulse received thereby, and means including an electrolytic switch operatively connected to said detonator for applying said impulse thereto when said predetermined period of time has elapsed.

9. A device for flooding a floating mine with water after the mine has been planted therein and a predetermined period of time has elapsed comprising a tubular casing, a wall disposed midway between the respective end portions of said casing and providing an upper well and a lower well therein, said upper well being in communication with said water for admitting a sufficient amount of water into the interior of the mine to cause the mine to sink to the bed of the body of water when said wall is fractured, said casing having a plurality of grooves formed therein adjacent said lower well and a plurality of weakened portions bordering on said grooves, said casing being adapted to be fractured at said weakened portions, an electroresponsive detonator arranged within said lower well and enclosed within said weakened portions in alignment with said upper well for fracturing said wall and weakened portions sufficiently to unseal said upper well when fired in response to an electrical impulse received thereby, and means including an electrolytic switch operatively connected to said detonator for applying said impulse to the detonator when said predetermined period of time has elapsed.

10. In a flooder for a sub-floating marine mine, in combination, a mine casing, a firing mechanism arranged within said casing, a source of electrical power, an arming circuit for said firing mechanism, means hydrostatically controlled for closing said arming circuit from said source of power to said firing mechanism as the mine is planted in a body of water, an electrolytic switch having an anode adapted to be severed by electrolytic action, means controlled by said circuit closing means for initiating said electrolytic action simultaneously with the closing of said arming circuit, a pair of normally closed contacts on said electrolytic switch included in said arming circuit, means for disengaging said normally closed contacts as the anode is severed, a pair of normally open contacts on said switch and adapted to be closed by said last named means as said normally closed contacts are disengaged, a device secured to said casing in watertight relation therewith, a normally sealed port arranged within said device in communication with said water and extending into the casing a predetermined amount for admitting a sufficient amount of water into the interior of the mine casing to cause the mine to sink as said port is unsealed, said device having a plurality of grooves formed therein and a plurality of weakened portions bordering on said grooves and adapted to be fractured and unseal said port, an electroresponsive detonator enclosed in said weakened portions adjacent the grooves for fracturing the device at said weakened portion thereof as the detonator is fired, and a firing circuit for said detonator including said arming circuit closing means and adapted to be closed as the normally open contacts are closed thereby to fire the detonator from said source of electrical power.

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