March 12, 1946. R. G. BUTLER, JR., ET AL 2,396,245

FUSE

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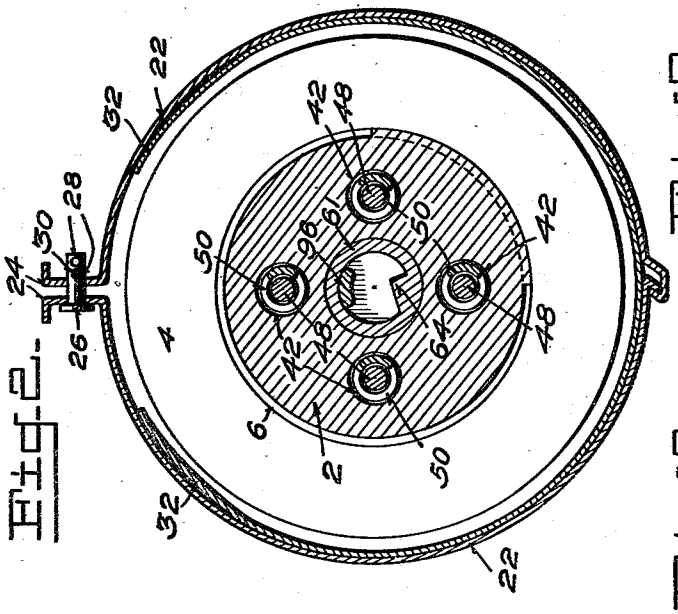


Fig. 2.

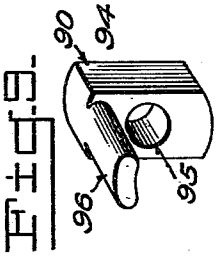


Fig. 5.

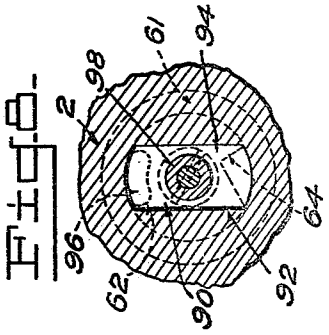


Fig. 8.

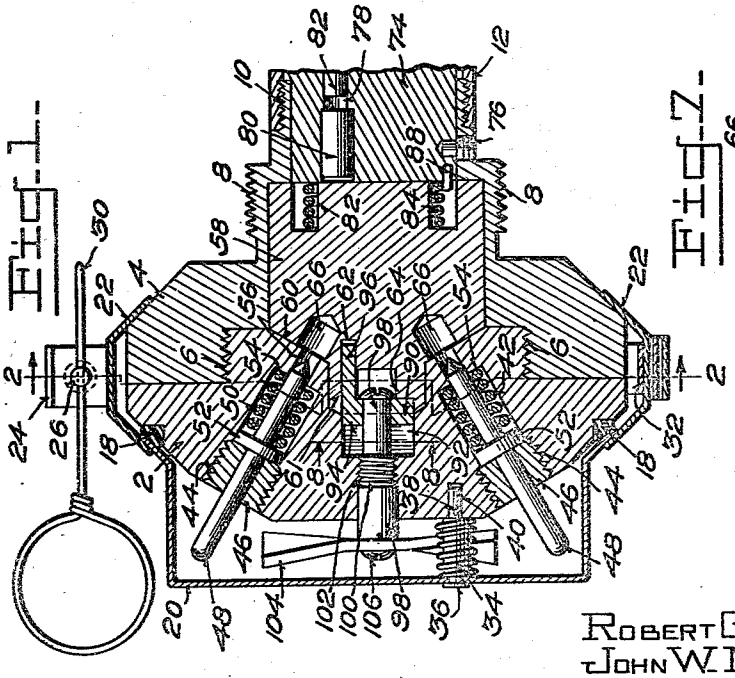


Fig. 1.

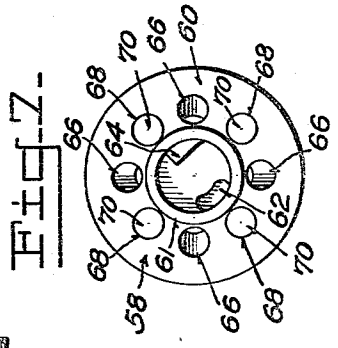


Fig. 7.

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Fig. 3.

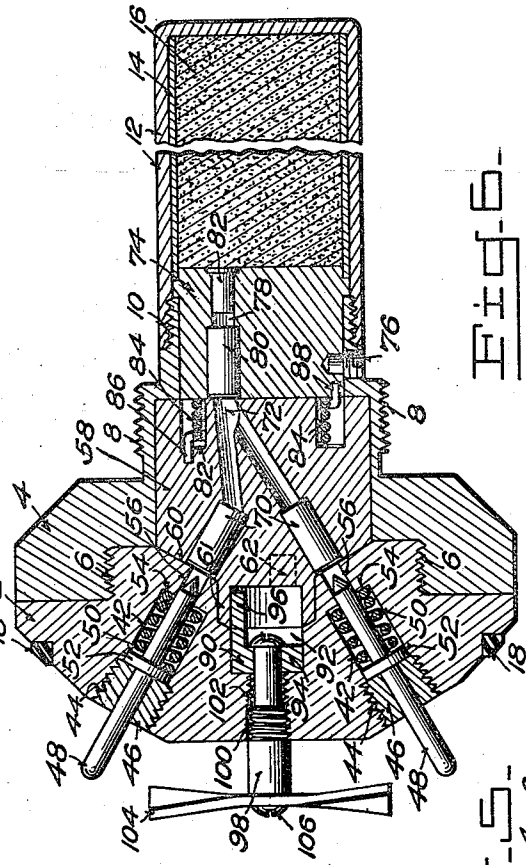


Fig. 6.

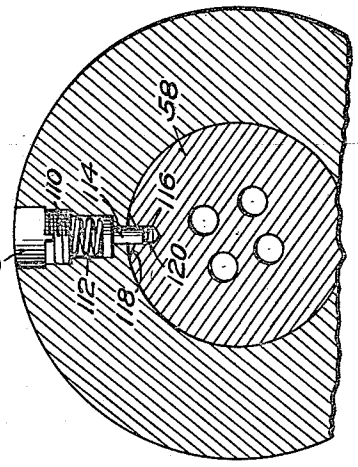


Fig. 5.

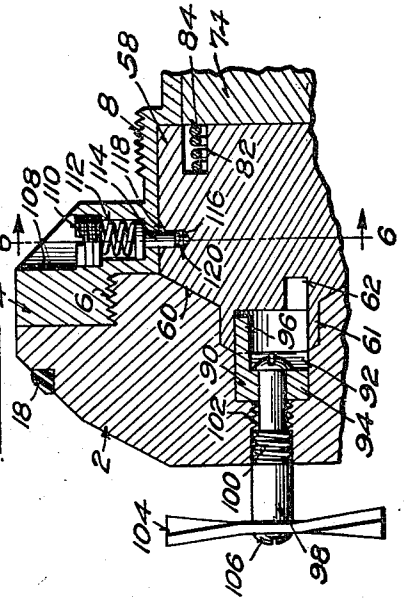
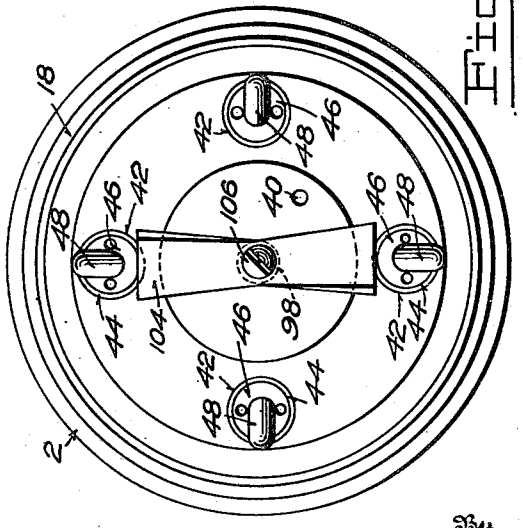


Fig. 4.



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UNITED STATES PATENT OFFICE

2,396,245

FUSE

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Application August 28, 1944, Serial No. 551,591

3 Claims. (Cl. 102—81.2)

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

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

Our invention relates to improvements in fuses, being particularly adapted for use in connection with bombs used against submarines, and its general object is to provide a device of this character which will not cause detonation or explosion upon impact with the surface of water, but which will cause such detonation or explosion upon impact with a solid object, irrespective of the angle at which such object is struck.

A further object of our invention is to provide a device of this character which is self-arming, which may be locked in both the unarmed and armed positions, and in which a vane is provided to move the device from the unarmed to the armed position when the vane is exposed to an air or water stream after the bomb is launched.

A still further object of our invention is to provide a device of this character in which impact of the striker members with an object or upon force being applied to the protruding ends of the striker members when the device is in unarmed position, will not only fail to cause detonation or explosion, but which will prevent damage to the striker members and associated parts as well, and in which the striker members will automatically return to proper unarmed position when the impact force has ceased.

With these and other objects in view, as will hereinafter more fully appear and which will be more particularly pointed out in the appended claims, reference is now made to the accompanying drawings forming a part of this application, in which:

Figure 1 is a fragmentary vertical, longitudinal, sectional view of our improved fuse, illustrating the unarmed position of same;

Figure 2 is a transverse sectional view, taken on the line 2—2 of Fig. 1;

Figure 3 is a vertical, longitudinal, sectional view of our improved fuse, illustrating the armed position of same;

Figure 4 is an end elevational view, illustrating the front end of the fuse;

Figure 5 is a fragmentary vertical sectional view, illustrating the mechanism for locking the rotor in armed position;

Figure 6 is a transverse sectional view, taken on the line 6—6 of Fig. 5;

Figure 7 is a front elevational view of the rotor;

Figure 8 is an enlarged fragmentary, transverse sectional view, taken on the line 8—8 of Fig. 1; and

Figure 9 is a detailed perspective view illustrating the rotor lock.

Referring now to the drawings in which similar reference characters represent similar parts, our invention comprises an annular body, the nose section 2 of which is threadedly secured to rear section 4, as shown at 6. These body portions may be of any suitable metal or material, as may the parts hereinafter referred to. The rear section 4 of the body is provided with a reduced threaded portion 8, to which a bomb (not shown) is adapted to be secured, and with a further reduced threaded portion 10, to which is secured an annular cup shaped booster charge casing 12, provided with a liner 14 and containing a booster charge of any suitable explosive 16.

The nose section 2 of the body is provided with an annular gasket 18 of rubber or any other suitable or desired fabric, composition, or material adapted to serve as a base upon which the flared rim of metallic cup-shaped member 20 rests. The cup-shaped member 20 is adapted to cover and protect the striker members and vane hereinafter described, and is securely held in place by the annular metallic clamp 22, the ends of which, 24, are turned up, as shown in Figs. 1 and 2, and are held together in clamped relation by a bolt 26, provided with circular openings 28, adapted to receive arming wire 30. An annular metallic spring member 32 is positioned on the inside surface of clamp 22, adapted to force the ends 24 of clamp 22 apart when the arming wire 30 is removed from bolt 26, thereby releasing the cup-shaped member 20, which is forced outwardly under the action of coil spring 34, and falls away clear of the nose section when the bomb is launched, carrying with it bolt 36. Coiled spring 34 is maintained in position around bolt 36, one end of which is suitably secured by riveting or otherwise to cup-shaped member 20, the other end comprising a spindle 38, adapted to be positioned in a circular recess 40 in the nose section 2. Spaced equidistantly about the nose section 2 are four angularly inclined openings 42, threaded at their outer ends as shown at 44, and adapted to receive threaded plugs 46. Plugs 46 are provided with circular openings, through which striker members 48 are slidably positioned. Striker members 48 are normally maintained in extended position, as shown in Figs. 1 and 3, under action of coil springs 50, one end of these springs acting on flanges 52 of striker members 48, while the other ends act on annular shoulders 54, formed

by the reduced portions 56, of the inside ends of openings 42.

Positioned within the body is a rotor 58, having an inclined face 60, and a hollow, reduced portion 61. The reduced portion 61 is provided with a recess 62, and a projection stop member 64, the purpose of which will be hereafter described. The inclined face 60 of the rotor is provided with four circular recesses, 66, adapted to receive the striker members, should these members be struck when in unarmed position, thereby preventing damage to the striker members and associated parts, as well as preventing detonation or explosion of the bomb. The inclined face 60 of rotor 58 is also provided with circular openings 68, aligned with striker members 48 when in armed position, as shown in Fig. 3. The front end of these openings 68 are adapted to receive primer detonators 70, while the other ends of the openings converge to a single opening, as shown at 72, Fig. 3. Mounted intermediate the rotor 58 and the booster charge 16, is an annular member 74, held in position by means of screws 76. Member 74 is provided with a circular opening 78, in alignment with opening 72 of the rotor, when in armed position. The front end of opening 78 is adapted to receive a detonator 80, while the opposite end of the opening is provided with a lead cup 82, crimped or otherwise suitably secured in the opening, containing tetryl or the like.

Positioned in a recess 82 of rotor 58, is a torsion spring 84, one end of which, 86, is secured to the rotor, while the other end, 88, is positioned in a recess in member 74. The action of this spring rotates the rotor from unarmed to armed position, when the rotor is unlocked, as will be hereinafter explained.

The rotor locking and arming mechanism comprises a lock, shown generally at 90, slidably positioned in recess 92 of the nose portion 2 of the body, and comprises a base 94, and an arm 96 extending at right angles therefrom. Arm 96 is adapted to engage recess 62 of the rotor and maintain same in unarmed position. The base portion, 94, of the lock is provided with a circular opening 95 through which bolt 98 is positioned. The intermediate portion of bolt 98 is threaded, as at 100, and adapted to engage a similar threaded portion of circular opening 102 in the nose portion 2 of the body. The protruding end of bolt 98 has a vane 104 fixedly mounted thereon, held in place by a smaller bolt or screw 106.

The body portion 4 is provided with a circular opening 108, adapted to receive a threaded bolt 110, which serves to compress coiled spring 112 between bolt 110 and plunger 114. The rounded end 116 of plunger 114 is adapted to ride in a shallow recess 118 in the outside surface of rotor 58, and when the rotor reaches the armed position the plunger engages a circular opening 120 in the rotor, whereby the rotor is securely locked in armed position against further rotation.

In operation, when it is desired to launch the bomb, from an airplane for example, the arming wire 30 is withdrawn, and the spring 32 spreads clamp 22, which loosens cup 20. Cup 20, is forced outwardly away from the nose of the fuse under action of coiled spring 34, and falls clear of the bomb, carrying with it bolt 36. When the bomb is launched, vane 104, normally held against rotation by bolt 36, is exposed to air or water stream and is caused to rotate by such stream, whereby the action of the threaded portion 100 of the bolt upon the threaded portion 102 of the opening in the nose 2 of the body serves to move lock 90 forwardly, withdrawing arm 96 from the recess 62 of the rotor, whereupon the rotor is rotated under action of torsion spring 84 to the point where the projection stop member 64 engages arm 96 of the lock, which prevents further rotation. When the rotor reaches this point, which is the armed position, plunger 114 is forced into engagement with circular opening 120, and the rotor is locked against further rotation.

While we have illustrated and described the invention in some detail, it is to be understood that the invention is not to be limited to such details, but only by the spirit of the invention and the scope of the appended claims.

We claim:

1. A fuse of the character described, comprising a body, a striker member movably positioned in and projecting from said body, a rotor positioned in said body, a recess in said rotor, a threaded opening in said body in axial alignment with said recess, a lock slidably engaging said recess, a bolt swiveled at one of its ends to said lock, a vane fixedly secured to the other end of said bolt and adapted to rotate said bolt upon exposure to an impelling stream, said bolt having a threaded intermediate portion engaging said threaded opening, means for preventing rotation of said lock, whereby upon rotation of said bolt said lock will move out of engagement with said recess, means for rotating said rotor and stop means carried by said lock for engaging said rotor, whereby further rotation of said rotor is prevented.

2. In a fuse of the character described, a body, a threaded opening in said body, a rotor having a recess and an adjacent oppositely disposed stop member positioned in said body, a bolt having a threaded intermediate portion engaging said threaded opening, an impeller affixed to one end of said bolt and adapted to rotate same, a lock swiveled to the other end of said bolt and engaging said recess, whereby upon rotation of said bolt said lock will slidably disengage from said recess, means for rotating the rotor after said disengagement, and stop means carried by said lock adapted to engage said stop member of said rotor, whereby further rotation of said rotor is prevented.

3. A fuse of the character described comprising front and rear body portions, a rotor concentrically interposed between said portions and provided with a plurality of detonator primers arranged obliquely to the axis of said rotor and passages from each primer to a booster charge, means carried by the front body portion for normally locking the rotor against rotation, a vane having operable connections with the rotor locking means to release the rotor during flight, means for rotating the rotor when released, a plurality of spring-backed strikers, one for each primer movably mounted in said front portion in line with said obliquely arranged detonator primers, said strikers having portions extending through and beyond said front portion for direct contact with a target upon impact.

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