March 22, 1932. G. H. BARDSLEY 1,850,196

FUSE FOR PROJECTILES

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Fig. 1.

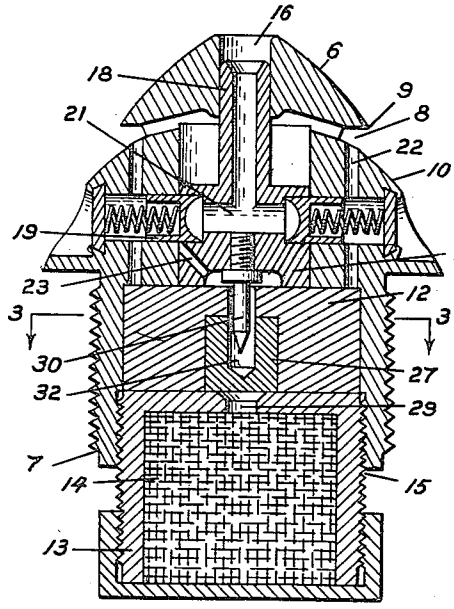

Fig. 2.

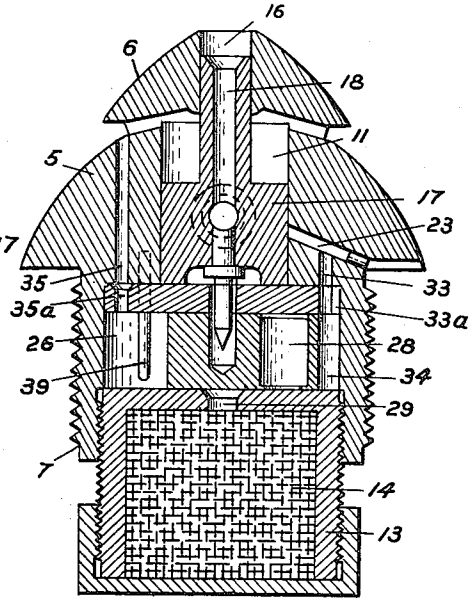

Fig. 3.

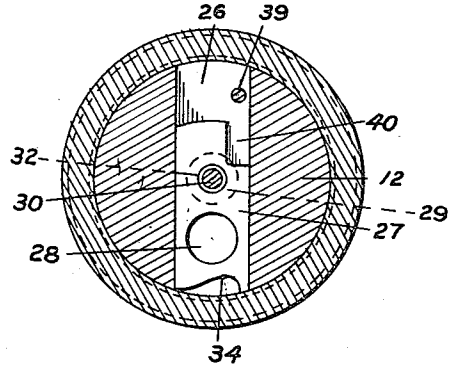

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Fig. 4.

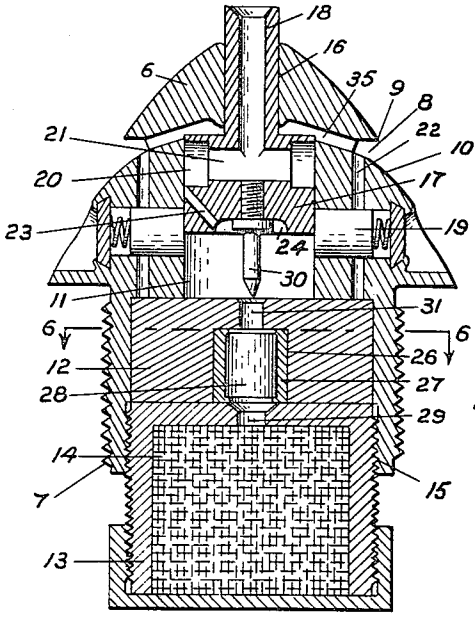


Fig. 5.

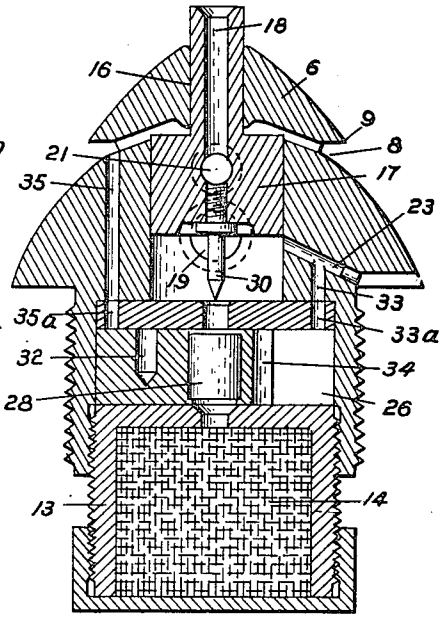


Fig. 6.

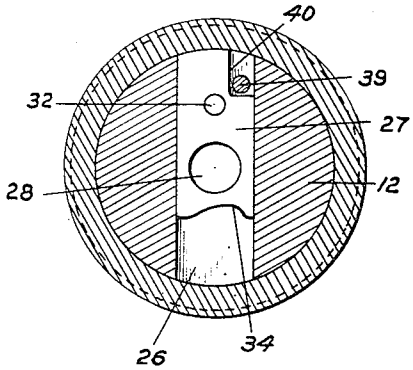
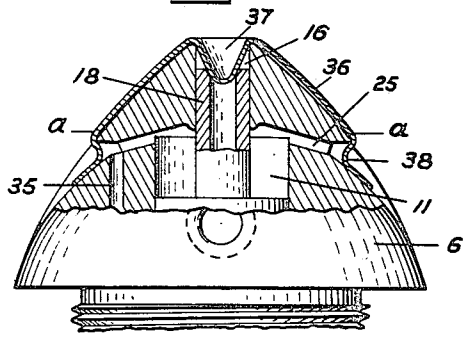


Fig. 7.



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UNITED STATES PATENT OFFICE

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FUSE FOR PROJECTILES

Application filed June 3, 1930. Serial No. 459,079.

(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 and is particularly designed for though not limited to that class of projectiles which have no rotation during flight.

All fuses are arranged with safety devices which restrain the firing pin from coming in contact with the primer until after the projectile has commenced its flight. In addition, certain safety features are incorporated whereby the explosive train is interrupted so that premature ignition due to shock or other causes will not function the bursting charge. In projectiles fired from a rifled weapon, the forces of inertia and centrifugal force are available and are used separately or collectively to actuate the elements of the safety devices.

The purpose of the present invention is to provide safety devices for a fuse which will be actuated by means of air pressure developed during flight of a projectile equipped with the fuse.

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 longitudinal sectional view of the improved fuse showing the parts in the safe or unarmed position;

Fig. 2 is a similar view taken at right angles to Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal sectional view corresponding to Fig. 1, but showing the parts in the armed position;

Fig. 5 is a similar view taken at right angles to Fig. 4;

Fig. 6 is a sectional view on the line 6—6 of Fig. 4; and

Fig. 7 is a fragmentary longitudinal sectional view of the fuse equipped with a novel shipping cap.

Referring to the drawings by numerals of reference:

The fuse comprises an ogival casing conforming externally to standard design and capable of being formed as an integral unit. It includes an intermediate head 5, a nose 6 and a hollow cylindrical body 7 threaded for attachment to a projectile. A peripheral recess 8 in the outer wall of the container forms a neck between the head and the nose and establishes an area of decreased pressure when the fuse is in flight. To facilitate this purpose the recess is so formed that the rim 9 of the nose constitutes a lip and the surface 10 of the head is sloped for some distance before it meets the ogive of the container.

The head 5 is formed with a central cavity 11 which is closed at the rear by a block 12 positioned within the hollow fuse body 7 and retained by a cup 13 carrying a booster charge 14 and threaded internally as at 15 to the fuse body. An axial opening 16 in the nose 6 extends to the cavity 11 and together they accommodate corresponding portions of a striker which consist of an enlarged base 17 and a tubular stem 18.

The striker is normally held in a retracted position with the base at the rear of the cavity and the front edge of the stem withdrawn into the nose, by means of a pair of spring pressed bolts 19 mounted in the head 5 and engageable in recesses 20 in the wall of the base 17 of the striker. The bolts are adapted to be moved outwardly to release the striker by means of air pressure and to this end a channel is conveniently provided in the striker by means of the tubular stem and an intersecting transverse duct 21 in the base leading directly to the bolts. A vent 22 leading to the annular recess 8 is provided in rear of each of the bolts and is occluded by the bolt when disengaged from the striker.

An inclined duct 23 extends from one of the recesses 20 to the concaved rear face 24 of the striker and serves to conduct air to the

rear of the striker after it is uncovered by the bolt. Due to the differential areas of the striker on which the air pressure is acting the striker is caused to move forwardly to the armed position shown in Fig. 4, the point of the striker being extruded. Vents 25 leading from the forward end of the cavity 11 to the annular recess 8 provide for exhausting the cavity during such movement of the striker.

The block 12 is formed with a transverse passage 26 in which is mounted a slide 27 carrying a primer detonator 28. In the normal unarmed position of the slide the primer detonator is maintained out of alignment with an axial flash passage 29 in the cup 13 through the agency of a firing pin 30 fixed to the striker and extending, when the striker is in retracted or unarmed position, through an aperture 31 in the block into a blind recess 32 in one end of the slide.

The movement of the slide to the armed position is accomplished when the striker having moved to armed position to withdraw the firing pin from the path of the striker uncovers a channel 23, 33 and 33*a* respectively in the fuse head and block which establishes communication between the cavity 11 and one end of the passage 26, the corresponding end of the slide being cut away as at 34 to provide the accommodation. Air pressure can thus be utilized to move the slide from one end of the passage 26 to the other end which is exhausted through the vent 35—35*a* leading to the annular recess 8. The primer detonator is now disposed axially of the fuse and in line with the flash passage 29.

As shown in Fig. 7 a shipping cap 36 is placed over the nose of the fuse and includes an indented apical portion 37 insertable in the opening 16 to positively restrain the striker against forward movement and also an indented marginal portion 38 fitting in the annular recess 8 for the purpose of excluding dirt therefrom and securely holding the cap in place. These portions are preferably separable by means of known expedients along a line *a*—*a* so that the cap may be readily detached prior to using the fuse.

In order to insure correct positioning of the block 12 and the alignment of the channel 33*a* and vent 35*a* with the complementary portions in the fuse head, a dowel 39 is provided and is preferably fixed in the fuse head. The dowel is extended into the passage 26 adjacent one of the side walls and the slide is formed with a slot 40 so that it will not be opposed by the dowel in moving to armed position. Furthermore, when assembling the slide by a longitudinal movement to have the blind recess 32 receive the projecting firing pin 30 the dowel serves to oppose placement of the slide unless the latter is in the unarmed position.

The booster cup and the slide and all elements of the container are assembled as units and then combined in proper relation to the block.

During the flight of a projectile equipped with the present fuse the air pressure upon the nose of the fuse is increased and the pressure under the rim or lip 9 is decreased. The air rushing into the hollow striker is concentrated on the bolts and drives them outwardly; and then being admitted behind the concaved rear end of the striker whose area exceeds the area of such of its surfaces on which the inrushing stream is acting, causes the striker to move forward to armed position, thereby carrying the firing pin out of the path of the slide. The exposure of the channel 33 on forward movement of the striker enables the air pressure to be directed to the passage 26 where it moves the slide to armed position. The arrangement is such that there are successive concentrations first on the bolts, then on the striker and then on the slide. The chambers or passages for all moving parts, namely the striker, bolts and slide are all vented to a point of reduced pressure, in the present instance the annular recess 8, in order that the air displaced by the moving parts will not build up retarding pressures.

I claim:

1. In a fuse for projectiles, a container forming a hollow body, a chambered head, and a chambered nose separated from the head by a peripheral recess, a striker having an enlarged base disposed in the chamber of the head and a tubular stem fitting in the chamber of the nose, a pair of spring-pressed bolts mounted in the head and engageable with the enlarged base of the striker to hold it in fired position, a transverse duct in the striker base in communication with the tubular stem and directed to the bolts, a duct leading from the transverse duct to the rear face of the striker and normally occluded by one of the bolts, a slide holder in the hollow body in rear of the striker, a transversely movable slide in said holder, a firing pin carried by the striker and normally disposed in the path of movement of the slide, a duct between the chamber in the fuse head and one end of the slide and said duct normally occluded by the striker, means for venting the air displaced on movement of the striker, bolts and slide to the peripheral recess, and a booster cup secured to the hollow body and retaining the slide holder.

2. In a fuse for projectiles, a container including a chambered head and a chambered nose separated from the head by a peripheral recess, a striker in the chamber of the head having a tubular stem fitting in the chamber of the nose, means engageable with the striker for locking it in fired position, a duct in the striker in communication with the tubular stem and directed to the locking means, a second duct in the striker leading from the

aforesaid duct to the rear face of the striker and normally occluded by the locking means, a slide mounted for transverse movement in rear of the striker, a firing pin carried by the striker and normally disposed in the path of the movement of the slide, a duct establishing communication between the striker chamber and one end of the slide and normally occluded by the striker, and means for venting the air displaced on movement of the striker, locking means and slide to the peripheral recess.

3. In a fuse for projectiles, a container including a chambered head and a chambered nose, a striker in the chamber of the head having a tubular stem fitting in the chamber of the nose, means engageable with the striker for locking it in fired position, a duct in the striker in communication with the tubular stem and directed to the locking means, a second duct in the striker leading from the aforesaid duct to the rear face of the striker and normally occluded by the locking means, a slide mounted for transverse movement in rear of the striker, a firing pin carried by the striker and normally disposed in the path of the movement of the slide, a duct establishing communication between the striker chamber and one end of the slide and normally occluded by the striker and means for venting the air displaced on movement of the striker, locking means and slide.

4. In a fuse for projectiles, a container including a chambered head and a chambered nose, a striker in the chamber of the head having a tubular stem fitting in the chamber of the nose, means engageable with the striker for locking it in fired position, a duct in the striker in communication with the tubular stem and directed to the locking means, a second duct in the striker leading from the aforesaid duct to the rear face of the striker, a slide mounted for transverse movement in rear of the striker, a firing pin carried by the striker, and normally disposed in the path of movement of the slide, a duct establishing communication between the striker chamber and one end of the slide, and means for venting the air displaced on movement of the striker, locking means and slide.

5. In a fuse for projectiles, a casing, a striker mounted in the casing for movement axially thereof, and having a stem extruding through the nose of the casing, means for locking the striker in the fired position, a slide mounted for transverse movement in the rear of the striker, a firing pin carried by the striker and normally disposed in the path of movement of the slide, an air channel extending from the nose of the casing and arranged to successively concentrate air pressure on the locking means, the striker, and slide to move these members, and means for venting the air displaced by said members to a point of reduced pressure.

6. In a fuse for projectiles, a casing, a striker mounted in the casing for movement axially thereof, and having a stem extruding through the nose of the casing, means for locking the striker in the fired position, a slide mounted for transverse movement in rear of the striker, a firing pin carried by the striker and normally disposed in the path of movement of the slide, an air channel extending from the nose of the casing and arranged to successively concentrate air pressure on the locking means, the striker, and slide to move these members.

7. In a fuse, a movably mounted locking means, striker and slide, the striker opposing movement of the slide and being opposed by the locking means, an air channel leading to all of said members whereby their movement is effected through air pressure in the order named, the locking means and the striker normally interrupting the air channel whereby successive concentrations of air pressure are directed to said members, and means for venting the air displaced by said members to a point of reduced pressure.

8. In a fuse, a movably mounted locking means, striker and slide, the striker opposing movement of the slide and being opposed by the locking means, and an air channel leading to all of said members whereby their movement is effected through air pressure in the order named, the locking means and the striker normally interrupting the air channel whereby successive concentrations of air pressure are directed to said members.

9. In a fuse, a movably mounted locking means, striker and slide, the striker opposing movement of the slide and being opposed by the locking means, means for directing air pressure to successively move said members in the order named, and means for venting the air displaced by said members to a point of reduced pressure.

10. In a fuse, a movably mounted locking means, striker and slide, the striker opposing movement of the slide and being opposed by the locking means, and means for directing air pressure to successively move said members in the order named.

11. In a fuse, three associated movable members, the intermediate member opposed by one of the remaining members and opposing the other remaining member, and means for directing air pressure to successively move the opposition members.

12. In a fuse, an axially movable member, a transversely movable member opposing movement of the axially movable member, an air channel in said axially movable member leading to the transversely movable member and to its rear face, the transversely movable member normally interrupting the air channel.

13. In a fuse, a pair of members mounted for movement at an angle to one another, one of said members arranged to oppose movement of the other, and means for conducting air pressure through the opposed member to successively move the opposing and the opposed member.

14. In a fuse, a pair of members mounted for movement at an angle to one another, one of said members arranged to oppose movement of the other, and means for conducting air pressure to successively move the opposing and the opposed member.

15. In a fuse, a pair of members mounted for movement at an angle to one another, one of said members arranged to oppose movement of the other, and means for conducting air pressure to move the opposing member in the direction of application of the air pressure.

16. In a fuse, a transversely movable member, and axially movable member opposing movement of the transversely movable member, an air channel in said axially movable member leading to its rear face, an air channel leading to one end of the transversely movable member, the axially movable member normally interrupting the channel leading to the transversely movable member.

17. In a fuse, a pair of members mounted for movement at an angle to one another, one of said members opposing movement of the other, and means for conducting air pressure through the opposing member to effect its movement and thence to the opposed member to effect its movement.

18. In a fuse, a member mounted for movement transversely thereof, means for conducting air pressure to move said member, and an air pressure operated member normally opposing movement of the transverse member.

19. In a fuse having a transverse passage, a member mounted at one end of the passage, and means for conducting air pressure to move said member to the other end of the passage.

20. In a fuse, an ogival casing formed with a peripheral recess to constitute an area of reduced pressure during flight, members in the casing movable through air pressure, and means for venting the air displaced by said members to the peripheral recess.

21. In a fuse for projectiles, a pair of apertured members arranged for assembly end to end, one of said members having a transverse passage, a slide insertable in the passage, and a dowel for assembling the apertured members, said dowel extending into the transverse passage to oppose reverse positioning of the slide.

22. In a fuse, a casing having a peripheral recess constituting an area of reduced pressure during flight, vents leading to said recess, a striker normally retracted within the casing but extruding therefrom when in armed position, and a shipping cap placed over the nose of the casing, said cap having an indented apical portion restraining movement of the striker to armed position and an indented marginal portion fitting in the peripheral recess.

GEORGE H. BARDSLEY.