

Nov. 1, 1960

R. P. MARSHALL
FUZE COMPONENT DESIGN

2,958,285

Filed Oct. 8, 1959

Fig. 1.

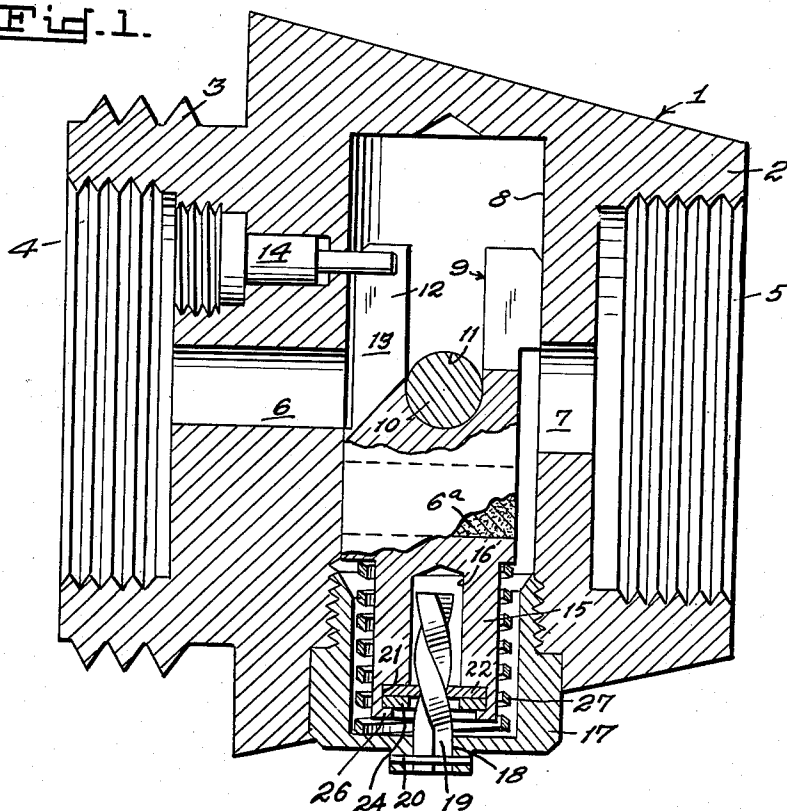


Fig. 2.

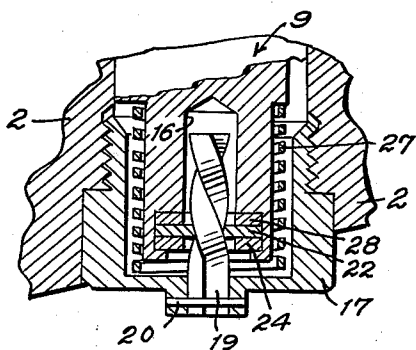


Fig. 3.

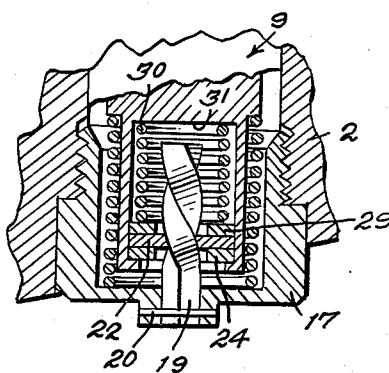


Fig. 4.



Fig. 5.



Fig. 6.



INVENTOR.
Robert P. Marshall
BY

S. J. Rotondi & A. J. Dupont

1

2,958,285

FUZE COMPONENT DESIGN

Robert P. Marshall, 504 Vista Drive, Falls Church, Va.

Filed Oct. 8, 1959, Ser. No. 845,295

1 Claim. (Cl. 102—76)

(Granted under Title 35, U.S. Code (1952), Sec. 266)

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.

This invention relates to a fuze component and more particularly relates to a means to retard the movement of a spring actuated arming slider of a fuze in order to relieve the shock of the slider seating at the end of its stroke and to provide a limited delay thereto.

The present invention is proposed as a solution of the premature functioning of non rotating 60 mm. and 81 mm. ammunition and its assembly to the M52 fuze. These premature functionings are believed to be caused by either the seating of the spring actuated arming slider, used in this type of fuze, transmitting the shock of seating to an oversensitive detonator, or the result of the fuze's firing pin being depressed once the slider has armed. It has been observed that the premature functionings have taken place from one to six feet from the muzzle of the weapon and it is desired to effect a delay arming of a short time duration to eliminate this hazard.

The present invention uses friction discs which are held without force within the slider, one disc having a square central opening so that it may rotate as it is being pulled along the length of a twisted actuating rod, also having a square cross section, as the slider is being moved into an armed position by a spring. The discs provide a time delay in the movement of the slider from unarmed to armed positions to allow the projectile to reach a safe distance from the muzzle of the weapon.

It is therefore a primary object of this invention to provide a time delay in the movement of an arming slider from its safe position in a fuze to an arming position therein.

It is another object of the invention to cushion the impact of a spring biased arming slider of a fuze upon reaching its armed position to prevent transmittal of the resultant shock to an over sensitive detonator in the fuze.

A further object of the invention is to provide a friction means to retard the movement of the spring biased slider in a fuze from a safety to an armed position.

A still further object is the provision of a plurality of friction discs within a spring biased arming slider, one disc having a square central opening adapted to be pulled along a helical rod, also having a square cross section whereby a short time delay is provided to the slider in its movement from a safety to an armed position.

A final object is to provide a fuze component that is simple in operation and reliable in functioning.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing, it being understood however, that the invention is not limited to the specific illustration or description but that such illustration or description constitutes a preferred embodiment of the invention.

In the drawing:

Fig. 1 is an axial section taken through the body of a fuze, the arming slider being in its safety position,

2

showing a delay mechanism for retarding the movement of the slider constructed in accordance with the present invention;

Fig. 2 is a partial section view of a modified form of time delay mechanism;

Fig. 3 is a partial section view of another modified form of time delay mechanism;

Fig. 4 is a perspective view of one of the friction discs having a square central opening;

Fig. 5 is a perspective view of a friction disc having a circular opening; and

Fig. 6 is a perspective view of another form of disc comprising a split ring.

Referring to the drawing, 1 indicates generally a fuze and includes a body 2 provided with external threads 3 for attachment to a projectile (not shown) and rearward internal threads 4 for securing a booster cup (not shown). Forwardly disposed internal threads 5 are provided for attachment of a fuze detonating element (not shown). Axial flash passageways 6 and 7 are provided. A transverse bore 8 is provided for receiving an arming slide indicated generally by 9. A bore riding pin 10 is slidable in a transverse bore 11 in body 2.

Such pins are common in the art and are usually spring-pressed as shown in U.S. Patent No. 1,992,928.

Arming slider 9 is provided with a first central slot 12 in its inner portion to receive bore riding pin 10. A second slot 13 receives a detent 14 which normally prevents rotational movement of slide 9. This rotational movement is normally prevented due to the fact that slide 9 is provided with a flash passage 6a for receiving a detonating element or the like for completing the powder train when slide 9 is moved to its armed position.

Slide 9 has a reduced outer portion 15 which is axially bored as at 16. Bore 8 is closed at its outer end by screw cap 17 which is provided with a square axial bore 18. An actuating rod 19 having a square cross section and helical twist is secured in bore 18 by a pin 20. The outer portion 15 of slide 9 is counter-bored as at 21 and receives a friction disc 22 having a square central opening 23 (see Fig. 4) through which rod 19 passes. A second disc 24 (see Fig. 5) having a circular opening 25 of larger diameter than rod 19 is received in counter-bore 21 and disposed below disc 22 as seen in Fig. 1. Both discs are retained in counter-bore 21 by crimping the outer edge of counter bore 21 as at 26.

Slide 9 is normally urged inwardly by coil spring 27.

In operation, the fuze body is attached to a projectile, not shown and to a detonating element, also not shown and completes a round of ammunition.

When fired from a weapon, bore riding pin 10 is ejected. Spring 27 tends to urge slider 9 towards its armed position in bore 8. Slider 9 is held against rotational movement by detent 14. In order that the projectile may not arm until a safe distance from the muzzle of the weapon, a limited delay is effected by the actuating rod 19 and friction discs 22 and 24 in the following manner: The actuating rod 19 is square in cross section and has a helical twist to give either one half revolution or one fourth revolution per inch for the purpose of causing friction disc 22, which has a square central opening, to rotate in counter-bore 21 as the rod 19 is pulled along its length as slider 9 moves in bore 8. In order for disc 22 to rotate, it must overcome the friction between its surface and the surface of friction disc 24 which has a round central opening 25 and is mounted below disc 22 also contained in counter-bore 21, and thus will retard the movement of slider 9.

A modified form of washer arrangement is illustrated in Fig. 2 and operates in the same manner as Fig. 1, however an additional member in the form of a split

3

washer 28 is contained in counter-bore 21 above disc 22 and is intended to pre-load discs 22 and 24 to give more constant results.

Fig. 3 illustrates still another arrangement of friction discs wherein an additional smooth disc 29 is used and in addition, a second spring 30 in an axial bore 31 in slider 9 which biases against disc 29 and offers a means of a more sensitive loading of the friction discs.

In order that the device work as consistent as possible in extremes of hot and cold weather conditions, the friction discs in all these applications should be assembled in dry condition, without lubricants, and fabricated from materials such as stainless steel, brass or plastics with smooth hard surfaces of relative high strength and stiffness.

It is apparent from the foregoing that a highly efficient means has been devised to provide a time delay for retarding the movement of an arming slider in a fuze for preventing premature arming in the fuze until it has traveled a safe distance from the muzzle of a weapon. Its operation is reliable due to its simplicity of construction.

It is to be understood that the form of the invention herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention.

What is claimed is:

In combination, a fuze including a body having a transverse bore therein, a slider carrying a detonator slidably mounted in said bore for movement from an unarmed to an armed position, there being an axial bore

4

in the outer portion thereof, means urging said slider toward the armed position, a bore riding pin carried by said body engaging said slider and extending through said bore to normally restrain said slider in the unarmed position until firing occurs, said pin being disengaged from said slider upon firing and freeing said slider for movement towards the armed position, means carried by said body for preventing rotary movement of the slider in said transverse bore, and means for delaying movement of said slider toward the armed position comprising a helically twisted rod fixed in said body and extending into said axial bore, and at least two friction discs having central openings arranged in coaxial abutting relation in said slider and slidable on said rod, the central opening of one of said discs being of the same configuration as the cross sectional configuration of said rod, so that the last named disc will be frictionally rotated against the other upon movement of said slider toward the armed position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,992,926	Towner	Feb. 26, 1935
2,779,287	Andrews	Jan. 29, 1957
2,821,925	Varaud	Feb. 4, 1958
2,870,713	Saloranta	Jan. 27, 1959
2,872,868	Donahue	Feb. 10, 1959

FOREIGN PATENTS

186,248	Germany	May 23, 1907
---------	---------	--------------