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CENTRIFUGALLY ARMED AND SELF-DESTROYING IMPACT FUZE

Original Filed Sept. 21, 1955

Fig. 1.

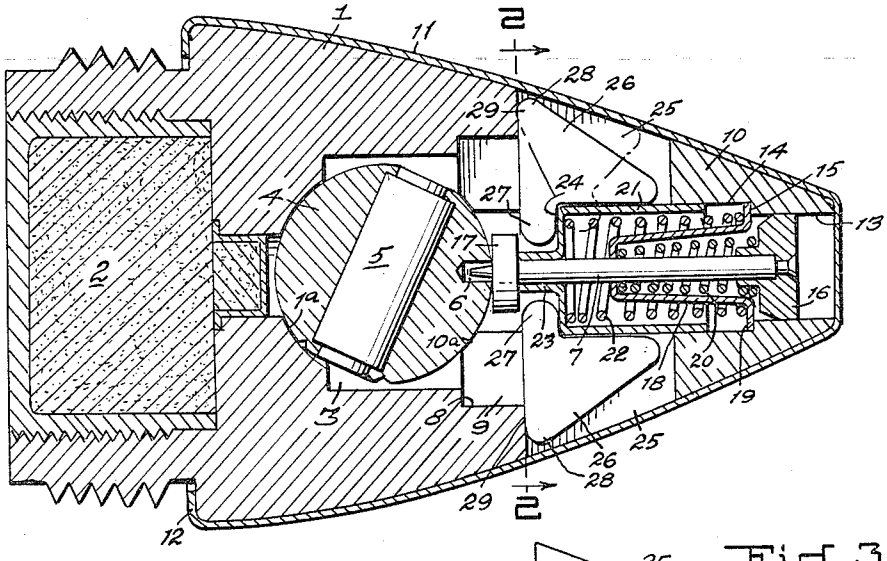


Fig. 3.

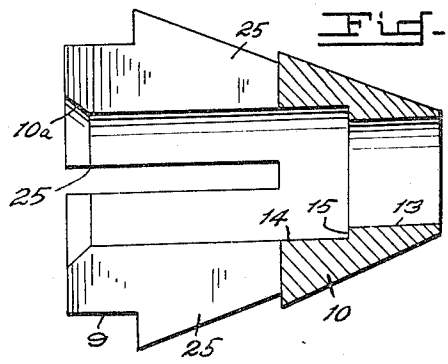


Fig. 2.

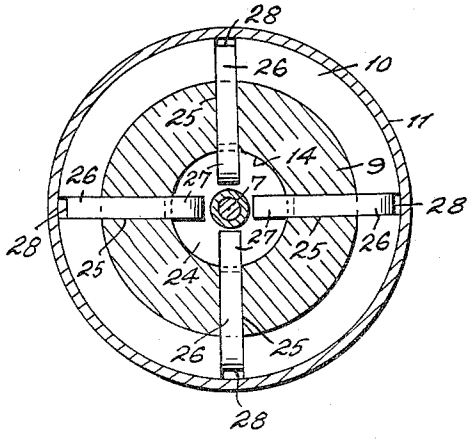
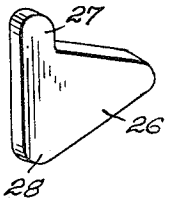


Fig. 4.



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CENTRIFUGALLY ARMED AND SELF-DESTROYING IMPACT FUZE

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Original application Sept. 21, 1955, Ser. No. 535,773, now Patent No. 2,924,176, dated Feb. 9, 1960. Divided and this application Sept. 14, 1959, Ser. No. 845,049

2 Claims. (Cl. 102—71)

This application is a division of application Serial Number 535,773, filed September 21, 1955, and now Patent Number 2,924,176.

This invention relates to fuzes for spin type projectiles.

An object of the invention is to provide a fuze which is positively held in unarmed position until it develops sufficient spin in flight to move weighted detents, under the influence of centrifugal force, to a position whereby a firing pin is caused to move from unarmed to armed position by movement of the detents.

Another object of the invention is to provide a fuze having a nose cap of frangible material insuring rapid detonation thereof on impact with a target constructed of easily penetrated materials.

A further object of the invention is to provide a fuze which will detonate on decay of spin if the projectile penetrates a target without detonation on impact therewith.

Other objects and advantages will be apparent from the following detailed description and the accompanying drawings in which:

Fig. 1 is a longitudinal sectional view of a fuze disclosing one form of the invention.

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1 and looking in the direction of the arrows,

Fig. 3 is a longitudinal sectional view of the nose cap insert shown in Fig. 1, and

Fig. 4 is a detail perspective of one of the detents shown in Fig. 1.

Referring now to Figs. 1 through 4 of the drawings. The fuze is formed with a body portion **1** rotatable about a longitudinal axis and carrying a booster charge **2**. The body portion has an internal cavity **3** in which a generally spherical rotor **4** is movable from a safe to an armed position under the influence of centrifugal force. The rotor has a primer charge **5** fixed within a diametral bore therein and a recess **6** formed in its surface as will be clear from Fig. 1. A firing pin **7** is slidable in coaxial alignment with the axis of the fuze body and engages in the recess **6** to maintain the fuze unarmed by holding the primer charge **5** out of alignment with the firing pin **7** and booster charge **2**. In its forward face the body portion **1** is formed with a bore **8** in which is seated the diametrically reduced end **9**, of an insert **10**, for limiting the rotor **4** to rotation only in the cavity **3**. For this purpose it will be noted that body **1** and insert **10** have cooperating recesses **1***a* and **10***a*, respectively, fitting smoothly about the corresponding surfaces of the rotor. A nose cap **11** of thin material envelops the insert **10** and the forward part of the fuze body **1** and is secured thereto as at **12** by any suitable means such as rolling. The insert is formed with an axial bore **13** and a coaxial counterbore **14** providing a shoulder **15** at their juncture. A head **16** is secured on the forward end of the firing pin **7** and slides in the bore **13** to guide the forward end of the firing pin in axial translation. An annular enlargement **17**

forming a shoulder is formed on the firing pin near its rear end. A generally, hollow, frusto-conical first spring housing **18** surrounds the firing pin **7** and has formed thereon a base flange **19** seated against the shoulder **15**. As clearly shown upon Fig. 1, this housing extends rearwardly into counterbore **14**. A first spring **20**, within the first spring housing **18** and surrounding the firing pin **7**, is confined between the closed end of the housing **18** and the firing pin head **16** for normally urging the firing pin forwardly. Surrounding the first spring housing **18** and slidable in the counterbore **14** is a second spring housing **21** shown as generally cylindrical in form and enclosing a second spring **22**. The second spring housing is diametrically reduced at its rear end as at **23**, to engage the annular enlargement **17** on the firing pin **7** and houses the second spring **22** bearing at its forward and rearward ends upon flange **19** and reduced end **23** of the second housing, respectively. The second spring **22** is of greater strength than spring **20** so that the parts are normally maintained in the position shown upon Fig. 1, with the tip of firing pin **7** seated in recess **6** of rotor **4**. It will be noted that the enlargement **17** on the rear end of the firing pin, in conjunction with the reduced end and neck portion of housing **21**, define an annular recess.

The insert **10** is formed with longitudinal slots **25** shown as four in number and uniformly spaced around the circumference thereof, Figs. 2 and 3. A detent **26** is positioned in each slot and is dimensioned to have a smooth fit therein. The detents are alike and shaped as clearly shown in Fig. 4, to provide finger **27** which contact with an abutment **24** on the second spring housing **21**. Each detent is confined for movement within its respective slot **25** by the side wall of the nose cap **11** and the front face **29** of the body portion **1**, and is formed with a pointed end **28** about which the detent is outwardly pivotable under the influence of spin to the dotted line position shown upon Fig. 1. In this form of the invention all four detents constantly engage the abutment **24**.

The operation of the device shown in Figs. 1 through 4 is as follows:

When a projectile, to which the fuze is attached, rotates in flight the detents **26** move outwardly in response to centrifugal force. The mass center of each detent is well forward of its pivot point **28**. Consequently each detent will move powerfully outwardly to the dotted line position, Fig. 1. During this movement the fingers **27** bear against the annular abutment **24** and move the second spring housing **21** forwardly compressing the second spring **22** and freeing the firing pin **14** for forward movement under the bias of the first spring **20** to armed position. When the rear end of the firing pin is withdrawn from the recess **6** in the rotor **4**, the rotor precesses in response to spin of the projectile until the primer **5** is coaxially aligned with the firing pin in fully armed position. If a hit is made on a target the forward end of the nose cap **11** and insert **10** will be deformed and the firing pin will be forced into the primer **5**. In the event that the target is too frail to deform the nose cap and insert, and the projectile continues beyond the target, eventual decay of spin will correspondingly lessen forward thrust of the detent fingers **27**. In such an event the spring **22** will overcome the lessened thrust of the detent fingers and the bias of spring **20**, and will drive the second sleeve **21** and its reduced end **23** against the shoulder formed by the enlargement **17** on the firing pin and detonate the primer charge **5**.

Having now fully disclosed the invention, what we claim and desire to secure by Letters Patent is:

1. In an impact detonated fuze having a rotatable body portion, a nose cap secured on the front end thereof, an insert in said nose cap, a centrifugally operated rotor having an ignition charge and a recess therein and being mov-

able from a safe to an armed position, an axially disposed firing pin having a front and rear end and being slidable in said insert said firing pin having its rear end engaged in the recess, said firing pin being formed with an annular shoulder, a first spring surrounding said firing pin for urging said firing pin to armed position, a sleeve slidable in said insert and surrounding said firing pin, said sleeve being formed with an annular abutment and a diametrically reduced portion in contact with the annular firing pin shoulder, a second spring in said sleeve adapted for maintaining said first spring under compression and retaining said firing pin in engagement with the recess, and a plurality of centrifugally operated cam levers, each pivotable at one end thereof on said body portion and having the other end in engagement with the annular abutment of said sleeve, said levers each having the center of mass thereof forwardly disposed in relationship to the pivot end thereof, whereby under the influence of spin said levers will retract said firing pin to an armed position against the bias of said second spring.

2. In an impact detonated fuze having a rotating portion, a nose cap secured on the front end thereof and having an insert therein, a centrifugally operated rotor having an ignition charge and a recess therein and being movable from a safe to an armed position, an axially disposed firing pin having one end engaged in the recess and having an enlargement thereon forming a

shoulder near said one end and a head secured to its other end and slidable in said nose cap insert, a first spring housing surrounding said firing pin, a first spring for normally urging said firing pin forwardly, a second spring housing slidable in the insert and having a diametrically reduced rear end engaging the firing pin shoulder and forming an abutment, a second spring within said second spring housing for normally urging said firing pin rearwardly against the bias of said first spring, and a plurality of centrifugally operated cam levers each pivotable at one end on said body portion and having the other end thereof in engagement with the annular abutment of said sleeve, and said levers each having the center of mass thereof forwardly disposed in relationship to the pivot end thereof, whereby under the influence of spin said levers will retract said firing pin to armed position against the bias of said second spring.

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