June 16, 1936. H. H. ZORNIG 2,044,026

FUSE FOR PROJECTILES

Filed Oct. 26, 1934 2 Sheets-Sheet 1

Fig. 1.

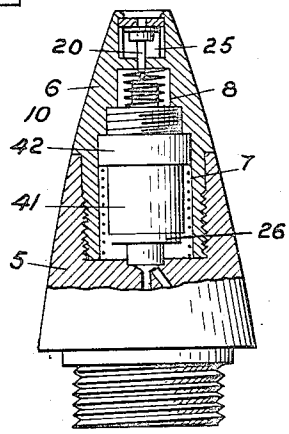


Fig. 2.

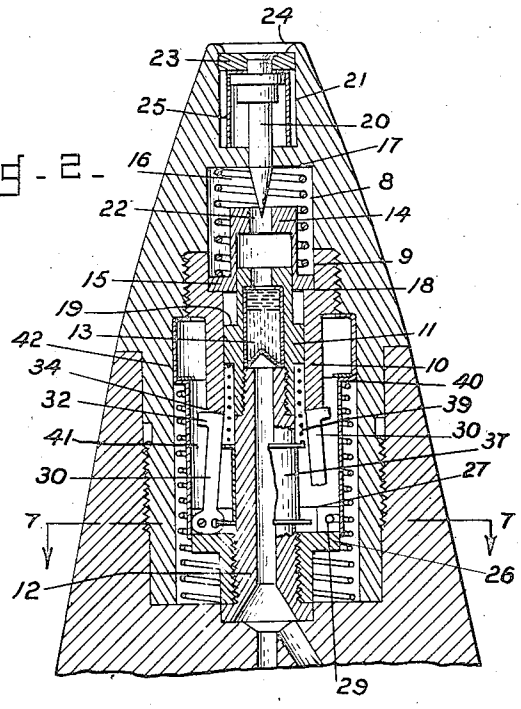


Fig. 3.

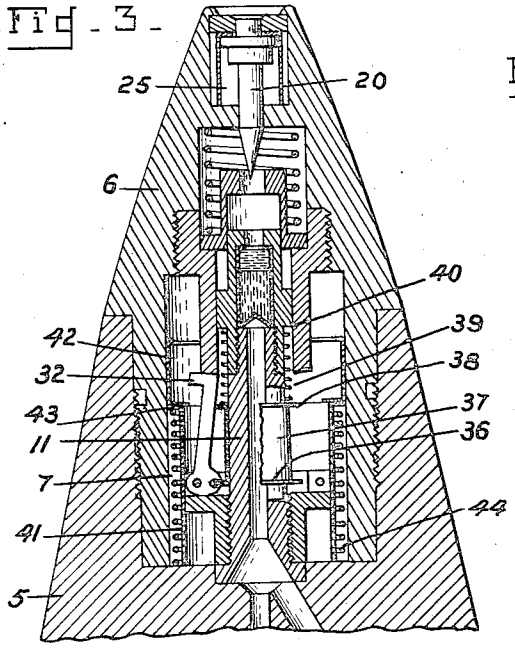
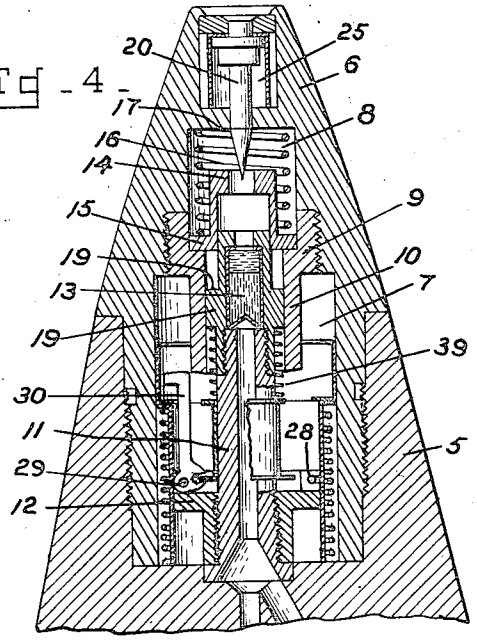


Fig. 4.



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Filed Oct. 26, 1934 2 Sheets-Sheet 2

Fig-5-

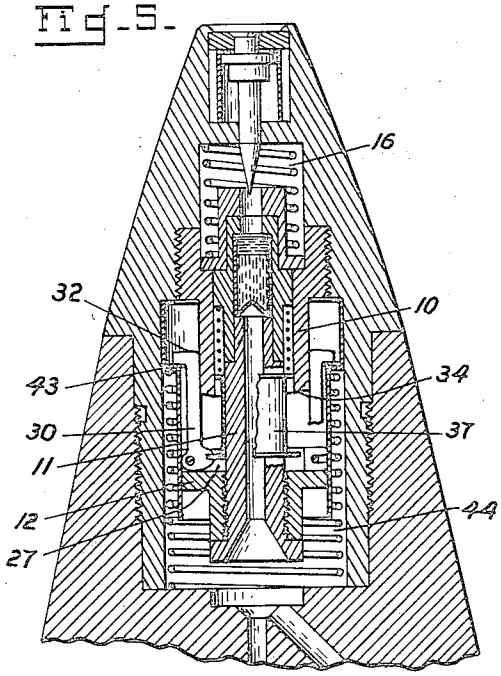


Fig-6-

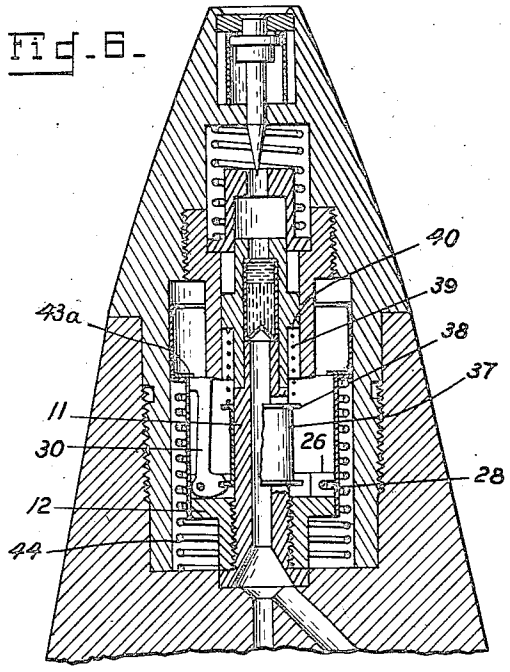


Fig-7-

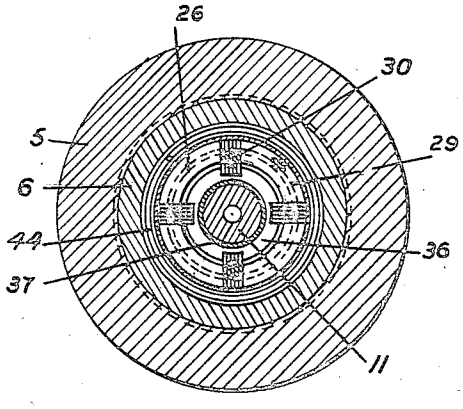


Fig-8-

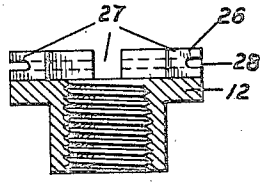


Fig-9-

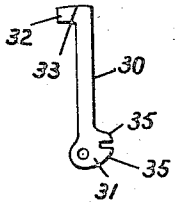
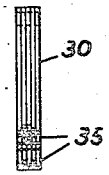


Fig-10-



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UNITED STATES PATENT OFFICE

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FUSE FOR PROJECTILES

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Newhall, Iowa

Application October 26, 1934, Serial No. 750,145

11 Claims. (Cl. 102—36)

(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 me of any royalty thereon.

The subject of this invention is a fuse for projectiles.

The purpose of the invention is to provide an arming device for a fuse which will be safe during handling and transportation and reliable in operation when a projectile equipped with the fuse is fired from a gun.

The invention consists generally in latching a movable member in a safe position and arranging the latches so that they can only be released when the fuse is subjected to the influence of forces corresponding to the forces of set back and rotation applied in the sequence and direction in which these forces occur when the projectile is fired from a gun.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

A practical embodiment of the invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view partly in side elevation and partly in longitudinal section showing the arming device in side elevation.

Figs. 2 to 6 are longitudinal sectional views showing various positions assumed by the arming device.

Fig. 7 is a detail sectional view on the line 7—7 of Fig. 2.

Fig. 8 is a detail sectional view of the base of the plunger.

Fig. 9 is a detail view in side elevation of one of the links.

Fig. 10 is a detail view in end elevation of Fig. 9.

Referring to Figs. 1 and 4 the fuse casing consists generally of a body 5 having a recessed forward end for threadedly receiving a nose 6. The nose is formed with a large rear chamber 7 and a front chamber 8. An apertured plug 9 threadedly secured to the nose separates the chambers 7 and 8 and includes a tubular guide 10 projecting rearwardly into the chamber 7.

A plunger mounted in the nose comprises a long tube 11 extending through the guide 10 and an enlarged base 12 positioned at the rear end of the tube in the chamber 7. The tube is preferably formed of several parts to conveniently carry a primer-detonator 13 in its forward end. The forward end of the tube extends into the chamber 8 and into an inverted cup 14 disposed in the chamber.

The cup 14 is formed with a flange 15 on its lower open end and a spring 16 confined between the flange and the front wall 17 of the chamber 8 normally maintains the flange on a shoulder 18 of the plug 9. The flange or lip of the cup 14 is also adapted to be engaged by an annular shoulder 19 on the tube 11 whereby the plunger is yieldingly held against forward movement towards a firing pin 20.

The firing pin (Fig. 2) mounted in a recess 21 in the nose has its point normally disposed in an aperture 22 in the cup 14. The firing pin is secured to a disc 23 which is held in forward position against a stop 24 by a shell 25 which is adapted to be crushed on impact.

The base 12 of the plunger (Figs. 5–10) is provided on its forward face with a ring 26 having a plurality of equi-distantly spaced slots 27. The ring is formed with a peripherally disposed groove 28 for receiving a wire 29. A plurality of similar latches or links 30, preferably of laminated construction, are pivotally carried by the wire 29, each link having its head 31 disposed in one of the slots 27. The forward or free end of each link is formed into a foot 32 with an arcuate face 33 adapted to engage an inclined face 34 on the tubular guide 10.

The inside part of the head 31 of each link is formed with jaws 35—35 to provide a mouth for receiving the flange 36 on the rear end of a sleeve 37. The sleeve slidably embraces the tube 11 and has a flange 38 on its forward end for seating a spring 39 which encircles the tube 11 and bears against an annular shoulder 40 formed thereon.

The sleeve 37 is normally moved to the rear by the spring 39 and by virtue of its engagement with the links 30, the latter are moved and held in an inclined position with relation to the axis of the fuse, with their feet 32 engaging the guide 10 as shown in Figs. 1 and 2 and their heads 31 engaging the base 12 of the plunger.

A cylindrical casing (Fig. 3) enclosing the base 12 of the plunger and the links 30 comprises a main rear part 41 of smaller diameter than the front part 42 and joined thereto by a perpendicularly offset shoulder 43 which is associated with an inwardly projecting flange or ring 43a (Fig. 6). The casing is movably mounted in the chamber

7, being normally maintained in the forward end thereof by means of a spring 44 embracing the reduced part 41 and confined between the shoulder 43 and the body 5 which closes the rear end of the chamber 7.

When the casing is in the forward position (Fig. 2), the reduced part 41 extends forwardly of the rear end of the guide 10 and being in the path of movement of the links 30 prevents them from moving completely out of engagement with the guide. When the casing is in the rearward position (Figs. 3 and 4) the front part 42 permits the links to move sufficiently to clear the guide 10.

The normal position of the parts is as shown in Fig. 2 with the casing 41—42 in forward position and the plunger 11—12 in rearward position where it is held by the links 30. The links are maintained in engagement with the guide 10 by the sleeve 37 and spring 39 and even though they are capable of limited movement they cannot be released because of the opposition of the main part 41 of the casing. In the safe position of Fig. 2, if the nose is struck pushing in the firing pin 20 by crushing the sleeve 25 the detonator is so far back that the firing pin cannot reach it. If the projectile is retarded without crushing in the firing pin as in case of ricochet the detonator cannot move forward on account of the latches 30.

When a projectile equipped with the fuse is subjected to the forces of set-back, as occurs when it is fired from a gun, the parts assume the position shown in Fig. 3. The casing 41—42 has moved to the rear to uncover the feet 32 of the links.

Rotation of the projectile causes the links to swing outwardly under the action of centrifugal force and against the action of the spring 39 as shown in Fig. 4, the links being constrained to simultaneous movement by virtue of their relation to the sleeve 37. When the casing recovers from the influence of the force of set-back it moves forwardly (Fig. 5) under the action of its spring and the flange 43a picks up the feet 32 of the links and carries the links and the plunger 11—12 along if the plunger has not already crept forward due to deceleration. The plunger 11—12 is held against further forward movement until impact by means of the spring 16. In the position of Fig. 5, if the nose is struck pushing firing pin 20 in by crushing sleeve 25 firing pin can reach the detonator functioning fuse. If the projectile is retarded without crushing in firing pin as in the case of ricochet the tube 11 moves forward due to its momentum compressing spring 16 and carrying detonator 13 against firing pin. Spring 16 is provided to prevent tube 11 creeping forward during flight of the projectile and carrying detonator on to firing pin before impact of the projectile.

Referring to Fig. 6 there is shown the position of the parts where rotation occurs before set-back is completed. In this instance the flange 43a will engage the feet of the links and the casing 41—42 will be incapable of further rearward movement.

I claim:

1. In a fuse, a container having a chamber, a tubular guide extending into the front part of the chamber, a plunger disposed in the chamber and having a tube extending into the guide, centrifugally movable links pivotally mounted at their rear ends in the plunger, a foot on the front end of each link adapted to engage the guide whereby the links hold the plunger in rearward position, a head on the rear end of each link and having a jaw, a sleeve on the tube of the plunger and having a flange inserted in the jaws of the links, a spring confined between the front end of the sleeve and a portion of the tube of the plunger, a casing movably mounted in the chamber and enclosing the links, said casing adapted to move on set-back and having an offset to provide a reduced rear part and an enlarged front part, and a spring normally holding the casing with its reduced part in position to oppose movement of the links out of engagement with the guide.

2. In a fuse, a container having a chamber, a tubular guide extending into the front part of the chamber, a plunger disposed in the chamber and having a tube extending into the guide, centrifugally movable links pivotally mounted at their rear ends in the plunger, a foot on the front end of each link adapted to engage the guide whereby the links hold the plunger in rearward position, means on the tube of the plunger and acting on the links to normally hold them in engagement with the guide, a casing movably mounted in the chamber and enclosing the links, said casing adapted to move on setback and having an offset to provide a reduced rear part and an enlarged front part, and a spring normally holding the casing with its reduced part in position to oppose movement of the links out of engagement with the guide.

3. In a fuse, a container having a chamber, a tubular guide extending into the front part of the chamber, a plunger disposed in the chamber and having a tube extending into the guide, centrifugally movable links pivotally mounted at their rear ends in the plunger, a foot on the front end of each link adapted to engage the guide whereby the links hold the plunger in rearward position, means acting on the links to normally hold them in engagement with the guide, a casing movably mounted in the chamber and enclosing the links, said casing adapted to move on set-back and having an offset to provide a reduced rear part and an enlarged front part, and a spring normally holding the casing with its reduced part in position to oppose movement of the links out of engagement with the guide.

4. In a fuse, a container having a chamber, a tubular guide extending into the front part of the chamber, a plunger disposed in the chamber and having a tube extending into the guide, centrifugally movable links pivotally mounted in the plunger, a foot on the front end of each link adapted to engage the guide whereby the links hold the plunger in rearward position, means acting on the links to normally hold them in engagement with the guide, a casing enclosing the links and normally in position to oppose movement of the links out of engagement with the guide, said casing movable on set-back to release the links.

5. In a fuse, a container having a chamber, a tubular guide extending into the front part of the chamber, a plunger disposed in the chamber and having a tube extending into the guide, centrifugally movable links pivotally mounted in the plunger, a foot on the front end of each link adapted to engage the guide whereby the links hold the plunger in rearward position, means acting on the links to normally hold them in engagement with the guide, and means for normally opposing movement of the links out of engagement with the guide and releasable on set-back.

6. In a fuse, a stop member, a plunger mov-

able relative to said member and having a central stem, centrifugally movable links pivotally mounted at their rear ends in the plunger, said links adapted to engage the stop member whereby they hold the plunger against movement, a head on the rear end of each link and having a jaw, a sleeve on the stem of the plunger and having a flange inserted in the jaws of the links, and a spring confined between the front end of the sleeve and a portion of the stem of the plunger.

7. In a fuse, a stop member, a plunger movable relative to said member and having a central stem, centrifugally movable links pivotally mounted at their rear ends in the plunger, said links adapted to engage the stop member whereby they hold the plunger against movement, a sleeve on the stem of the plunger and engageable with the links and a spring confined between the front end of the sleeve and a portion of the stem of the plunger.

8. In a fuse, a stop member, a plunger movable relative to said member, centrifugally movable links pivotally carried by the plunger, means acting on the links to normally hold them in engagement with the stop member, a casing movably mounted relative to the plunger and enclosing the links, said casing adapted to move on set-back and having an offset to provide a reduced rear part and an enlarged front part, and a spring normally holding the casing with its reduced part in position to oppose movement of the links out of engagement with the stop member.

9. In a fuse, a stop member, a plunger movable relatively to said member, centrifugally movable links pivotally carried by the plunger, means acting on the links to normally hold them in engagement with the stop member, a casing movably mounted relative to the plunger and enclosing the links, means for normally holding the casing in position to oppose movement of the links out of engagement with the stop member, said casing movable on set-back to release the links, and means on the links whereby they are picked up by the casing on movement of the latter counter to set-back.

10. In a fuse, a stop member, a plunger movable relative to said member, centrifugally movable links pivotally carried by the plunger and normally engageable with the stop member, a casing movably mounted relative to the plunger and enclosing the links, means for normally holding the casing in position to oppose movement of the links out of engagement with the stop member, said casing movable on set-back to release the links, and means on the links whereby they are picked up by the casing on movement of the latter counter to set-back.

11. In a fuse, a stop member, a plunger movable relative to said member, centrifugally movable links pivotally carried by the plunger and normally engageable with the stop member, a casing movably mounted relative to the plunger and enclosing the links, means for normally holding the casing in position to oppose movement of the links out of engagement with the stop member, and said casing movable on set-back to release the links.

HERMANN H. ZORNIG.