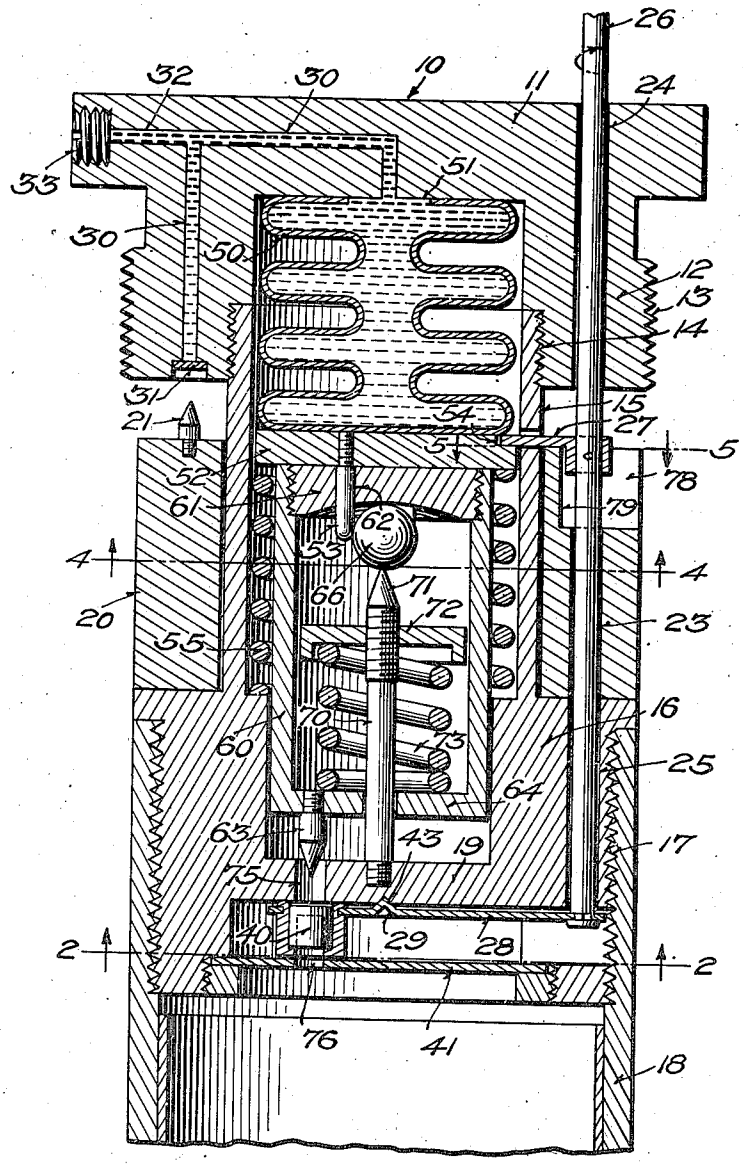
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DELAY ARMING ANTIDISTURBANCE FUSE

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Fig. 1.



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DELAY ARMING ANTIDISTURBANCE FUSE

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Fig. 2.

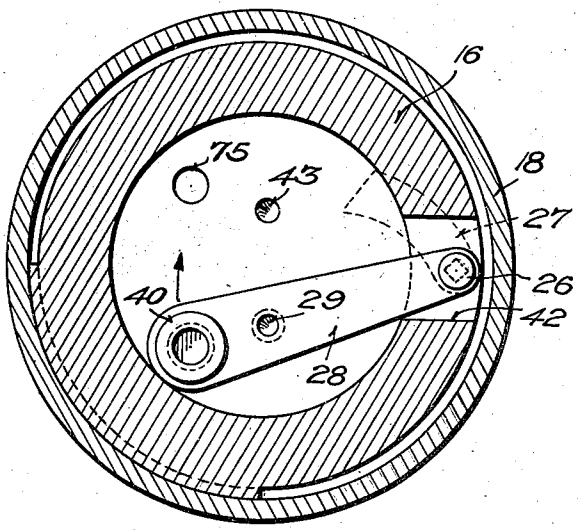


Fig. 3.

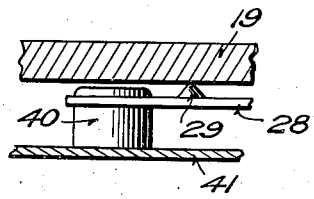


Fig. 5.

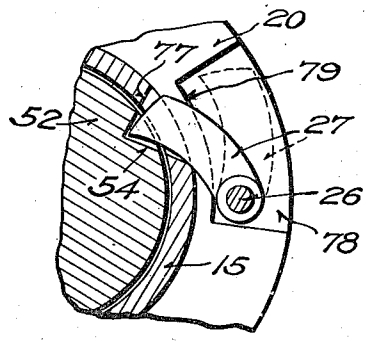


Fig. 4.

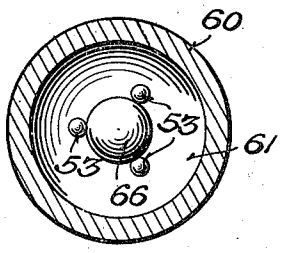


Fig. 6.

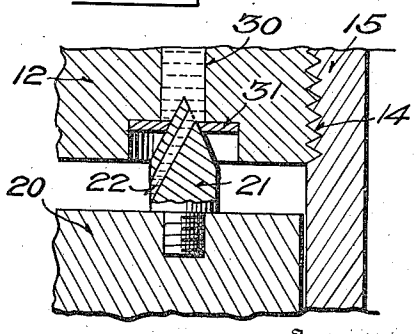
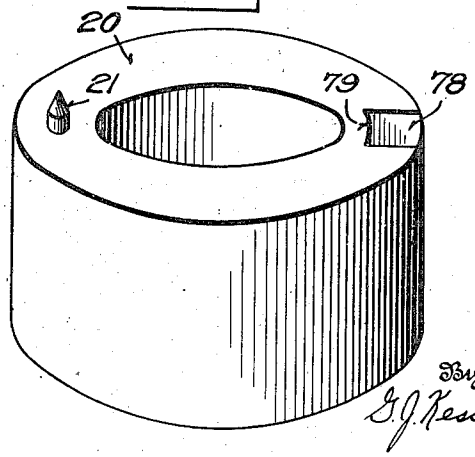


Fig. 7.



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DELAY ARMING ANTIDISTURBANCE FUSE

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Fig. 9.

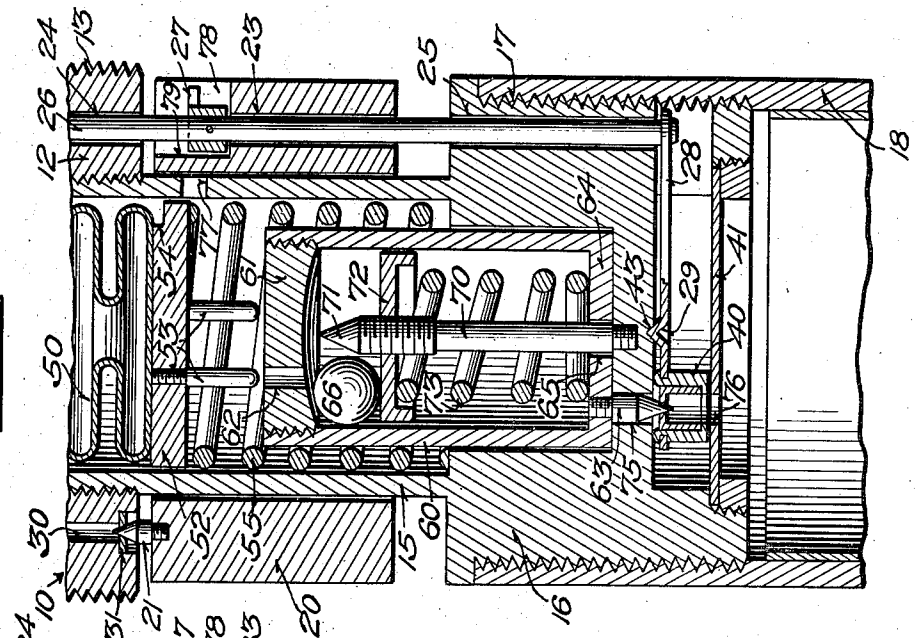
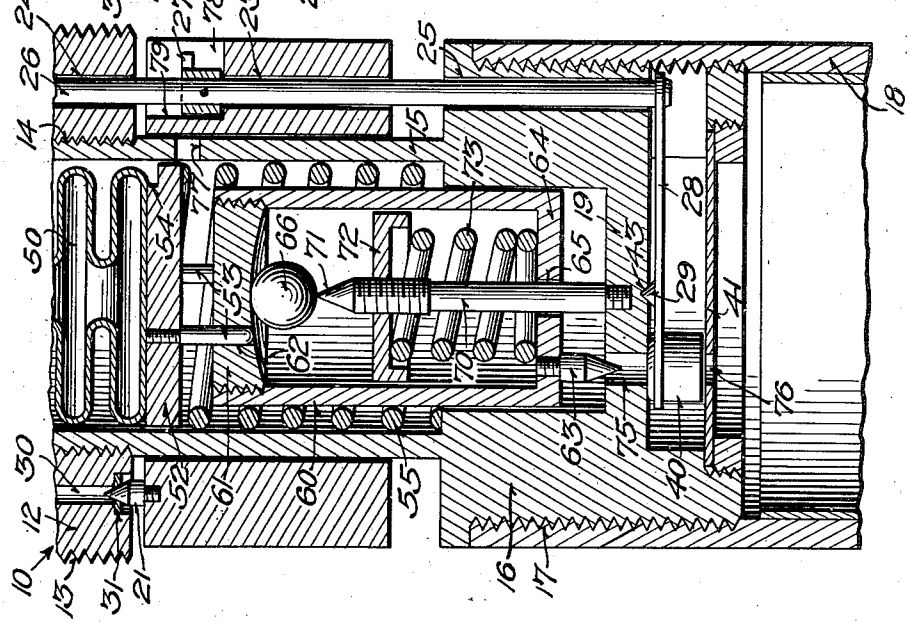


Fig. 8.



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UNITED STATES PATENT OFFICE

2,455,958

DELAY ARMING ANTIDISTURBANCE FUSE

John Taylor, Bronxville, N. Y.

Application February 27, 1947, Serial No. 731,200

1 Claim. (Cl. 102—81)

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

1

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

My invention relates to an anti-disturbance or anti-lift fuse for military explosive items such as land mines, shells, bombs, rockets and the like and relates more particularly to means whereby the mechanism is initially actuated. In the instance of a bomb or other projectile the initial actuation is preferably achieved by the shock of impact, while in the instance of a non-projected item, such as a land mine, the actuation may be initiated by a blow, by clockwork or in any other suitable manner.

Devices of the character of my invention were widely used in the recent war to prevent bomb disposal units from lifting and disposing of unexploded land mines, projectiles, bombs and the like and generally comprise means for arming the device so that the slightest disturbance of the device thereafter will detonate the charge.

With the foregoing in view, an object of my invention is to provide an improved anti-disturbance fuse.

A further object is to provide an improved arming means for a fuse.

A further object is to provide an improved arming means for a fuse wherein the arming is accomplished by the bleeding of fluid from a collapsible container.

A further object is to provide an improved anti-disturbance mechanism for a fuse.

A further object is to provide an improved anti-disturbance mechanism for a fuse which, when armed, comprises a ball or roller precariously interposed between a static part and a spring loaded movable firing mechanism whereby detonation of the fuse is prevented as long as said ball or roller remains in place. Said ball or roller being adapted to be displaced at the slightest disturbance to detonate the fuse.

A further object is to provide in a fuse a novel combination of anti-disturbance and arming means.

A further object is to provide a novel method of arming a fuse.

Other objects and advantages reside in the particular structure of my invention, combination and arrangement of the several parts and in the particular method or mode of operation, all of which will be readily apparent to those skilled in the art upon reference to the drawings and to the hereinafter set forth specification wherein the invention is shown, described and claimed.

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In the drawing:

Figure 1 is a longitudinal section through a fuse according to the invention, most of the parts being shown in the safe position, but the detonator being shown in the armed position;

Figure 2 is a transverse section taken on the plane of the line 2—2, Figure 1;

Figure 3 is a fragmentary, longitudinal section showing the detonator in the unarmed position;

Figure 4 is a fragmentary, transverse section taken on the plane of the line 4—4 of Figure 1;

Figure 5 is a fragmentary, transverse section taken on the plane of the line 5—5, Figure 1;

Figure 6 is an enlarged, longitudinal, fragmentary section of a detail, showing the initiation of the arming cycle;

Figure 7 is a perspective view of a detail;

Figure 8 is a view like Figure 1, the parts being shown in the armed position; and

Figure 9 is a view like Figure 1 showing the position of the parts at the moment of firing.

Referring specifically to the drawing, wherein like references have been used throughout to designate like parts, 10 designates a substantially cup-shaped head member for the fuse which is formed with a base 11 and an annular side wall 12. The outer periphery of the wall 12 is suitably formed as at 13 for a readily detachable connection with a container (not shown) for an explosive charge. The inner periphery of the wall 12 is detachably connected as at 14 to a cylindrical connecting portion 15 of a cup-shaped base member 16 of the fuse. The base of the member 16 is detachable connected as at 17 to the usual booster casing 18. The open ends of the cup-shaped head member 10 and the base member 16 are in opposed, facing relation and are spacedly connected by the cylindrical connector 15.

The head member 10 is formed with a bleed passage 30 therein one end of which opens into the interior of the cup-shaped portion and the other end of which opens through the free end edge of the side wall 12. Such last named end of the passage 30 is normally closed by a rupturable sealing disc 31. A branch passage 32 of bleed passage 30 opens through the periphery of the base member 10 and comprises a filling opening for fluid. Such branch passage is normally sealed by a readily removable closure 33.

A cylindrical hammer 20 is slidably mounted on the outer periphery of the connector 15 concentrically thereof. One end edge of the hammer 20 is provided with a pointed pin 21 which upon impact in the instance of a projectile or upon the application of force in the instance of a land mine, is adapted to move forward with the ham-

mer and puncture the rupturable sealing disc 31 of the bleed passage 30 in the head member 10.

The pin 21 is formed with a passageway 22 therethrough (Figure 6) or with other suitable means to prevent the pin 21 from sealing the bleed passage 30 in the event it sticks therein after puncturing the sealing disc 31. The pin 21 is maintained in centered relation to disc 31 by the shaft 26 which extends through a longitudinal shaftway 23 in one side wall of hammer 20.

The head member 10 and base member 16 are formed with shaftways 24, 25 respectively therethrough which are aligned with each other and with the shaftway 23 in hammer 20. The shaft 26 is freely received in the ways 23, 24, 25 for free rotation therein. The outer end (not shown) of shaft 26 is connected to any suitable means for rotating the shaft to effect a partial arming of the fuse. A latch 27 is fixed on shaft 26 intermediate its ends and, as will be described later, normally locks certain of the parts of the fuse in the unarmed position. The inner end of the shaft 26 has a spring arm 28 fixed thereon for rotary movement therewith. A detent 29 is formed on the inner surface of arm 28 adjacent the free end thereof. A primer 40 is carried by the free end of the arm 28. The detent 29 normally bears against the floor 19 of the base member 16, whereby to maintain the primer 40 firmly against the cover 41 of the booster 18 (Figure 3).

A collapsible metal bellows 50 is fixed to the inside of base 11 of the cup-shaped head member 10 and has an opening 51 therein surrounding the inner end of the bleed passage 30. The opposite end of the bellows 50 has disc 52 fixed thereon which in turn has a plurality of outwardly and longitudinally extending pins 53 fixed thereto and arranged to form a cage. One edge of the disc 52 may be recessed as at 54 (Figures 1 and 5) to receive the latch 27 to prevent collapse of the bellows prior to the arming cycle. One end of a coil spring 55 concentrically disposed within the connector 15, bears against the free face of disc 52 and loads bellows 50 for collapsing. The other end of the coil spring 55 is seated on the upper edge of the base member 16.

A firing pin assembly which comprises a cylindrical member 60 which is slidably mounted in the cup-shaped base member 16. The upper end of the cylinder 60 is provided with a plano-concave closure disc 61 which is detachably secured thereto with the concave surface disposed inwardly. Holes 62 are formed through closure 61 and slidably receive the cage pins 53 which extend through said closure into the interior of the cylinder 60 when the fuse is in the unarmed position. A firing pin 63 is extended outwardly from an eccentric location on the outside of the closed bottom end 64 of the cylinder 60. An axially disposed hole 65 is formed through the bottom 64 and slidably receives an axially extending pin 70 the butt end of which is detachably secured to the floor 19 of the base member.

The free end of the pin 70 is pointed as at 71 and terminates inside the cylinder 60 in spaced relation to the closure disc 61. A collar 72 is fixed on the pin 70 below the point 71 thereof. A firing pin spring 73 is compressed between the collar 72 and the floor 64 of the cylinder 60 to load the latter for movement toward the floor 19 of the base member 16. A ball or roller 66 is located in the cylinder 60 in the space between the collar 72 and the closure disc 61. When the fuse is in the unarmed position (Figure 1), the ball 66 is held in the cage formed by the cage pins 53 by pressure of the point 71 of the pin 70. By virtue of the concave ball seating surface of the disc 61 plus the axial location of the pin 70, this position is precariously and temporarily maintained when the fuse is armed (Figure 8). However, upon the slightest disturbance, the ball 66 is displaced and the firing pin spring drives the cylinder 60 in a firing direction (Figure 9).

For firing, the floor 19 of the base member 16 has an eccentric hole 75 therethrough to permit passage of the firing pin 63. The primer 40 is ultimately positioned in alignment with hole 75 and a flame hole 76 is formed in the cover 41 of the booster 18 in alignment with said hole 75. A recess 43 in the outer surface of the floor 19 of the base 16 receives the detent 29 of the primer arm 28 to lock the latter when the same has been swung a distance sufficient to position the primer 40 in alignment with the holes 75 and 76. Any suitable means (not shown) may be provided to stop the further rotation of the shaft 26 and/or the swinging thereby of the primer arm 28 after the detent 29 seats in recess 43.

The operation of the fuse will be described as applied to an aerial bomb. Before the bomb is dropped the parts are generally in the positions shown in Figure 1 except that the primer 40 is located as shown in Figures 2 and 3. As the bomb falls the arming vanes or other means (not shown) rotate the shaft 26 whereby the latch 27 is withdrawn from the recess 54 of the disc 52 through a slot 77 in the connector 15 to the broken line position (Figure 5) whereby to clear the shoulder 79 formed in the recess 78 of the hammer 20 and free the latter for movement. At the same time, the primer arm 28 is swung from the Figure 2 position to the armed position of Figure 1. No other arming movement takes place while the bomb is in flight.

Upon impact, the freed hammer 20 is thrown forward by its inertia and the pointed pin 21 thereof punctures the disc 31 of the bleed passage 30. Fluid from the bellows 50 is now forced out through passage 30 and the bellows is slowly collapsed by the action of the spring 55. As the bellows collapse, the cage pins 53 are gradually withdrawn through the holes 62 in closure 61 until the armed position of Figure 8 is attained. Firing of the fuse may now occur at once if any inaccuracy of manufacture has resulted in the location of the pin point 71 slightly off center relative to the ball 66. Otherwise, the fuse may remain in the armed position indefinitely until some disturbance displaces the ball 66.

Thus, even if detonation occurs instantaneously with the completion of the arming cycle, the fuse will not function until after maximum penetration has been achieved. If functioning is delayed after the arming cycle the enemy is denied the use of the danger area around the bomb as the position and arrangement of the parts is such that the bomb can neither be removed nor disarmed. Obviously the morale shattering aspects of the latter situation are of the greatest importance in modern warfare.

While I have shown and described what is now thought to be the preferred form of the invention, it is obvious that the same is susceptible of other forms and expressions. Consequently, it is understood that the invention is not limited to the precise structure shown and described except as hereinafter claimed.

I claim:

In a fuse, the combination of arming means

comprising a fluid filled compressible member, means for bleeding fluid from said member, means associated with said member operative to arm said fuse upon at least partial compression of said member, said last named means comprising a retainer retractable upon compression of said member, a readily displaceable element normally held in an operative position by said retainer but being freed for displacement upon retraction of said retainer, a spring loaded firing mechanism in engagement with said element, said mechanism being releasable from said element for movement in a firing direction upon displacement of said element.

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