

May 29, 1951

R. D. MILLER

2,554,586

DETENT

Filed Sept. 11, 1943

2 Sheets-Sheet 1

FIG. 1

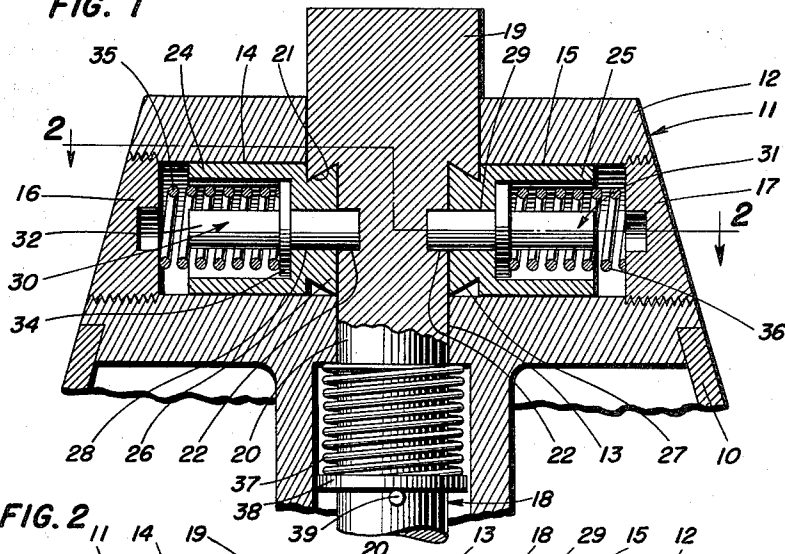


FIG. 2

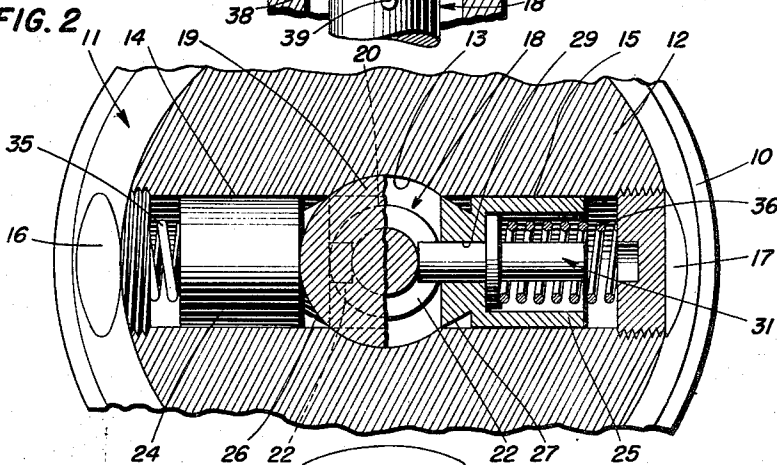
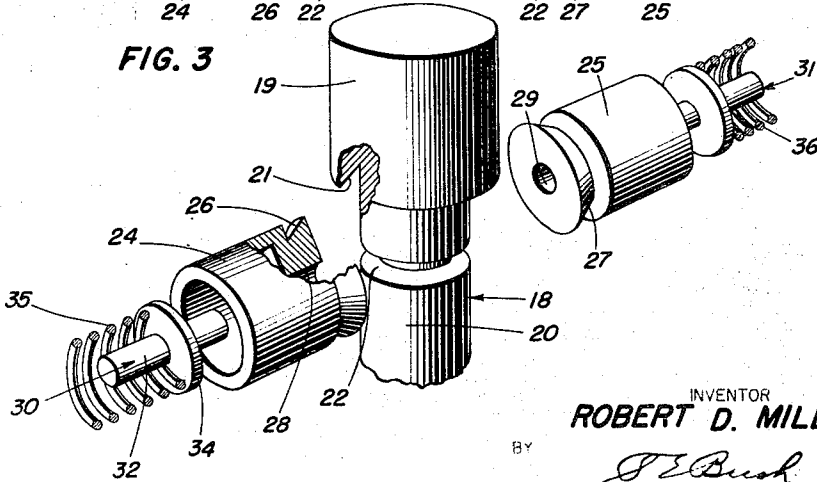


FIG. 3



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FIG. 4

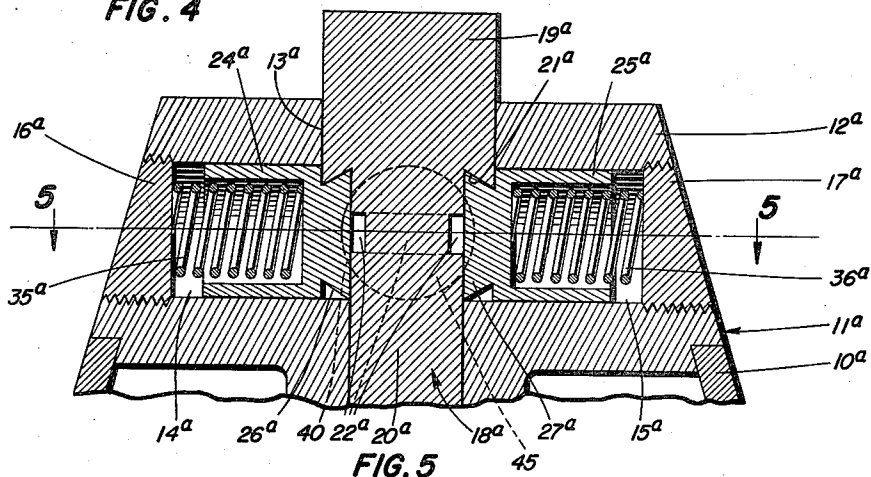
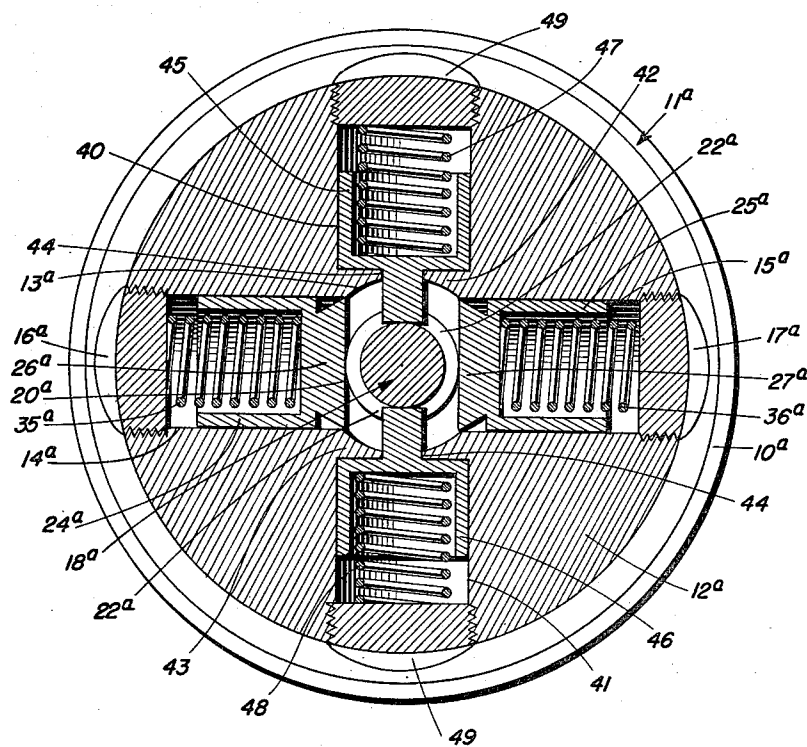


FIG. 5



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DETENT

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5 Claims. (Cl. 102—79)

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This invention relates to detents for fuzes and more particularly to a novel detent designed for use in a projectile fuze of the contact type having an axially movable firing pin, the detent serving to prevent unintended movement of the firing pin.

Projectile fuzes of the contact type have a firing pin which, because of its vulnerable location, is susceptible to an accidental blow capable of exploding the detonator. The possibility of accidental explosion in this manner is prevented by the present invention, one of the objects of which is to provide a detent wherein means are employed for preventing a premature shifting movement of the firing pin, regardless of whether an axial or lateral force is applied to the pin.

Another object of the invention is to provide a detent employing dual locking means for assuring that the firing pin of the projectile will be maintained in a safe position until the projectile has been fired from the gun.

Another object of the invention is to provide a detent means having an interlock between the detent element and the firing pin, and the usual latching element and the firing pin, whereby the detent element is held in locking engagement with the firing pin by the latching element, which also is in engagement with the firing pin.

Another object of the invention is to provide a firing pin locking means having components which move in sequential order when acted upon by the proper forces.

Still another object of the invention is to provide a device of this character which is simple in construction, and which will be highly efficient in operation.

Other objects and many of the attendant advantages of this invention will be appreciated readily as the same becomes understood by reference to the following detailed description, when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a fragmentary longitudinal sectional view of one embodiment of the invention;

Fig. 2 is a fragmentary transverse section taken on line 2—2 of Fig. 1;

Fig. 3 is an exploded view in perspective of the interlocking parts of the invention;

Fig. 4 is a fragmentary longitudinal sectional view showing a modified embodiment, and

Fig. 5 is a transverse section taken on line 5—5 of Fig. 4.

Reference is first made to Figs. 1 and 2 of the accompanying drawings, wherein the numeral 10 indicates generally a portion of a shell casing having mounted in its forward end a contact fuze 11.

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The fuze comprises a body 12 having an axial, plural-diametered passage or bore 13. Communicating with and at right angles to the bore 13 are radial cylindrical bores 14 and 15, the outer ends of which are closed by threaded plugs 16 and 17, respectively.

Slidably mounted within the bore 13 is a firing pin 18, the pin having a relatively large upper portion or head 19 occupying the largest-diameter part of the bore and extending therefrom beyond the forward end of the fuze body. The head of the firing pin has an undercut shoulder 21 disposed above the shank 20 of the pin and designed to receive portions of detents to be described hereinafter.

In the shank 20 near the shoulder 21 is an annular groove 22 which is designed to confront, respectively, the bores 14 and 15 of the body 12.

Slidably mounted within the bores 14 and 15 are detent elements 24 and 25, respectively. These elements are generally cylindrical in shape and terminate at their inner ends in substantially frusto-conical detent portions 26 and 27, respectively, the enlarged ends of which are disposed adjacent the shank 20 of the firing pin. The detents 26 and 27 normally engage beneath the undercut shoulder 21 of the firing pin 18 to prevent premature inward displacement of the pin. In the inner end portions of the detent elements 24 and 25 are axial bores 28 and 29 which receive latch elements 30 and 31, respectively.

A typical latch element is shown at 30 and includes a shank 32 having intermediate its ends an external flange 34, which forms a stop for limiting the inward movement of the latch element under the influence of a compression spring 35, the inner end of which abuts the outer face of the flange. The outer end of the spring 35 abuts the plug 16 and urges the latch 30 into locking engagement in the annular groove 22 of the firing pin 18, for aiding the detent portion 26 in retaining the firing pin against inward displacement. It will be noted that the latch elements 30 and 31 are of identical construction and perform the same function.

Seated in a recess in the inner end portion of the body 12 and surrounding the firing pin 18 is a compression spring 37, the outer end of the spring engaging the body 12 and the inner end resting against a ring 38 secured to the firing pin, as shown at 39. The purpose of the spring 37 is to urge the firing pin inwardly, as will be explained presently.

The operation of this embodiment of the invention will now be described. In the normal

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handling of a projectile employing the new detent, the firing pin is held against inward displacement by engagement of the detent portions 26 and 27 with the shoulder 21 of the firing pin. In this connection, it is desired to point out that two of the detents are arranged in opposed relation to insure that the firing pin will be limited against displacement should it be subjected to a severe lateral force. When the projectile is fired from the gun, the centrifugal force due to rotation of the projectile will first shift the latch elements 30 and 31 outwardly against the action of the springs 35 and 36, thereby disengaging the shanks 32 and 33 from the firing pin 18. Concurrently, the detent portions 26 and 27 will move outwardly under centrifugal force, the cam surfaces thereof slightly raising the firing pin against spring 37 until the detent portions have been displaced from the shoulder 21. Immediately upon release from the detent elements, the firing pin is shifted inwardly by action of the spring 37, but only a sufficient distance to prevent the detents from returning to locking position when the centrifugal force diminishes. This inward movement of the firing pin 18 by action of the spring 37 is limited by the engagement of the inner end of said firing pin with the outer surface of a detonator, not shown. It should be noted in this connection that spring 37 is sufficiently strong to move said firing pin to the aforesaid clearing position, but is not of sufficient strength to cause the firing pin to puncture the detonator. The firing pin is then ready for operation upon impact of the projectile with a target.

The modification shown in Figs. 4 and 5 is essentially the same as the principal form shown in Figs. 1 to 3, and its parts are designated by identical numerals, distinguished, however, by the exponent letter *a*. The detent elements 24*a* and 25*a* are the same in every respect as the detent elements 24 and 25 except that they do not contain the latch elements. Accordingly, their headed inner ends on which the detent portions 26*a*, 27*a* are formed are solid instead of having the bores 28 and 29.

Independent cylindrical bores 40 and 41 are formed in the fuze body 12*a* diametrically opposite each other, at right angles to the bores 14*a*, 15*a* and in the same transverse plane of the fuze. Walls 42 and 43 separate the bores 40, 41 from the bores 14*a*, 15*a*, but communication is had between the bores 40 and 41 through openings 44. Latch elements similar to the elements 30, 31 occupy these openings but instead of being long and solid, as shown in Figs. 1, 2 and 3, they are relatively short and are expanded into cups 45 and 46 which occupy the bores 40, 41. The cups 45 and 46 are urged against the walls 42 and 43 to hold the inner ends of the latch elements in an annular groove 22*a* in the firing pin 18*a*, by springs 47, 48 which at their inner ends abut the cups and at their outer ends abut plugs 49. These plugs, like the plugs 16*a*, 17*a*, provide cylinder closures.

The construction of Figs. 4 and 5 makes provision for the separate housing of the detent and latch elements, and instead of the detent elements providing inner abutments for the latch elements, as in Figs. 1 and 2, the function of limiting inward movement of the latch elements is transferred to the walls 42, 43.

The operation of the modification shown in Figs. 4 and 5 is substantially identical with that of the principal form, the latch and detent elements following the same sequence of movement

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under the influence of centrifugal force to release the firing pin.

Obviously many other modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination with a projectile fuze having a firing pin provided with a shoulder and a spaced groove, means for preventing premature shifting of the firing pin, comprising a detent element having a portion engageable with the shoulder of said firing pin, a latch element contained by the detent element and engaged in the groove, and a spring for urging both of said elements into operative position.

2. In a point contact fuze having a nose portion formed with a bore, and a firing pin mounted in the bore, said firing pin having a reduced portion defining a shank and an undercut shoulder, an annular groove in the shank, and cylinders in the nose portion communicating with the bore and normally confronting the annular groove, detent elements mounted in the cylinders and having generally frusto-conical portions normally engageable with the undercut shoulder for preventing inward displacement of the firing pin, latch elements having portions engageable in the annular groove for normally preventing outward displacement of the firing pin, whereby said detent portions are secured against disengagement from the undercut shoulder, and springs for urging the latch and detent elements into operative position, said latch and detent elements being shiftable by centrifugal force for freeing the firing pin.

3. In a projectile fuze having an axially movable firing pin, a detent unit comprising two concentrically mounted locking elements individually responsive to centrifugal force, and extending radially to said pin, resilient means urging both elements into engagement with said pin to hold the latter against axial movement, one of said elements having an enlarged end and the firing pin having an undercut portion interlocking with said enlarged end, whereby said element is capable of locking the firing pin against motion in only one direction, the other having an end of uniform diameter and the firing pin having a straight-sided groove wherein said end engages, thereby locking it against motion in either direction, whereby said pin can move only after centrifugal force releases said last named element and thereupon the other element.

4. In combination with a projectile fuze having an axially shiftable firing pin provided with an undercut circumferential shoulder, and also provided with a circumferential groove, a single unit for preventing premature shifting of the firing pin, said unit comprising a detent element having a portion initially interlocked with said firing pin under said shoulder and normally preventing inward movement of said firing pin to firing position, and means entering said groove and thus engaging the firing pin and cooperating with said detent element for normally preventing outward displacement of said firing pin, said detent element and said last mentioned means being shiftable by centrifugal force to clear the firing pin.

5. In combination with a projectile fuze having an axially shiftable firing pin provided with an undercut circumferential shoulder, and also

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provided with a circumferential groove near said shoulder, a safety unit for preventing premature shifting of the firing pin, said unit comprising a detent element having a tapered portion engageable under the shoulder and normally preventing movement of said firing pin to firing position, and means guided by said detent element and engaging in said groove of the firing pin and cooperating with said detent element for normally preventing displacement of said firing pin, said last mentioned means and said detent element being shiftable sequentially by centrifugal force to clear the firing pin.

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