

Feb. 2, 1937.

M. L. MATHSEN

2,069,259

DELAYED ARMING DEVICE FOR FUSES

Filed Aug. 7, 1936

Fig - 1 -

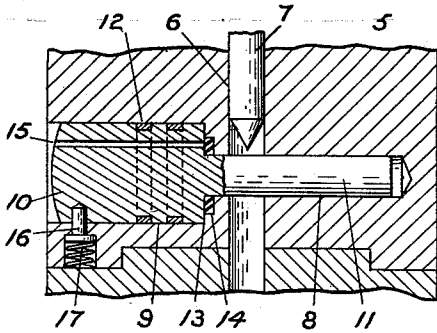


Fig - 2 -

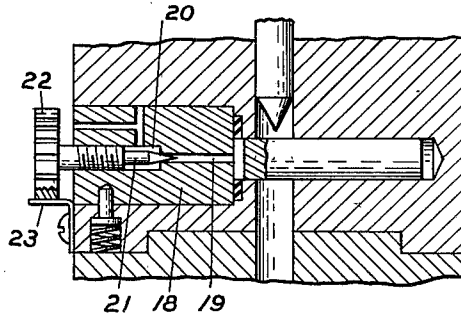


Fig - 3 -

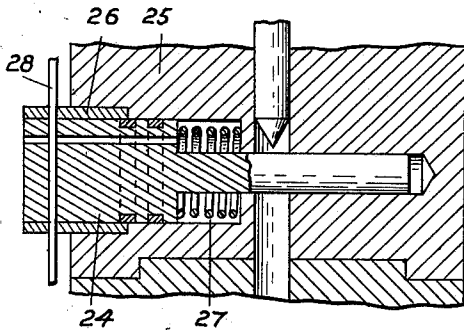


Fig - 5 -

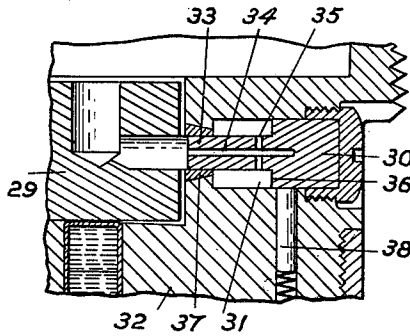
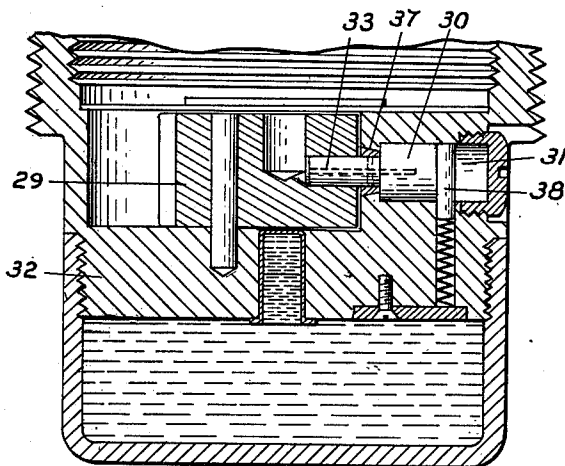


Fig - 4 -



Inventor
Marvin L. Mathsen
By *W. H. Roach*
Attorney

UNITED STATES PATENT OFFICE

2,069,259

DELAYED ARMING DEVICE FOR FUSES

Marvin L. Mathsen, Wharton, N. J.

Application August 7, 1936, Serial No. 94,816

3 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.

5 This invention relates to a delayed arming device for fuses.

Fuses for projectiles are provided with various types of safety devices which are intended to maintain the firing mechanism or explosive train in safe or unarmed position until the projectile is some distance on its flight. These devices are in the form of arming bolts arranged to be moved under the influence of centrifugal force or of a spring.

15 The purpose of this invention is to provide a simple and novel arrangement whereby the rate of movement of the arming bolt may be controlled and its removal delayed. This is accomplished by regulating the admission of air to the space in rear of the bolt either through a valved orifice or a dimensioned passage and thereby destroying the partial vacuum which is created on movement of the bolt and which tends to retard ejection of the bolt.

25 To these and other ends, the invention consists in the construction, arrangement and combination of elements described hereinafter and pointed out in the claims forming a part of this specification.

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

Fig. 1 is a longitudinal sectional view of a portion of a fuse equipped with a centrifugally operated arming bolt constructed in accordance with the invention.

Fig. 2 is a similar view of a modified form of bolt.

Fig. 3 is a similar view of a spring operated bolt.

Fig. 4 is a longitudinal sectional view of a portion of a fuse showing an arming bolt for a rotor.

Fig. 5 is a view with the bolt of Fig. 4 in ejected position.

Referring to Fig. 1 there is shown the body 5 of a fuse for a projectile which is adapted to rotate on its axis during flight. The body 5 is formed with an axial passage 6 in which an element of a firing mechanism such as a firing pin 7 is movably mounted. A transverse passage in the body has a portion 8 of small diameter intersecting the axial passage, and a portion 9 of large diameter opening into the outer wall of the body.

An arming bolt comprising a body 10 with a reduced stem 11 is mounted in the transverse pas-

sage with the stem 11 disposed in the portion 8 so that it interrupts the axial passage 6 and prevents movement of the firing pin 7 to firing position. The body 10 of the bolt is provided with a form of packing, in the present instance with piston rings 12—12, in order to establish an air seal. The shoulder 13 of the bolt seats on a packing ring 14 which fits in a recess in the fuse body and closely surrounds the stem 11. An air inlet 15, whose diameter is determined by the period of delay required for a particular type of fuse, extends from the outer face to the shoulder of the arming bolt.

A pin 16 mounted in the fuse body 5 for movement longitudinally thereof is normally held in engagement with the arming bolt by a spring 17. The pin is disengaged from the arming bolt due to the force of setback when the projectile is fired from a gun.

In the arrangement shown in Fig. 2 the arming bolt 18 is formed with an air inlet 19 including a chamber 20 for a needle valve 21. The valve 21 has a notched handwheel 22 which is engaged by a detent 23 and thereby held in position of adjustment. A fuse for an artillery projectile should arm somewhere between 100 and 1000 feet from the gun. With the valve adjusted to provide arming at 550 feet, a tolerance or safety factor of 450 feet is allowed. In a bomb or flare launched from aircraft the fuse should arm between 6 and 8 seconds. In this case the valve would be adjusted to provide arming at 7 seconds.

In the modification shown in Fig. 3 the invention is applied to a fuse for a bomb or flare adapted to be launched from aircraft. In this arrangement the arming bolt 24 normally projects from the fuse body 25 and this projecting portion is disposed within a sleeve 26 fixed to the fuse body. The arming bolt is held in the normal safe position against the action of an ejection spring 27 by means of a release wire 28 passing through aligned apertures in the sleeve and arming bolt. This release wire is associated with the aircraft and is withdrawn when the bomb is launched.

In the modification shown in Figs. 4 and 5 there is shown a fuse having a conventional rotor 29 which normally interrupts a firing mechanism and which is moved during flight to arm the firing mechanism in a well known manner. The rotor is held in the safe or unarmed position by an arming bolt 30 mounted in a transverse passage 31 in the fuse body 32. In this arrangement the stem 33 of the bolt is formed with a longitudinal air inlet 34 and a transverse outlet 35 which leads to the space inside the shoulder 36 of the

bolt after the bolt has commenced its movement. The stem moves through a packing 37 carried by the fuse body 32 at the exit of the passage 31. A set-back pin 38 normally holds the arming bolt in engagement with the rotor and is moved in the usual manner.

As the arming bolt commences its movement under the influence of centrifugal force or of the spring, there is a tendency for a partial vacuum to be created which retards ejection of the arming bolt. The degree of retardation is controlled by the dimensions of the air inlet, the mass and the force of the arming bolt being taken into consideration.

I claim.

1. In a fuse, a body having a passage, an arming bolt slidably mounted in the passage and when movable therein during flight having a tendency to create a vacuum which retards its movement, an air inlet in the bolt for conducting air to the rear of the bolt to destroy the vacuum, said inlet dimensioned to control the degree of

retardation and the rate of movement of the bolt, and packing around the arming bolt.

2. In a fuse, a body having a passage, an arming bolt slidably mounted in the passage and when movable therein during flight having a tendency to create a vacuum which retards its movement, an air inlet in the bolt for conducting air to the rear of the bolt to destroy the vacuum, said inlet dimensioned to control the degree of retardation and the rate of movement of the bolt.

3. In a fuse, a body having a passage, an arming bolt slidably mounted in the passage and when movable therein during flight having a tendency to create a vacuum which retards its movement, an air inlet in the bolt for conducting air to the rear of the bolt to destroy the vacuum, said inlet dimensioned to control the degree of retardation and the rate of movement of the bolt, and a valve carried by the bolt for regulating the passage of air through the air inlet.

MARVIN L. MATHSEN.