Nov. 7, 1961 H. KIPFER 3,007,412

PROJECTILE FUZE

Filed Sept. 8, 1958

Fig. 1

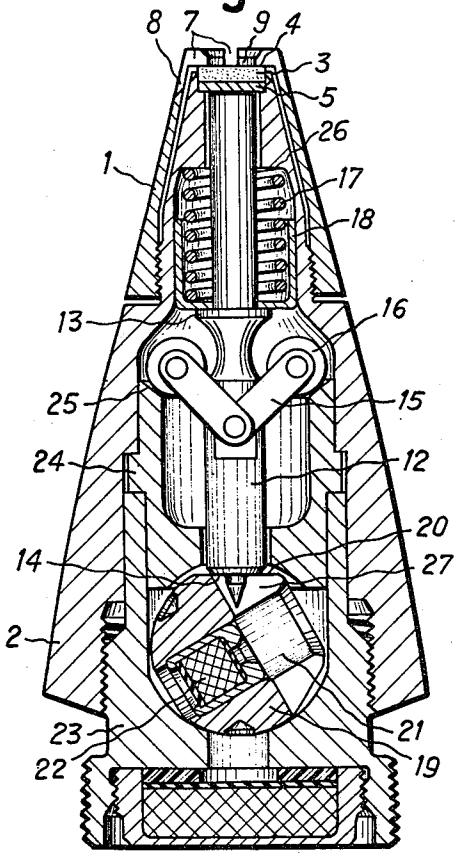


Fig. 4

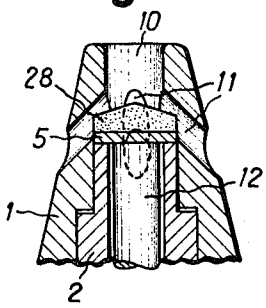


Fig. 5

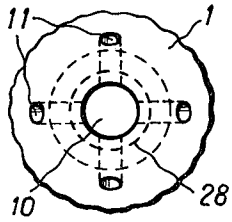


Fig. 2

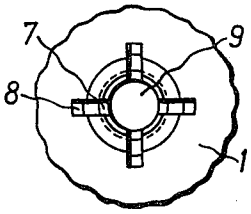
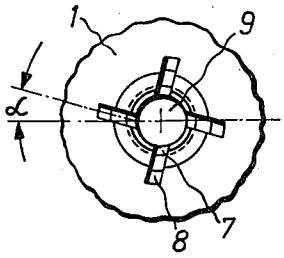


Fig. 3



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PROJECTILE FUZE

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4 Claims. (Cl. 102—71)

The present invention relates to a projectile fuze the striker pin of which is locked in a safe position by a fusible body sunk into the tip of the fuze with its frontal face exposed to the relative airflow, whereby the heat produced by damming up this airflow at the frontal face fuses the said body after a certain safety distance of the projectile from the muzzle of the weapon from which it has been fired, whereby the said striker pin is released and the fuze is armed.

In the known fuzes of this kind the said fusible body has the form of a disc-shaped pill and except on its frontal face is completely enclosed in the tip of the fuze which has a smooth circumference. Experience has shown that with this arrangement the said safety distance varies within wide limits depending on the temperature of the projectile and of the ambient atmosphere.

It is a main object of the present invention to provide a projectile fuze of the kind referred to wherein the said safety distance is kept within narrow limits, regardless of these variations of temperature.

It is another object of the present invention to allow the use of a metal or alloy for the said fusible body of a higher melting point than hitherto possible, this higher melting point contributing to the safety of handling the ammunition provided with said fuze.

It is yet another object of the present invention to allow the use of a projectile fuze of the kind referred to on projectiles having comparatively low muzzle velocities and accordingly low temperatures arising from the damming of the airflow.

With these and other objects in view which will become apparent later from this specification, I provide a projectile fuze having a convergent tip with a central bore in it and comprising in combination: a fuze casing, a cap screwed to the said fuze casing, a striker pin arranged co-axially with the said central bore, a fusible body arranged in the said tip between the frontal end face of the said striker pin and the inner end face of the said cap, the said fusible body having its frontal end face exposed by the said central bore to the air dammed-up in flight at the said tip and in the solid condition restraining the said striker pin from moving axially forward, and when fused by the heat of the said air releasing the said striker pin, air ducts being provided in the said tip conducting air from the said central bore past over the said fusible body in an aft direction.

The heating effect on the said fusible body by the air flowing over it from the said central bore has been found superior to that hitherto attained and greater uniformity of the said safety distance regardless of temperatures has been attained. The other objects of the invention, namely the use of a higher melting point alloy for the fusible body, and the use of the fuze with projectiles having comparatively low muzzle velocities have also been attained.

In order that the invention may be clearly understood and readily carried into effect, some embodiments thereof will now be described by way of example with reference to the accompanying drawings, from which further preferred features of the invention will become apparent.

In the drawings:

FIG. 1 is a longitudinal section of a projectile fuze having a first embodiment of the tip of the fuze.

FIGS. 2 and 3 are plan views of fuze tips corresponding to FIG. 1.

FIG. 4 is a longitudinal section of a second embodiment of the tip of the fuze.

FIG. 5 is a plan view of the embodiment according to FIG. 4.

In the fuze illustrated in FIG. 1 the fuze casing is denoted 2. In the longitudinal axis of the fuze the striker pin 12 is arranged, on which swivel arms 15 with roller-shaped flyweights 16 are articulated. The striker pin is subject to the action of the spring 17. This spring bears at the front on the face 26 of the fuze casing 2, and at the rear through a sleeve 18 on the collar 13 of the striker pin 12, and tends to force the latter rearward. The spring 17 and the swivel arms 15 with the flyweights 16 form the mechanism for the self-destruction on the projectile. Any rearward displacing of the striker pin in the transport position illustrated is prevented by the spherical rotor 19, which is rotatably arranged in a bearing formed by the components 23 and 24. In a bore 21 of the rotor 19 the detonator 22 is inserted which contains the initial charge. In the transport position the rotor 19 is turned in such a manner that the striker pin 12 cannot penetrate into the detonator 22. Under the bias of the spring 17 the striker pin 12 abuts in this position with its shoulder 14 on the face 20 of the rotor and prevents thereby the same from turning. The point of the striker pin extends in this position into the slot 27 of the rotor 19.

The tip of the casing of the fuze is formed by the cap 1 screwed to the fuze body 2. The fusible body 3, consisting of an alloy melting at a low temperature is forced by the face 4 of the cap 1 against a support 5 resting on the body 2 of the fuze which prevents the fused material from being forced by the air pressure into the interior of the fuze. The cap 1 is provided with a central bore 9 going right through to the fusible pill 3. In the transport position the striker pin 12 abuts with its flattened end the rear end face of the said support 5.

The forward surround of the fusible pill formed by the cap of the fuze is slotted in front and laterally, so that the fusible pill is laid bare there. These slots 7 form ducts with grooves 8 continuing them rearwardly, through which the air can flow off to the rear over the forward edge of the fusible pill. These grooves are so deep that their bottom, which includes an angle with the longitudinal axis of the fuze, exceeding half the aperture angle of the tip of the fuze, reaches into the immediate vicinity of the edge of the rear end face of the fusible pill. According to FIG. 2 the planes of symmetry of the air ducts indicated constitute also planes of symmetry of the fuze.

By the arrangement of the air ducts according to FIGS. 1 and 2 the air drag acting on the projectile is increased by a certain amount, and thereby the flight periods of the projectile over certain distances become somewhat longer. This increase of the flight periods may be minimised in that the longitudinal middle planes of said slots intersect the central bore 9 of the cap 1 on a generatrix thereof and include an angle α with a radial plane containing said generatrix, which does not exceed the final rifling angle of the barrel of the weapon from which the projectile provided with this fuze is fired.

This arrangement, which is slightly less favourable as regards production, is shown in FIG. 3.

FIG. 4 shows a further embodiment of the invention by way of example. The fusible body 28 is sunk deeper into the cap 1, and the central bore 10 is longer. Thereby the fusible body is better protected from being damaged than in the embodiment according to FIGS. 1 to 3. The air ducts for discharging the air dammed up in the bore 10 are designed as bores 11, the axes of which intersect the axis of the fuze and include an acute angle therewith. The bores 11 are so placed, that the fusible

body, as shown in FIG. 4, projects into the clear thereof, and is exposed at its upper edge to the flow of the emerging air. The fusible body may be provided with an obtuse conical point for improving the flow conditions.

The number of the bores **11**, which are preferably arranged at uniform intervals from each other, depends on the permissible difference of the safety distances ahead of the muzzle at high and low temperatures. This difference becomes the smaller, the higher the number of these ducts.

The arming of the said fuze when screwed on to a projectile to be fired from a rifled bore is effected, in that the flyweights **16** abutting the conical face **25** of the component **24** pull the striker pin **12** forward after the fusion of the pill **3**, i.e. after the projectile has left the barrel and at a certain distance from the muzzle thereof, until the forward end face of the base **5** partaking in the movement of the striker pin **12** abuts the face **4** of the cap **1**. By this forward arming movement of the striker pin its shoulder **14** is lifted off the rotor **19** so far that the same can erect itself under the action of centrifugal force whereby the axis of the bore **21** containing the detonator **22** is made to coincide with the longitudinal axis of the fuze and the detonator can be ignited by the striker pin.

While I have herein described and illustrated in the accompanying drawings what may be considered typical and particularly useful embodiments of my said invention I wish it to be understood that I do not limit myself to the particular details and dimensions described and illustrated; for obvious modifications will occur to a person skilled in the art.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a projectile fuze comprising a fuze casing provided with a central bore; a substantially flat fusible body located in front of said casing closing said central bore and having an outer rim; a conical cap fixed to said fuze

casing enclosing said fusible body and resting on the rim of said fusible body, said cap being provided with a front face and a conical outer surface extending rearwardly from said front face along said bore, said cap being further provided with a cavity extending rearwards from said front face, said fusible body being spaced from said front face and limiting the depth of said cavity, said cavity in flight damming up the air flowing against the fuze, said cap being further provided with open air ducts leading from said cavity to said conical outer surface to generate a flow of air from said cavity to said conical outer surface and said outer rim extending partly into said air ducts.

2. In a projectile fuze as claimed in claim 1 wherein said air ducts are formed by slots extending axially in said cap where it surrounds said fusible body.

3. In a projectile fuze as claimed in claim 1 wherein said air ducts are formed by slots extending axially in said cap where it surrounds said fusible body, the longitudinal middle plane of each of said slots intersecting a generatrix of a central bore of said cap, and making an angle with a radial plane containing said generatrix.

4. In a projectile fuze as claimed in claim 1, wherein said air ducts are formed by bores in said cap connecting said cavity ahead of said fusible body with the circumference of said cap behind said fusible body.

References Cited in the file of this patent

UNITED STATES PATENTS

2,270,342	Remondy	Jan. 20, 1942
2,420,612	Nichols	May 13, 1947
2,513,185	Lauritsen	June 27, 1950
2,596,171	Rabinow	May 13, 1952
2,777,392	Laakso	Jan. 15, 1957
2,782,717	Burri	Feb. 26, 1957
2,850,978	Franklin	Sept. 9, 1958