Feb. 26, 1957 H. BURRI ET AL 2,782,717

FUZE

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Fig. 1

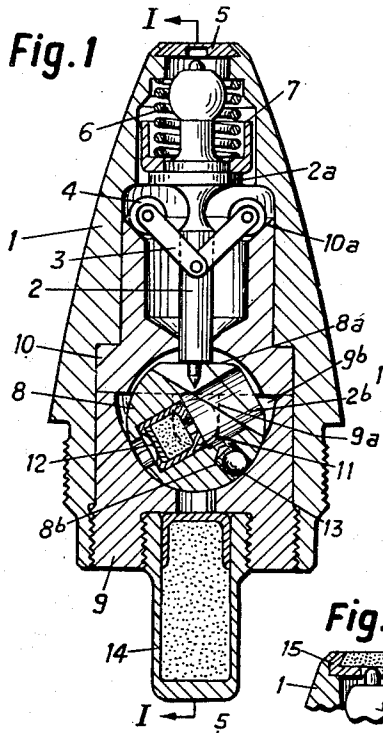


Fig. 2

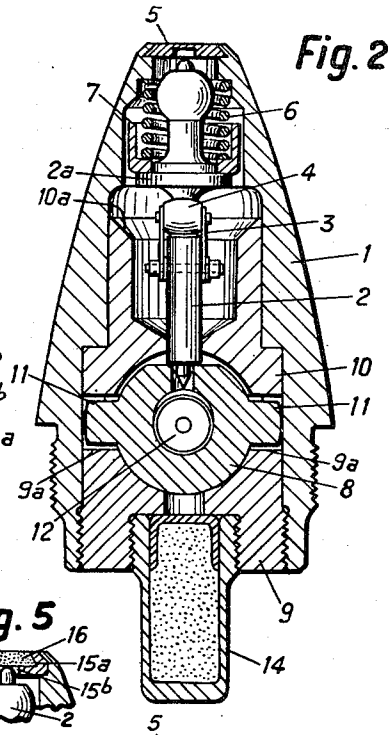


Fig. 5



Fig. 3

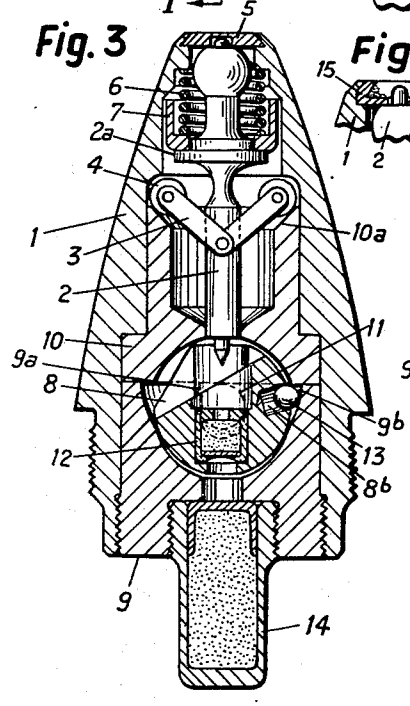


Fig. 6

Fig. 4

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Fig. 7

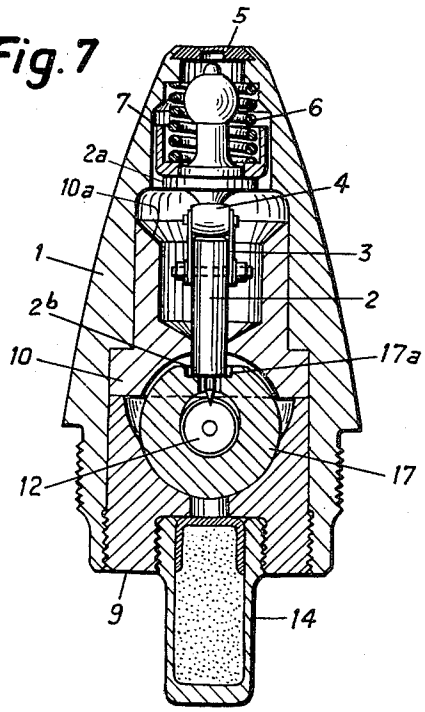
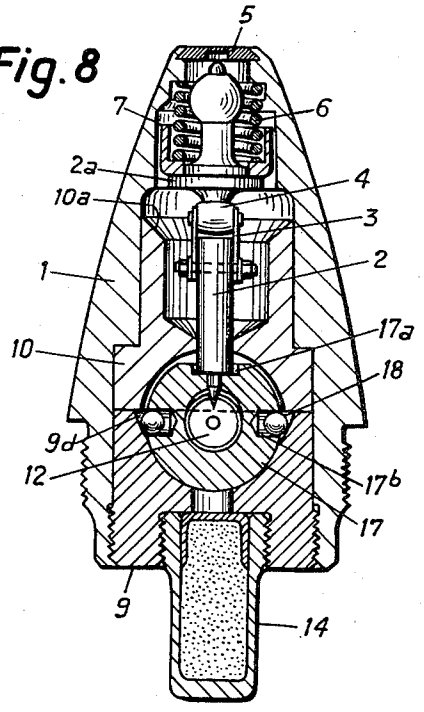


Fig. 8



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FUZE

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2 Claims. (Cl. 102—71)

The present invention relates to a fuze with a built-in self-destruction device, in which fuze the detonator containing the priming charge is so disposed in the transport position that it is unable to ignite the intensifying charge. This arrangement has the advantage that self-ignition of the priming charge, such as may occasionally occur in storage, or in the gun barrel when firing, will not be transmitted to the high-explosive charge of the shell.

The fuze in accordance with the invention consists of a casing, a spring-loaded percussion pin or striker mounted therein for longitudinal displacement and carrying two flyweights arranged on swivelling arms and able to bear against an oblique surface of the casing under the influence of centrifugal force, an intensifying or amplifying charge arranged at the rear end of the casing, and a member disposed between the percussion pin or striker and the intensifying charge and capable of rotation about an axis perpendicular to the axis of the striker, said member having a bore containing a detonator which can be rotated into the path of the striker and which, in this position, communicates with the intensifying charge through a bore in the casing, and said fuze is characterized by the fact that the rotatable member is provided with a recess or cavity against which the striker abuts in the transport position in such a way that the striker locks the member before and during firing, in a position in which the detonator is swivelled out of the path of the striker and in which also the bore between the rotatable member and the intensifying charge is closed by the said member.

In the accompanying drawing, several embodiments of the fuze in accordance with the invention are depicted.

In the drawing:

Figure 1 is a longitudinal sectional view of a first embodiment of the fuze, in transport position;

Figure 2 is a longitudinal sectional view of the fuze in transport position, taken along the line I—I in Figure 1;

Figure 3 is a longitudinal sectional view of the fuze in the armed condition;

Figure 4 is a longitudinal sectional view of the fuze in the detonating position;

Figure 5 is a fragmentary sectional view of the fuze in a second embodiment, in transport position;

Figure 6 is a fragmentary sectional view of the second embodiment in the armed condition;

Figure 7 is a longitudinal sectional view of a further embodiment of the fuze;

Figure 8 is a longitudinal sectional view of a further embodiment of the fuze.

In the embodiment depicted in Figures 1 to 4, the numeral **1** designates the fuze casing, which is screwed on to the body of the projectile and is closed at its forward end by a plate **5**. Disposed in the longitudinal axis of the fuze is the percussion pin or striker **2** to which the swivelling arms **3** with the roller-shaped flyweights **4** are attached. The striker **2** is acted upon by the spring **6**. The latter abuts at one end against a shoulder of the

fuze casing **1** and at the other end through a bushing **7** against a collar **2***a* of the striker **2**, and tends to force the striker to the rear.

The movement of the striker to the rear is prevented in the transport position by the spherical member **8**, which is disposed in a spherical mount or socket constituted by the parts **9** and **10**. The spherical member **8** is provided, on an axis perpendicular to the axis of the fuze, with two cylindrical trunnions or journals **11** which are guided in a slot **9***a* of the part **9**. The spherical member **8** is therefore rotatable only about the said axis. Disposed in a bore in the member **8** is the detonator **12**. In the transport position the member **8** is so rotated that the striker **2** cannot pierce the detonator **12**. In this position the shoulder **2***b* of the striker is forced by the spring **6** against the flattened area **8***a* of the surface of the member **8**, thereby preventing the latter from rotating.

When the projectile is fired, the flyweights bear against an oblique surface **10***a* of the member **10** and, by one component of their centrifugal force, draw the striker forward against the pressure of the spring **6**. As a result, the striker or percussion pin is lifted from the flat **8***a* on the member **8** and the latter rotates under the action of the centrifugal forces until its bore lies coaxial with the striker pin **2**. In this position the member **8** is held by the ball **13**, which, accommodated in the short bore **8***b*, emerges into the recess **9***b* of part **9** on the rotation of the member **8** and abuts against the lower edge of the part **10**.

In this armed position, shown in Figure 3, the striker is able to pierce the detonator, the detonation of which is transmitted by the intensifying charge **14** to the high-explosive charge of the projectile.

The spherical member **8** has a certain amount of play in its mount or bearing so that it can perform a short movement in the axial direction of the fuze. The length of the slot **9***a* in this latter direction is so proportioned that the member **8**, in its rearmost position, lies flush against the bearing surface by its entire surface, whilst the journals or trunnions **11** have a clearance in the axial direction of the fuze in the slot **9***a*. In the forward position of the member **8**, the trunnions **11** abut against the under edge of the member **10**, whilst the surface of the member **8** in not in contact with the surface of the spherical socket.

The following is the manner in which the fuze functions:

In the transport position (Figure 1), the spherical member **8** is so turned that the striker **2** cannot pierce the detonator **12** and at the same time the communication between the detonator **12** and the intensifying charge **14** is blocked. This blockage has the result that in the event of spontaneous ignition of the primer composition of the detonator **12** during storage or during transport, the intensifying charge **14** is not detonated. The rotor **8** is held in the transport position by the striker **2**, the latter being forced against the flat **8***a* by the pressure of the spring.

When the projectile is fired, its acceleration forces the striker pin **2** and the spherical member **8** to the rear. As a result, the striker is pressed firmly against the flat **8***a* of the body **8**. Moreover, the friction of member **8**, which member is firmly pressed by the acceleration force into the spherical socket, opposes the rotation of said member. Only when the projectile has left the gun barrel do the flyweights **10***a*, which bear against the oblique surface **10***a*, draw the striker pin, by a component of their centrifugal force, so far forward against the pressure of the spring **6** that the striker pin abuts against the plate **5**. As a result, the member **8** is liberated and rotates under

the action of the centrifugal force until the ball **13** disposed in the bore **8***b*, which ball **13** is likewise caused by the centrifugal force to slide outwards into the recess **9***b* of the member **9**, encounters the under edge of the member **10**. In this position the bore of the member **8** is coaxial with the striker pin and the communicating bore to the intensifying charge is liberated. The fuze is now armed (Figure 3). This arming of the fuze cannot occur until the projectile has emerged from the gun barrel.

Owing to the friction of the air, the rotary speed of the projectile progressively diminishes. As a result, the centrifugal force of the flyweights becomes steadily less until the moment finally arrives when the axial component of the centrifugal force becomes smaller than the force of the spring **6**, whereupon the flyweights **4** slide off the surface **10***a* and the striker pin **2** is driven by the spring **6** into the detonator and provokes self-destruction of the shell (Figure 4). If the projectile strikes a target, the forward part of the fuze is compressed and the striker pin **2** is driven into the detonator **12**.

In the embodiment shown in Figures 5 and 6 the fuze is not armed until the projectile has travelled a certain distance after leaving the muzzle of the gun. To achieve this end, the plate **5** of the embodiment previously described is replaced by a rolled-in plate **15**. In a cavity **15***a* in the plate **15** is a compound **16** melting at low temperatures, for example at temperatures below 150° centigrade. The striker pin **2** abuts firmly against the compound **16** through a hole **15***b* in the plate **15** and cannot be drawn forward by the flyweights so long as the compound **16** is in position.

The manner in which the device functions is as follows:

As in the embodiment previously described, when the projectile is fired the striker pin **2** and the spherical member **8** are forced to the rear by the forces of acceleration, with the result that the member **8** cannot rotate. When the projectile has left the gun barrel, the flyweights tend to draw the striker pin forward by one component of their centrifugal force, and thereby to accomplish the liberation of the spherical member. The striker pin **2**, however, bears by its forward part against the compound **16** and is thereby prevented from performing such a movement. When a certain time has elapsed, the compound **16**, which is made of material of low melting point, melts. The striker pin can now move forward and reach its armed position in accordance with Figure 3, whereby the spherical member **8** is liberated. For the rest, the function of the fuze is the same as described in reference to the preceding embodiment.

In the embodiment shown in Figure 7, the rotatable member, designated by the numeral **17**, has no trunnions, but rises solely under the influence of its centrifugal force. The striker pin **2** blocks the rotatable member **17** by engaging, by its shoulder **26**, in a cylindrical depression **17***a* in the rotary member **17**. As a result, when the projectile is fired the rotatable member **17** cannot rotate and arm the fuze until the flyweights **4** have drawn the striker pin **2** forward by one component of their centrifugal force. If, owing to erosion of the gun barrel, the rotary speed at which self-destruction occurs is not achieved when the projectile is fired, the fuze remains unarmed. For the rest, the manner in which the fuze functions is the same as described in reference to the preceding embodiments.

It is also possible to make the depression **17***a* with tapered sides, in which event, by suitably selecting the angle of taper of the wall of the tapered depression, the arming response limit can be fixed as desired.

In the embodiment shown in Figure 8, the rotatable member **17** has two short, coaxially aligned bores **17***b* located in the pivotal axis of the member **17**. Accommodated in the bore **17***b* are balls **18** which, after the firing of the projectile, move outwards under the action of the centrifugal force, bear against the surface **9***d*, and thereby serve as bearings for the body **17** during its rotation.

The embodiments described are, needless to say, only a few of numerous possibilities of implementing the inventive idea.

What we claim is:

1. In a projectile, a casing having a passage formed therein and extending from front to rear along a longitudinal axis, a rotor pivoted in said casing behind said passage for rotation about a transverse axis extending at right angles to said longitudinal axis, said rotor being rotated about said transverse axis by centrifugal forces produced when said projectile is rotated about said longitudinal axis, a striker pin movably mounted in said passage, resilient means located in said casing and engaging said striker pin to hold it in engagement with said rotor in the transport position and thereby secure the rotor against rotation, pin-retaining means located in front of said casing and comprising a compound closing the front of said passage and melting by heat developed by the firing of the projectile, said pin-retaining means preventing the pin from shifting out of its transport position prior to firing, and means actuated by centrifugal forces and connected with said striker pin for moving said striker pin out of engagement with said rotor when the projectile is rotated about the longitudinal axis and after the melting of said compound, said pin-retaining means further comprising an abutting surface for the striker pin to prevent the striker pin from moving beyond the armed position after the melting of the compound.

2. A projectile in accordance with claim 1, wherein said casing comprises a seat at the rear of said passage, whereby a rotation of said rotor is normally prevented by frictional engagement of said rotor with said seat, said casing further having formed therein slots extending on opposite sides of said rotor, and journals connected with said rotor and extending in the direction of said transverse axis, said journals projecting into said slots and forming with said slots bearings for holding the rotor with play in the direction of said longitudinal axis.

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