

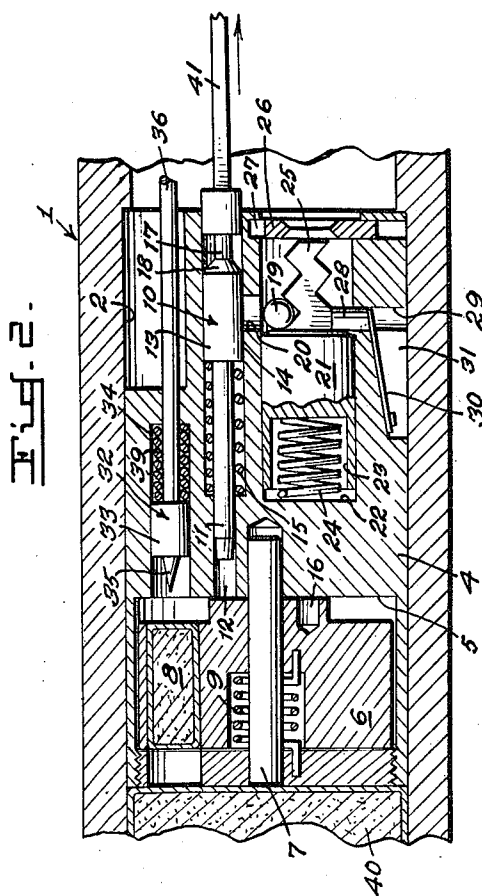
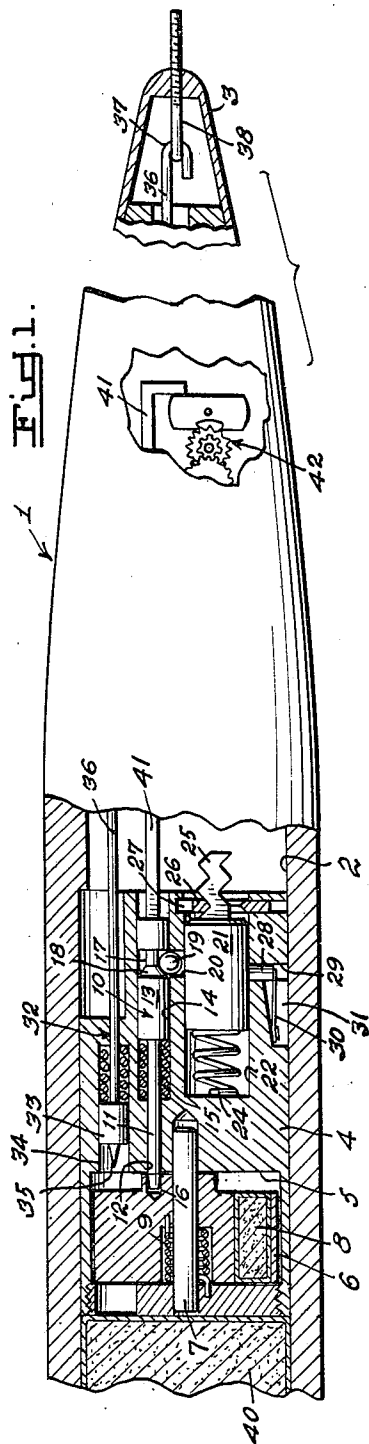
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FUZE ARMING AND SAFETY MECHANISM

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FUZE ARMING AND SAFETY MECHANISM

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2 Claims. (Cl. 102—78)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to us of any royalty thereon.

This invention relates to a fuze arming mechanism and more particularly to a mechanism in which the drop safe time delay prevents arming of the fuze when dropped in such a position as to place forces on the mechanism similar to the forces required to arm the mechanism under actual firing conditions.

The arming mechanism of the invention is especially adaptable for use with a point detonating fuze of the type disclosed in a co-pending application filed May 27, 1955, Serial No. 511,807, for Fuze Safety Device, now Patent No. 2,889,778 of June 9, 1959.

It is a primary object of the invention to prevent the arming of a fuze when accidentally dropped yet to arm the fuze after it has been launched.

It is another object to provide an arming mechanism adapted to prevent arming of a fuze during short periods of acceleration.

Another object is to provide an arming mechanism that is simple in design and reliable in operation.

A further object is to provide an arming mechanism for a fuze in which a spring biased detent piston is adapted to move rearwardly upon acceleration under the influence of a rack and pawl to free a detent ball for unlocking a spring biased pin which holds a detonator carrying a rotor and allow the rotor to rotate to an armed position to align the detonator with a firing pin.

A still further object is to provide a time delay mechanism adapted to arm the fuze upon normal launching acceleration but not upon short periods of acceleration due to dropping and similar mishandling.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing in which:

Figure 1 is an elevation, partly in section of a fuze and showing an arming mechanism constructed in accordance with the invention, the mechanism being illustrated in its unarmed condition, and,

Figure 2 is a fragmentary sectional view illustrating the mechanism in its armed condition.

Referring now to the drawing in which like numerals are used to designate like parts throughout the same, 1 indicates generally a fuze body for attachment to a projectile (not shown) and is provided at its forward end with a frangible nose cap 3, and a bore 2 receiving a housing 4. Housing 4 is bored as at 5 to provide a chamber for receiving a rotor 6 which is mounted for rotation on shaft 7 and carries a detonating charge 8. Rotor 6 is spring wound by a coil spring 9 and is held in its normal position by a release pin indicated generally by 10. Pin 10 is slidably mounted in housing 4 and defines a rearward stem portion 11 slidable in a bore 12 in housing 4, and an enlarged portion 13 slidable in a counter bore 14 which is coaxial with bore 12. A coil spring 15 in bore

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14 biases against a shoulder formed by stem portion 11 and enlarged portion 13 to normally urge pin 10 in a forward direction. Stem portion 11 is received in a bore 16 to retain rotor 6 in its unarmed position.

5 The enlarged portion 13 of release pin 10 is provided with an annular reduced portion 17 having a rearward beveled wall 18 and is adapted to receive a portion of a ball 19 disposed in a radial bore 20. Ball 19 is maintained in the reduced portion 17 by a cylindrical piston designated generally by 21. Piston 21 is slidably mounted in a bore 22 in housing 4. Bore 22 is parallel to bores 12 and 14. Piston 21 is bored at one end as at 23 to form an axial recess to receive one end of a coil spring 24. Spring 24 biases piston 21 forwardly in bore 22. 10 A toothed rack 25 is integral with and extends forwardly from the forward face of piston 21. A reciprocating pawl 26 is slidably mounted in a radially disposed groove 27 and is adapted to intermittently engage toothed rack 25. A locking means for piston 21 is provided and consists of a pin 28 slidable in a radial bore 29 in housing 4 and is urged towards piston 21 by a leaf spring 30 in a chamber 31 of the housing 4.

A firing pin indicated generally by 32 is provided for detonating the detonator charge 8 and defines a head 33 15 slidable in a bore 34 parallel to bores 12, 14 and 22. A firing point 35 is integral with the rearward face of head 34. Firing pin 32 is maintained in a retracted or "cocked" position by a connection 36 which is attached as at 37 to an element 38. Element 38 is threadably engaged with nose cap 3. Firing pin 32 is normally biased in a rearward direction by a coil spring 39 in bore 34. A booster charge 40 detonatable by charge 8 is disposed in bore 2 for detonating a projectile 43, a portion of which is shown in Figure 1.

35 If desired, release pin 10 may be utilized to initiate a self-destruction mechanism 42, a portion of which is shown in Figure 1. In such case, a connection 41 is provided between the release pin and mechanism 42. (Mechanism 42 forms no part of this invention.)

Operation

40 When projectile (not shown) and fuze 1 are launched, acceleration will cause piston 21 to move rearwardly against the bias of spring 24 and under the influence of the toothed rack and pawl 26 a time delay will be provided. Upon reaching full rearward travel in bore 22 (see Figure 2) piston 21 is locked by pin 28 which engages the forward face of piston 21 by urge of leaf spring 30.

45 Upon projectile deceleration, beveled wall 18 of pin 10 will push ball 19 into bore 22 to release pin 10 which will then move forward out of bore 20 whereby rotor 6 will rotate to align detonator 8 with firing pin 32. The fuze is now armed.

50 Upon impact of the projectile with a target, nose 3 is crushed and connection 36 will be released to permit firing pin 32 to move rearwardly under bias of spring 39 and fire detonator 8.

55 From the foregoing, it will be apparent that the invention presents a novel fuze arming mechanism in which the drop safe time delay prevents arming of the fuze due to accidental dropping, mishandling, etc., yet will allow to normally arm the fuze when launched under firing conditions.

60 It is to be understood that the form of the invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

65 What is claimed is:

70 1. In an arming and safety mechanism for a fuze com-

prising a body, a frangible nose cap on said body, a booster charge in said body, a housing in said body, a firing pin slidably mounted in said housing,, said firing pin being connected at its forward end to said nose cap, a spring normally urging said firing pin rearwardly in said housing, a spring-wound rotor having a bore in its forward face thereof journaled for rotation between an unarmed to an armed position in said housing, a detonator carried by said rotor, a spring biased release pin slidably mounted in said housing for releasable engagement with said rotor to normally hold said rotor in said unarmed position, said release pin in a forward direction, a spring loaded acceleration responsive detent member slidably mounted in said housing, said detent being disposed in parallel relation to said release pin and a ball detent normally engaging said reduced portion in said enlarged portion in said release pin, said ball detent adapted to move out of engagement with said release pin upon full rearward movement of said acceleration responsive detent and permit said release pin to move out of engagement with said rotor and permit said rotor to rotate to said armed position whereby said detonator in said rotor is in alignment with said firing pin and whereby when said nose cap is crushed, said firing pin will fire said detonator in said rotor.

2. In combination, an arming and safety mechanism for a fuze comprising a body, a frangible nose cap on said body, a booster charge in said body, a housing in said body, a spring wound rotor journaled for rotation from a safe to an armed position in said housing, a detonator in said rotor, a firing pin slidably mounted in said housing, said firing pin connected to said nose cap at its forward end, there being first and second spaced bores in said housing, said bores being disposed in parallel,

axially spaced relation to the longitudinal axis of said fuze and a radial bore connecting said first and second bores, a spring loaded release pin slidably mounted in said first bore, said release pin having a rearwardly extending stem portion and an enlarged forward portion, said stem portion adapted to engage and hold said rotor in said safe position, there being an annular reduced portion in said enlarged portion, acceleration responsive time delay means for said fuze comprising a spring urged piston having a rack integral to its forward end slidably mounted in said second bore, a radially disposed pawl slidably mounted in said housing and adapted to intermittently engage said rack during forward and rearward movement of said piston, a ball detent normally disposed in said radial bore adapted to engage said annular reduced portion in said enlarged portion of said release pin to hold said release pin in a rearward position to lock said rotor in said safe position, said ball detent being freed from said radial bore upon full rearward movement of said piston whereby said release pin will move forward to release said rotor to rotate to said armed position and align said detonator with said firing pin and locking means mounted in said housing to hold said piston in its full rearward position.

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