Sept. 5, 1950 L. T. MEISTER 2,520,949

FUSE FOR BOMBS

Filed July 13, 1946

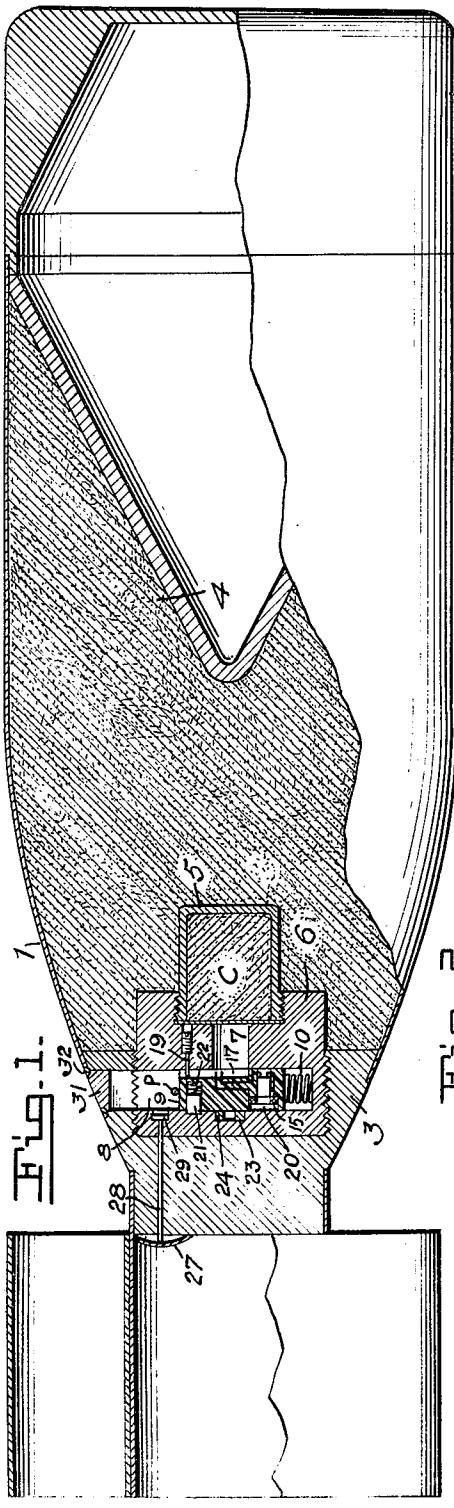


Fig. 1.

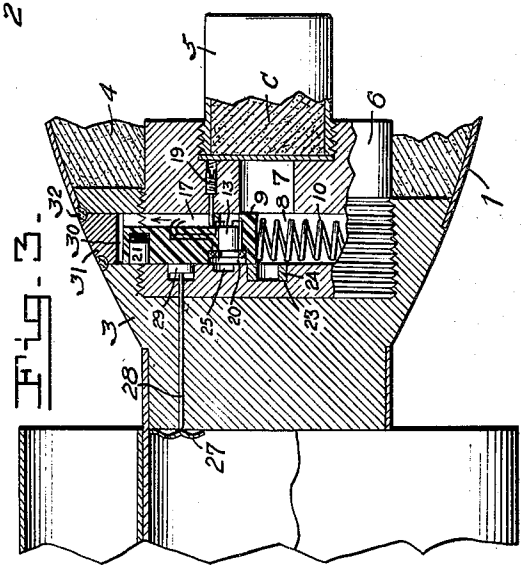


Fig. 3.

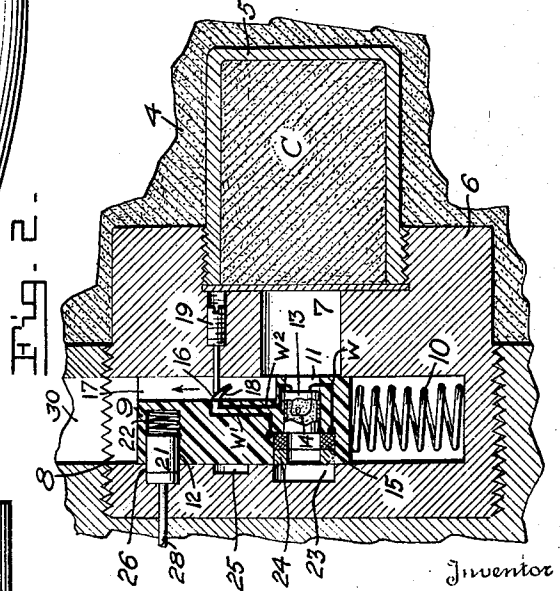


Fig. 2.

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FUSE FOR BOMBS

Leo T. Meister, Hillside, N. J.

Application July 13, 1946, Serial No. 683,378

11 Claims. (Cl. 102—70.2)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a new and useful improvement in fuzes for bombs and is designed more particularly for use on aerial bombs for attacking submarines, or other subaqueous targets. It is operative on a bomb which is subjected to an impact with the surface of the water and an impact with the target, the former impact arming the fuze and the latter impact causing the fuze to explode the bomb. The particularly novel feature of my improved fuze is the means provided for maintaining the fuze unarmed before and after it is dropped until its impact with the surface of the water, for arming the fuze by such impact while preventing exploding of the bomb by such impact, and for exploding the bomb by its impact on the target.

The structure and operation of the fuze of this invention is substantially equivalent to the fuze of my invention described and claimed in my application Serial Number 683,966, filed July 16, 1946, relating to a mechanically detonated fuze.

The fuze described and claimed in this application has a novel and useful feature not possessed by the fuze described and claimed in my said coincident application, viz. means to disarm the fuze should the bomb fail to hit the target. This disarming is secured by hydrostatic means operating when the bomb sinks to a depth in the water at which the pressure is sufficient to cause the disarming means to function.

While I have illustrated in the drawing filed herewith and have hereinafter fully described one specific embodiment of my invention, it is to be distinctly understood that I do not consider my invention to be limited to said specific embodiment, but refer for its scope to the claims appended hereto.

In the drawing:

Fig. 1 is a longitudinal vertical section, partly in elevation, of a bomb provided with my improved fuze, the parts being shown in unarmed position.

Fig. 2 is an enlarged fragmentary section showing the parts in firing position.

Fig. 3 is an enlarged fragmentary section, partly in elevation, showing parts in position to disarm the fuze.

As illustrated in the drawing, my improved fuze is applied to a bomb intended for launching from a plane for attack on a submarine. The bomb has a charge-carrying head 1 with nose 2 and tail 3. A hollow-cone charge 4 is carried in head 1 and provided with booster charge C in

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container 5 threaded into the forward end of body 6 threaded into the forward end of tail 3 and extending forwardly into charge 4. The body or first member 6 has an axial bore 7 extending rearwardly from container 5 to a transverse bore 8 in body 6. Slidable in bore 8, there is a block or second member 9 made of any suitable dielectric material. The block 9 is urged upwardly in bore 8, by coil spring 10 seated in bottom of bore 8, and has two spaced transverse bores 11 and 12. The bore 11 is so positioned in block 9 as to be brought into and out of axial alignment with bore 7 by reciprocation of block 9. Bore 11 extends through block 9 and has threaded therein a container 13 for an electric squib 14 connected by wire W to a field coil 15 mounted in bore 11 and connected by wire W—1 with an electric contact member 16 extending forwardly into a slot 17 in the forward face of block 9. A second contact member 18 is also disposed in slot 17 adjacent contact 16 and is connected by wire W—2 to the squib 14. A pin 19 threaded in body 6 projects into slot 17 in the path of contacts 16 and 18 whereby the contacts are brought into engagement when block 9 is moved by spring 10 into one position. The container 13 and coil 15 are disposed forwardly in bore 11 so that the forward end of container 13 precisely registers with the forward face of block 9 and the rear face of coil 15 is spaced forwardly of the rear face of block 9 to form a socket 20 at the rear end of the bore 11. The bore 12 extends into the block 9 from its rear face and receives therein a bolt or latch 21 urged rearwardly by a coil spring 22 seated in forward end of bore 12. The body 6 has a socket 23 coaxial with its bore 7 and opening rearwardly from bore 8. A suitable permanent magnet 24 is seated in socket 23. The two sockets 20 and 23 are so designed and related, that when the block 9 is moved to bring its bore 11 into line with bore 7, sockets 20 and 23 register. The body 6 has a socket 25 so disposed relative to bolt 21 as to receive bolt 21 therein when the block 9 is depressed against spring 10 to maintain bores 7 and 11 out of alignment, the bolt 21 being seated in socket 25 by its spring 22. The body 6 has a socket 26 so disposed relative to bolt 21 as to receive bolt 21 therein when the block 9 is raised by its spring 10 to align bores 7 and 11. Suitably mounted on the outside of tail 3 there is a hydrostatic diaphragm 27 (Figs. 1 and 3) connected by rod 28 to an ejector 29 slidable in socket 26. The tail 3 has a socket 30 co-axial with bore 8 and so designed as to receive the upper portion of block 9 therein when block 9 is fully raised by its spring 10. The socket 30 is closed by plug 31 and seal 32.

The parts may be assembled in the following manner:

Magnet 24 is passed either through bore 7 or bore 8 and seated in socket 23. The container 13, squib 14 and coil 15 with wiring are positioned in block 9. Bolt 21 with its spring 22 is placed in bore 12 and pushed inwardly to permit block 9 to slide downwardly in bore 8 to seat on its spring 10. The bolt 21 is held in block 9, as it passes socket 26, by any suitable tool inserted through rear face of body 6. Block 9 is forced downwardly sufficiently to seat bolt 21 in socket 25 holding spring 10 under maximum compression. Pin 19 is seated in slot 17 over contacts 16 and 18. Container 5 is then screwed into the accommodating recess until bore 8 is coaxial with socket 30 in body 6 which is mounted in tail 3. A safety pin P may be passed through tail 3 and body 6 across bore 8 to lock block 9 in unarmed or depressed position. Ejector 29 is passed through open socket 30 and bore 8 and seated in socket 26. Rod 28 is positioned to connect ejector 29 with diaphragm 27. Plug 31 is placed to close socket 30 and seal 32 is applied. Charge 4 is placed in head 1 and nose 2 applied thereto.

When the bomb is about to be launched, the safety pin P is removed and the bomb is maintained unarmed by bolt 21 seated in socket 25 restraining block 9 against upward movement, and thereby maintaining the lead in train interrupted. Also, when the block 9 is held in this position, the two electric contacts 16 and 18 are out of engagement and the circuit through the squib 14 is open (Fig. 1).

When the bomb is dropped from the plane and strikes the water, the impact is sufficient to cause the bolt 21 to move forwardly against its spring 22 out of socket 25, thereby releasing block 9 which is projected upwardly by its spring 10, the block 9 and its associated parts assuming their positions illustrated in Fig. 2. The bore 11 is aligned with bore 7 and the lead in train is uninterrupted. Also the contacts 16 and 18 are brought into engagement by pin 19 against which they have been pressed by upward movement of block 9. The bolt 21 seated in socket 26 holds the fuze in armed position. It will be noted that, while the parts are moving from unarmed to arming position, the magnet 24 is immobilized in socket 23 by block 9. However, when block 9 has risen, its socket 20 registers with socket 23 and affords a passage for magnet 24.

When the bomb strikes the submarine or other object, the impact displaces the magnet 24 from its socket 23 into socket 20 (Fig. 2), and such displacement energizes coil 15 sufficiently to excite a sufficient charge through wires W, W—1, W—2 and contacts 16 and 18 to cause squib 14 to function, thus detonating the bomb.

Should the bomb fail to strike the submarine or any other object in the water, and consequently cause no further impact after it is armed, the hydrostatic diaphragm 27 will function as soon as the bomb has reached that subaqueous depth at which the pressure is adequate to operate the diaphragm 27 and the rod 28 will move the ejector 29 to release the bolt 21 from socket 26, thereby releasing block 9 which is then ejected to the fullest extent by spring 10, its upper end moving into socket 30 in head 3, the contacts 16 and 18 moving free of pin 19 and separating to break the circuit of coil 15, and bore 11 is moved out of alignment with bore 7, thereby interrupting the lead in train, and the fuze is disarmed (Fig. 3).

Should the disarmed bomb be salvaged, the seal 32 can be broken and plug 31 removed from tail 3 to afford access through opened socket 30 to slide 9 in bore 8, and slide 9 may be restored to its position illustrated in Fig. 1. Ejector 29 is retracted and connected by rod 28 to an unused diaphragm 27, and plug 31 is replaced and seal 32 applied. The fuze is now unarmed and the salvaged bomb restored for use.

Having described my invention, what I claim is:

1. In a fuze for an aerial bomb for attacking a subaqueous target, the combination of an electric squib for firing said bomb; a permanent magnet slidable in said fuse, a field coil electrically connected with said squib and slidable in said fuze into and out of co-axial relation with said magnet, said magnet being slidable toward said coil when in co-axial relation; means to maintain said coil out of co-axial relation with said magnet, said maintaining means being rendered inoperative by the impact of the bomb on the water; and means to slide the coil into co-axial relation with said magnet when said maintaining means is inoperative, the sliding of said magnet toward said coil being caused by the impact of the bomb on the target, and causing said coil to fire said squib.

2. In a fuze for an aerial bomb for attacking a subaqueous target, the combination of an electric squib for firing said bomb; a permanent magnet slidable in said fuze; a field coil electrically connected with said squib and slidable in said fuze into and out of co-axial relation with said magnet, said magnet being slidable toward said coil when in co-axial relation to induce a voltage therein; means to maintain said coil out of co-axial relation with said magnet, said maintaining means being rendered inoperative by the impact of the bomb on the water; and means to slide the coil into co-axial relation with said magnet when said maintaining means is inoperative; the sliding of said magnet toward said coil being caused by the impact of the bomb on the target and causing said coil to fire said squib.

3. In a fuze for an aerial bomb for attacking a subaqueous target, the combination of an electric squib for firing said bomb; a permanent magnet slidable in said fuze; a field coil slidable in said fuze into and out of co-axial relation with said magnet, said magnet being slidable toward said coil when in co-axial relation; an electrical circuit connecting said coil with said squib; means to maintain said coil out of co-axial relation with said magnet and said circuit open, said maintaining means being rendered inoperative by the impact of the bomb on the water; and means to slide the coil into co-axial relation with said magnet, and to close said circuit when said maintaining means is inoperative, the sliding of said magnet toward said coil being caused by the impact of the bomb on the target, and causing said coil to fire said squib.

4. In a fuze for an aerial bomb for attacking a subaqueous target, the combination of an electric squib for firing said bomb; a permanent magnet slidable in said fuze; a field coil slidable in said fuze into and out of co-axial relation with said magnet, said magnet being slidable toward said coil when in co-axial relation; an electrical circuit connecting said coil with said squib; means to maintain said coil out of co-axial relation with said magnet and said circuit open, said maintaining means being rendered inoperative by the impact of the bomb on the water; means to slide the coil into co-axial relation with said magnet, and to close said circuit when said

maintaining means is inoperative; and means to immobilize said magnet until said impact, said immobilizing means being rendered inoperative when the magnet and coil are brought into coaxial relation, the sliding of said magnet toward said coil being caused by the impact of the bomb on the target and causing said coil to fire said squib.

5. In a fuze for an aerial bomb, a body, a block movable in said body, spring means urging said block in one direction of movement, a squib carried by said block, a two-part firing device for said squib, one said part being carried by said block and the other being carried by said body, latch means normally engaging said block to hold said parts out of cooperative relation, said latch means being releasable in response to initial impact of said bomb to release said block and subsequently to secure the same with said parts in cooperative firing relation, said parts being adapted to cooperate in response to a second impact of said bomb to fire said squib, and means responsive to hydrostatic pressure incident on said bomb for releasing said latch means when said parts are in cooperative relation to thereby permit movement of said block by said spring means, to move said parts out of cooperative relation.

6. In a fuze for an aerial bomb for attacking a subaqueous target, a body, a block slidable in a passageway in said body, a detonation-initiating unit in said block, magnetic induction firing means for said unit and comprising a magnet part carried by said body and a solenoid part carried by said block, said parts being cooperable to fire said unit when said block is moved in said body from a first position to a second position, means urging said block from first to second position, releasable means maintaining said block in said first position and adapted to be released by a first impact of said bomb to permit movement of said block to second position, whereby said parts are responsive to a second impact of said bomb for firing said unit, and means responsive to a predetermined hydrostatic pressure incident upon said bomb to again release said block and permit said urging means to move said block and solenoid part out of cooperable relation with said magnet part.

7. In a fuze for an aerial bomb, a body having a passageway therein, and first, second and third recesses opening into said passageway, a block slidable in said passageway, a squib and a firing circuit therefor carried by said block, said circuit including a solenoid adapted to align with said first recess when said block slides from a first to a second position, a magnet mounted in said first recess and immobilized therein by said block when the latter is in first position, spring means urging said block into second position, a plunger in said block spring-urged outwardly, said plunger being adapted to engage in said second recess to hold said block in first position, and in said third recess to hold said block in second position, said plunger being responsive to initial impact of said bomb to release said block from first position and then lock the same in second position, said magnet being movable toward said solenoid in inductive relation therewith in response to a second impact of said bomb to thereby energize said circuit and fire said squib.

8. A fuze, as recited in claim 7, said circuit including adjacent, normally-separated contacts projecting from said block, and means carried by said body and projecting into the path of said contacts to close them when said block moves from first to second position.

9. A fuze, as recited in claim 7, and means responsive to a predetermined hydrostatic pressure incident upon said bomb for releasing said plunger from said third recess and permitting said spring means to move said block and solenoid whereby the latter is moved out of alignment with said magnet and the bomb thereby disarmed.

10. In a fuze for aerial bomb for attacking a subaqueous target, a fuze body having a passage therethrough, a magnet mounted in a recess in the wall of said passage, a block fitting said passage and having an opening transversely of said passage, said block being slidable in and along said passage from a first position in which said opening is out of alignment with said recess on one side thereof, to successive second and third positions in which said opening is respectively aligned with and again out of alignment with said recess on the other side thereof, a firing coil in said opening and in inductive relation with said magnet only when said block is in second position, spring means urging said block out of first position toward second and third positions, latch means carried by said block and releasably engageable in a first hole in the wall of said passage to hold said block in first position, said latch means being released from said first hole in response to initial impact of the bomb to permit movement of said block to second position and releasably lock the same in second position by engagement in a second hole in the wall of said passage, said magnet being movable relatively to said coil in response to a second impact of said bomb, only when said block is in second position, a firing circuit in said bomb including said coil, and means responsive to a predetermined external ambient pressure on said bomb to release said latch means from said second hole.

11. In a fuze for an aerial bomb, a fuze body, a block movably mounted in said body, a detonation-initiating unit in said block, firing means for said unit comprising a magnet part carried by said body and a coil part in said block, said parts being relatively movable to induce a voltage in said coil part, on impact, only when said block has moved from a first to a second position in said body, means urging said block to said second position, latch means acting between said block and body and operable to releasably secure said block in said first position and to release the same in response to initial impact of the bomb and then to again releasably secure the block in second position, whereby a second impact of the bomb induces a firing voltage in said coil, and a firing circuit including said coil.

LEO T. MEISTER.

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