United States Patent

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[73] Assignee The United States of America as represented by the Secretary of the Navy

[54] CENTRIFUGALLY ARMED ORDNANCE FUZE
5 Claims, 6 Drawing Figs.

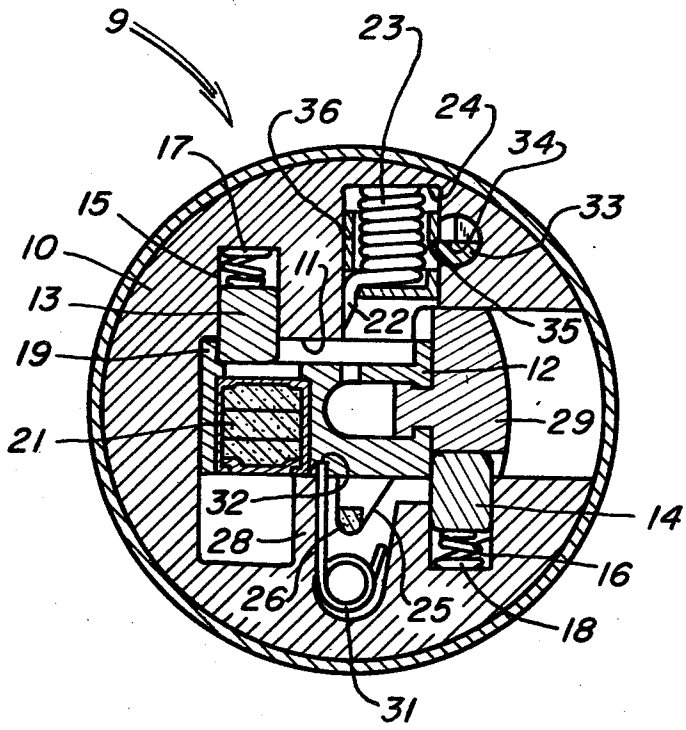
[52] U.S. Cl. 102/79, 102/71
[51] Int. Cl. F42c 15/22
[50] Field of Search 102/71, 79

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ABSTRACT: A centrifugally armed fuze having a spring-biased, spin-actuated stab detonator and a plasticized explosive booster lead-in. Once armed at a first predetermined rotational velocity, an interdependent compound lever system, having two centrifugally responsive sears, restrains a spring-biased firing pin until the spin rate decays to a second (lower) predetermined rotational velocity. The sears bear against one another and one rests within a slot formed in the other to obtain mechanical advantage by leverage.



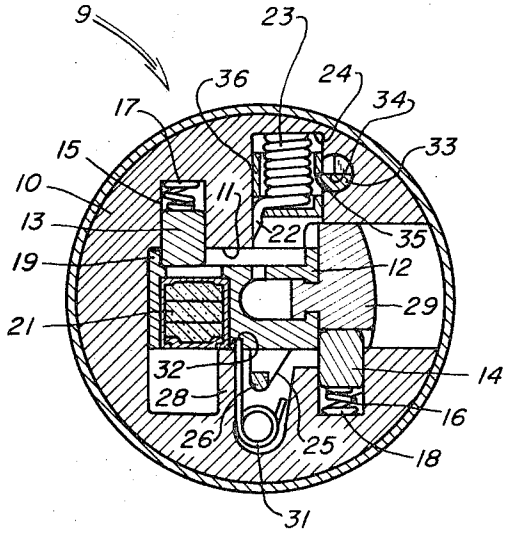


FIG. 1

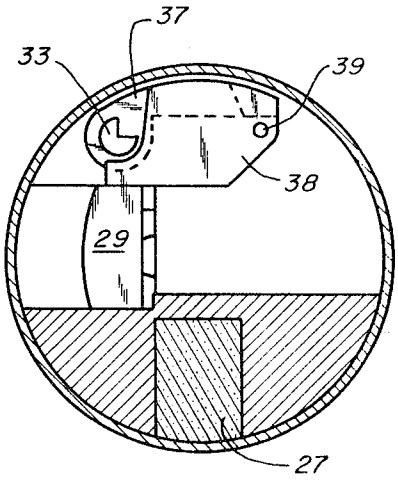


FIG. 3

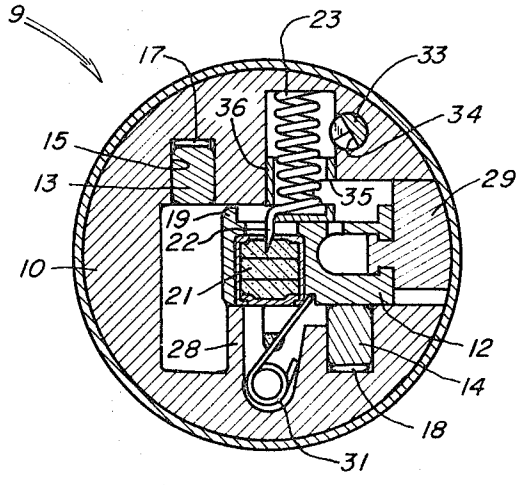


FIG. 2

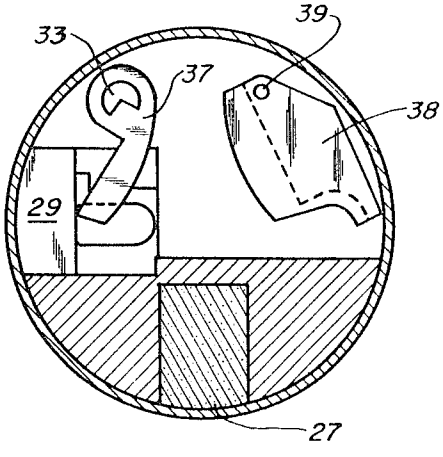
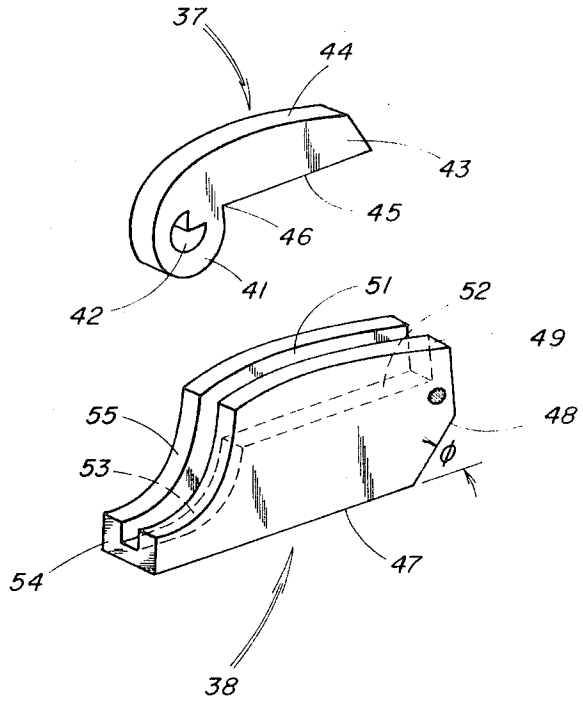


FIG. 4

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FIG. 6



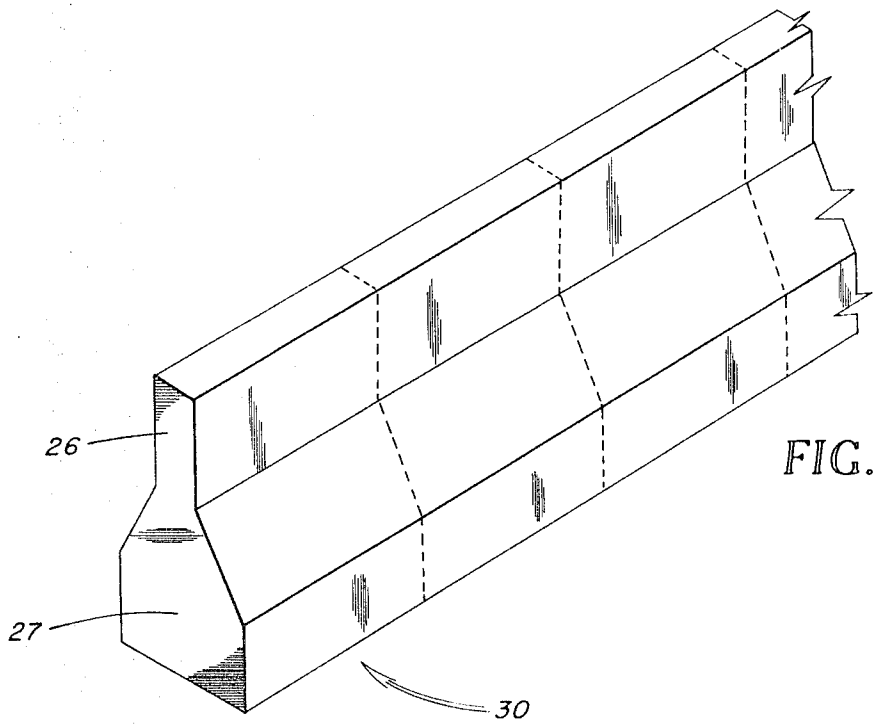


FIG. 5

CENTRIFUGALLY ARMED ORDNANCE FUZE

BACKGROUND OF THE INVENTION

This invention relates generally to ordnance fuzes, and more particularly to a centrifugally armed ordnance fuze which detonates in response to spin-rate decay.

Those concerned with the development of centrifugally armed fuzes have long recognized the need for a fuze which will detonate regardless of the orientation of the fuze with respect to the target at impact. Previously known centrifugally armed fuzes utilize a striker pin located in the nose of the ordnance item or a movable inertial weight for firing the ordnance item upon target impact; but, for the fuze to function properly in either case, it is critical that the angle of attack of the fuze be within specific narrow limits, and proper functioning of the fuze cannot be assured unless the fuze is so positioned at impact. In most ordnance applications it is desirable to incorporate a fuze which will function properly irrespective of its orientation at the time of impact, and this characteristic is essential in a fuze for use in a free-falling bomb or bomblet. The fuze disclosed in U.S. Pat. application No. 491,856 filed on Sept. 27, 1965 by William J. Donahue for Centrifugally Armed Fuze, of common assignee herewith, accomplishes its general purpose of providing a centrifugally armed fuze having all of the advantages of the previously known fuzes and yet which is capable of firing independently of its orientation at the time of impact with the target.

Although the fuze disclosed in the aforementioned U.S. Pat. application has served its general purpose, it has not proved entirely satisfactory under all conditions of service due to newly imposed safety requirements and operational capabilities which necessitate further improvements. Safety dictates that the difference between the arming rotational velocity and the firing rotational velocity be as great as possible in order to ensure that the ordnance device is not detonated by a midair collision with another such ordnance device while the deploying aircraft might be adversely affected. Accordingly, it is desirable to raise the arming spin rate as high as possible, but an upper limit, of the order 3,000 r.p.m., is imposed by the operational characteristics of the ordnance device itself. For example, the arming spin rate cannot be selected higher than the maximum spin rate of the ordnance device which is a function of the drop altitude, the velocity of the deploying aircraft, the atmospheric conditions, and the external contour of the ordnance device. Although the arming spin rate is so limited, the firing spin rate has no inherent lower limit. Hence, from a safety standpoint it is desirable to reduce the firing spin rate as low as possible.

Moreover, desirable operational capabilities are achieved by lowering the firing spin rate. For use in an antipersonnel ordnance device, it is desirable to provide a fuze which will enable the ordnance device to strike the target and then bounce as high as possible before detonating. Therefore, since spin rate decay begins to occur after the ordnance device strikes the ground, the optimum fuze will fire after a large spin rate decay, provided by a low firing spin rate of the order of 1,000 r.p.m., to enable a high bounce after impact.

Furthermore, production cost limitations restrict the materials which may be used in such a fuze, and materials which are easily cast, such as lead, should be used to control the respective spin rates. Still further, since cost is always an important consideration in a mass produced item, cost reductions in either individual elements or in assembly labor are endlessly sought.

SUMMARY OF THE INVENTION

Accordingly, one object of this invention is to provide a new and improved centrifugally armed ordnance fuze for a bomb which fires in response to spin-rate decay and irrespective of the fuze orientation at the time of target impact.

Another object of the invention is the provision of a new and improved centrifugally armed ordnance fuze which fires in response to spin-rate decay and irrespective of fuze orientation at the time of target impact, characterized by a large difference between the arming and firing rotational velocities.

Still another object of the present invention is to provide a new and improved centrifugally armed ordnance fuze which fires in response to spin-rate decay and irrespective of the fuze orientation at the time of target impact, characterized by a low firing rotational velocity.

A further object of the instant invention is to provide a new and improved centrifugally armed ordnance fuze which fires in response to spin-rate decay and irrespective of the fuze orientation at the time of target impact, characterized by its low manufacturing cost.

A still further object of this invention is the provision of a new and improved centrifugally armed ordnance fuze which fires high in the air after striking the target and bouncing irrespective of the fuze orientation at the time of target impact.

Briefly, in accordance with one embodiment of this invention, these and other objects are attained by providing in the fuze disclosed in the aforementioned U.S. Pat. application Ser. No. 491,856, a plasticized explosive booster lead-in and a slot in one of the sears to enable it to significantly encapsulate the other sear.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a front elevation, partly in section, of a preferred embodiment of the fuze of the present invention in its unarmed or safe condition;

FIG. 2 is a front elevation, partly in section, of the same preferred embodiment of the fuze of the present invention in its armed and fired condition;

FIG. 3 is a rear elevation, partly in section, of the fuze as shown in FIG. 1;

FIG. 4 is a rear elevation, partly in section, of the fuze as shown in FIG. 2;

FIG. 5 is an enlarged perspective view of a length of the plasticized explosive booster lead-in used in the fuze of the present invention; and

FIG. 6 is an enlarged exploded perspective view of the sears of the preferred embodiment of the fuze of the present invention in their position prior to firing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate identical or corresponding parts throughout the several views, and more particularly to FIGS. 1 and 2 thereof wherein the centrifugally armed ordnance fuze of the present invention, indicated generally by reference numeral 9, is shown as consisting essentially of a cylindrical support block or housing 10, preferably of zinc, having a radial channel 11 formed therein, said channel extending from one peripheral wall of the support block through a major portion of the block. A slider 12 is slidably positioned within the channel for movement therein from a first, unarmed, position to a second, armed, position in response to a predetermined centrifugal force. The fuze of the present invention is intended for use in a free-falling drop bomb or bomblet (not shown) having aerodynamic fins (also not shown) to induce rotation of the ordnance item about an axis. The details of the ordnance device itself form no part of the present invention, but it should be understood that the fuze of the present invention is to be positioned in such an ordnance item so as to rotate about a fuze axis passing perpendicularly through the center of FIGS. 1—4.

A pair of elongate slider locking detents 13 and 14 are slidably positioned within a pair of elongate recesses 15 and 16, respectively, formed in support block 10 and are resiliently biased outwardly of said recesses into abutting con-

tact with slider 12 by means of a pair of helical compression springs 17 and 18, respectively. Locking detent 13 is resiliently urged into abutting contact with an upstanding shoulder 19 integrally formed on the slider body and locking detent 14 is resiliently biased into abutting contact with the forward edge of the slider body, to thereby obstruct movement of slider 12 and to releasably lock the slider in its unarmed position.

Mounted within a bore provided in slider 12 is a conventional stab detonator 21 of the type normally employed in fuzes and being so constructed as to detonate upon being punctured or pierced by a sharp object with a minimum energy threshold. The conventional stab detonator typically has three explosive components, each of which magnifies or amplifies the magnitude of the initial detonation. A firing pin 22 is resiliently urged into channel 11 by means of a stored-energy compression spring 23, but the firing pin is normally held in a cocked position by restraining means hereinafter explained. It is essential that the stored energy capacity of the spring be in excess of the minimum sensitivity of the detonator by a predetermined safety factor. Firing pin 22 and compression spring 23 are received within a firing-pin recess 24 formed in the support block in communication with channel 11. The firing pin may be an integral part of the spring by sharpening the end of the spring, as illustrated, or may be a separate element. Firing pin 22 is so mounted in support block 10 that, when slider 12 is moved from its unarmed position to its armed position, stab detonator 21 will be positioned directly below the firing pin for actuation thereby. Positioned beneath firing pin 22 on the opposite side of channel 11 is a recess 25 into which extends one end of a plasticized explosive fuze 26. Fuze 26 is so positioned as to receive the detonation generated by stab detonator 21 upon piercing of the stab detonator by firing pin 22, the plasticized explosive fuze being connected to a two-dimensional, plastic explosive, bell end 27 of a booster lead-in 30 which is sympathetically detonated by fuze 26 and amplifies the detonation to a magnitude sufficient to detonate the main explosive charge (not shown) in the ordnance item. The details of fuze 26 and bell end 27 of booster lead-in 30 will be more fully discussed hereinafter with reference to FIG. 5. As seen in FIG. 1, when fuze 9 is in its unarmed position, stab detonator 21 is on one side of a barrier wall 28 while plastic explosive fuze 26 is on the opposite side of the barrier wall to prevent a sympathetic detonation of fuze 26 and ultimately the main charge by the stab detonator in the event that stab detonator 21 is, in some manner, actuated before fuze 9 has gone through its arming cycle. It should be noted that, when slider 12 is in the unarmed position as shown in FIG. 1, an aperture is provided in the upper portion of the slider in alignment with firing pin 22 for receipt thereof if the firing pin should be prematurely released. In such event the firing pin would lock the slider in place thus safing the fuze against subsequent arming.

To enable slider 12 to move from its unarmed to its armed position in response to centrifugal force developed during the spin of fuze 9, it is of course necessary that the center of gravity of the slider be radially displaced from the central axis of the fuze, and, for this reason, a slider weight 29 is secured to the slider by conventional means, such as press fitting. For the same reason, locking detents 13 and 14 must be positioned in a radially offset position from the central axis of the fuze so that the centrifugal force acting upon the mass of the detents will cause the detents to compress springs 17 and 18, respectively, and be retracted into recesses 15 and 16, respectively, when subjected to a predetermined centrifugal force. The masses of the slider locking detents 13 and 14 and the spring constants of compression springs 17 and 18 are so selected that the slider locking detents will be withdrawn into recesses 15 and 16 at a rotational velocity slightly lower than the rotational velocity required to move the slider from the unarmed to the armed position. As the rotational velocity of the spinning fuze increases to the magnitude necessary to retract the slider locking detents, centrifugal force also acts upon slider 12 and this force must be counteracted to prevent the slider from pushing the slider-locking detents against the walls of their recesses and binding the detents to prevent retraction thereof into their recesses. To perform this function, a torsion spring 31 is positioned within a seat formed in support block 10 and has one arm extending outwardly therefrom, the end of said arm extending into a shallow recess 32 formed in a side wall of the slider. The spring characteristics of the torsion spring are so selected that the spring will restrain the slider from movement in response to the centrifugal force acting thereupon until the rotational velocity of the fuze has reached a value greater than the rotational velocity required to retract the slider-locking detents. After slider-locking detents 13 and 14 have been retracted, the increasing rotational velocity of fuze 9 develops a greater centrifugal force on slider 12 sufficient to overcome the force of torsion spring 31, and the slider is caused to move outwardly in channel 11, which movement deflects the arm of spring 31 and withdraws it from the shallow recess 32, the end of the spring arm then engaging the outer surface of slider 12 and functioning as a ratchet to lock the slider in its armed position. It has also been found that detents 13 and 14 will slide more readily and bind less frequently as the ratio of length to diameter is increased. Thus, the more elongate the detents, the more reliable their function.

After slider 12 has been moved to its armed position, firing pin 22 is still restrained from contact with the stab detonator by means of a shaft 33 rotatably mounted within support block 10 and having an arcuate sector removed therefrom to define a flat shoulder 34 which engages a slot or recess 35 formed in a firing spring housing 36. Firing pin compression spring 23 is maintained in its compressed condition by means of the engagement of shoulder 34 with slot 35 in firing spring housing 36 and release of firing pin 22 may only be accomplished by rotation of shaft 33 in a counterclockwise direction as viewed in FIGS. 1 and 2. Rotational movement of shaft 33 is controlled by a mechanism positioned on the back side of the cylindrical housing and more clearly illustrated in FIGS. 3 and 4. Stored energy spring 23 acts upon shaft 33 by means of spring housing 36 to urge the shaft for rotation in a counterclockwise direction as viewed in FIGS. 1 and 2, which motion would be in a clockwise direction as viewed in FIGS. 3 and 4. Fixedly secured to shaft 33 for rotation therewith is a first sear 37 for cooperation with a second sear 38 which is pivotally mounted on a shaft 39, the axis of shaft 39 being parallel to the axis of shaft 33 which is, in turn, parallel to the central axis of fuze 9. Clockwise movement of sear 37 under the force of firing pin compression spring 23 is obstructed by sear 38 which is prevented from movement in the unarmed position by means of an abutting contact with slider weight 29, as shown in FIG. 3. When fuze 9 has been subjected to a rotational velocity sufficient to cause the slider to move to its armed position, slider weight 29 is moved out of contact with sear 38, thus freeing sears 37 and 38 for movement due to the force exerted by firing pin compression spring 23. The sears are pivotally mounted at their extremities and have their centers of gravity displaced from their pivotal axes to thereby form a compound lever system acting upon shaft 33 in such a manner that the centrifugal forces exerted upon sears 37 and 38 produce a moment of force upon shaft 33 in a direction opposite to the moment of force produced by firing pin compression spring 23. The spring characteristics of compression spring 23 and the masses and dimensions of sears 37 and 38 are so designed that the centrifugal forces developed by the sears will be greater than the force of spring 23 upon the shaft until the rotational velocity of fuze 9 has decayed to a predetermined value below the rotational velocity at which arming occurs. The spring characteristics are limited somewhat in that the spring must be sufficiently stiff to store enough energy to be in excess of the minimum sensitivity of the detonator by a predetermined safety margin. Thus, the lower limit of the force applied by spring 23 on shaft 33 is restricted, and therefore the centrifugal force exerted upon the sears have a minimum limitation requirement. The problem of maintaining a sufficiently high

centrifugal force at a sufficiently low firing spin rate has necessitated further development of the sears forming the compound lever system as will be described more fully hereinafter with reference to FIG. 6. Nevertheless, at the predetermined firing rotational velocity which is lower than the arming velocity, the force of firing pin compression spring 23 overcomes the centrifugal forces developed by sears 37 and 38 and thereby rotates the sears to the positions shown in FIG. 4, and permits rotation of shaft 33. Rotation of shaft 33, in turn, releases firing spring housing 36 from its abutting contact with shoulder 34 and thus permits spring 23 to thrust firing pin 22 into stab detonator 21, as shown in FIG. 2.

As seen in FIG. 5, booster lead-in 30, is made of a plasticized explosive which may be extruded in long lengths and then cut at appropriate intervals as indicated by the dotted lines. One such plasticized explosive which has proved satisfactory for this purpose is manufactured and sold by E. I. duPont de Nemours Co., Wilmington, Del. under the trademark Data Sheet. Significantly reduced assembly labor costs may be attained by employing an extrudable plastic explosive for the booster lead-in instead of the more conventional pressed powder metal-encapsulated boosters ordinarily used in such fuzes. After the individual booster lead-in is cut from the extruded strip of material, it may be easily emplaced in the fuze by pressing into an appropriately shaped cavity extending through the bottom of housing 10.

Referring now to FIG. 6, sears 37 and 38 are more clearly illustrated in the enlarged exploded perspective view. Sear 37 has a generally circular end portion 41 with an aperture 42 formed therein to mate with shaft 33 and has elongate portion 43 with an arcuate upper surface 44 and a planar lower surface 45 which terminates perpendicularly with circular end portion 41 at corner 46. As will be apparent hereinafter, sear 37 is thin with respect to sear 38, and, according to the preferred embodiment, sear 37 is less than one-third as thick as sear 38. Sear 38, having a planar bottom surface 47 for engagement with slider weight 29, is shaped so as to occupy the greatest possible volume above surface 47 consistent with its operational rotation. Surface 47 terminates at one extremity with the intersection of a surface 48 disposed at a sufficiently large angle with respect to surface 47 to permit sear 38 to rotate to its firing position as illustrated in FIG. 4. Sear 38 has an arcuate upper surface 49, preferably of the same radius as surface 44 of sear 37 and as the fuze itself. Sear 38 has provided therein a central slot 51 sufficiently wide to accommodate sear 37 therein. Slot 51 has a generally planar surface 52 and a generally quarter-circular surface 53 so disposed as to matingly engage against the bottom of sear 37. Sear 38 has a generally planar surface 44 at one extremity thereof which is connected to arcuate surface 49 by a curved surface 55 designed to narrowly miss contact with shaft 33 as seen in FIG. 3. As may be seen in FIG. 3, the sears are designed so that sear 38 occupies as much volume as possible and, assuming the sears are both made of lead as in the preferred embodiment, that sear 38 is substantially heavier than sear 38. The nature of the compound lever system is such that, as shaft 33 begins to turn under the force of spring 23, there is only a point contact between sears 37 and 38 which occurs between surface 52 of sear 38 and the tip of elongate portion 43 of sear 37. Thus, all of the centrifugal force exerted by sear 38 will be applied to sear 37 at the point where it obtains maximum leverage (i.e., the greatest distance from the pivot point at the center of shaft 33). On the other hand, the centrifugal force developed by sear 37 acts as if it were a single force passing through the center of gravity and is therefore much closer to the pivot point. Thus, it is apparent that any gains in centrifugal force of sear 38 at the expense of loss of centrifugal force of sear 37 provide a significant mechanical advantage with respect to the moment of force applicable to shaft 33 because of the greater moment arm. Hence, with sear 38 occupying more space, a greater useful centrifugal force may be obtained at lower spring rates and thus the firing rotational velocity may be significantly reduced with the previously mentioned advantages thereof. It is apparent therefore that slot 51 in sear 38, which enables sear 38 to interfit around sear 37 significantly enclosing the latter, provides numerous advantages.

From the foregoing it may be seen that the fuze of this invention operates as follows: When the free-falling bomb or bomblet is dropped, the rotational velocity of the bomblet and fuze therein increases from zero to a magnitude in excess of the predetermined rotational velocity required for arming. Prior to the attainment of the arming rotational velocity, slider-locking detents 13 and 14 retract thereby releasing slider 12 for movement from its unarmed position, as seen in FIG. 1, to its armed position, as seen in FIG. 2, upon attainment of the predetermined arming rotational velocity. When slider 12 moves to its armed position, stab detonator 21 is brought into alignment with firing pin 22 and plasticized explosive fuze 26 and is prepared for detonation in response to a predetermined decay in the spin rate of fuze 9. Firing pin 22 is, however, held in its cocked position by means of shoulder 34 on shaft 33 engaging firing-spring housing 36. Firing pin 22 will be maintained in its cocked position by means of the centrifugal forces acting upon sears 37 and 38 until the rotational velocity of fuze 9 diminishes to a predetermined magnitude below the arming rotational velocity, at which time firing pin compression spring 23 will overpower the centrifugal forces upon the sears and thus drive firing pin 22 into stab detonator 21.

It is apparent that the fuze of this invention is simple in construction but reliable in operation since it eliminates the need for any point-detonating striker pins or inertial weights arranged for movement upon impact with the target. The decay in the rotational velocity required to fire the fuze of the present invention occurs at some point in time after the weapon strikes the target. The particular structural elements employed in this invention and their arrangement in a new and novel manner produce a fuze which is extremely reliable and yet is designed in such a manner as to readily lend itself to manufacturing in subminiature sizes to thereby decrease the volume occupied by the fuze in small weapons and thus maximize the destructive capabilities of the weapon by increasing its payload. To avoid sympathetic detonation of the booster lead-in by the stab detonator, safety requirements necessitate a predetermined minimum separation distance between the booster lead-in and the stab detonator, and the use of a thin plasticized explosive fuze maintains the safety separation distance by minimizing the volume occupied by the lead-in charge and thus further miniaturizes the fuze. By varying the masses of the slider, slider weight, sears, and locking detents, as well as the spring characteristics of the various resilient bias springs, within the limitations heretofore mentioned, the amount of the spin-rate decay required for firing may be varied so that the fuze may either be designed to fire instantaneously upon impact or, alternatively, by designing the fuze to have a greater spin-rate decay, a delayed action may be induced which would cause the bomblet to bounce and fire above ground for increased fragmentation effects against ground personnel.

Obviously many modifications and variations of the present invention are possible in 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 herein.

We claim:

1. In a fuze for firing an ordnance device in response to a decrease in its rotational velocity from a first predetermined value to a second predetermined value, having

a firing pin resiliently biased toward its firing position,

a rotatable shaft normally restraining said firing pin from movement,

a first pivotally mounted sear having its center of gravity displaced from its pivotal axis, and

a second pivotally mounted sear having its center of gravity displaced from its pivotal axis, said second sear being so positioned with respect to said first sear as to bear against

said first sear and thereby form an interdependent compound lever system therewith,

whereby the centrifugal forces exerted upon said sears may produce a moment of force upon said shaft in a direction opposite to a moment of force which may be produced by said resiliently biased firing pin for releasing said firing pin for movement,

the improvements comprising:

said first sear having a thickness sufficiently less than said second sear so as to interfit within a slot formed within said second sear such that said first sear may be significantly encapsulated by said second sear, and

a plasticized explosive booster lead-in positioned at a point spaced from said firing pin.

2. In a fuze for firing an ordnance device in response to a decrease in its rotational velocity from a first predetermined value to a second predetermined value, having

a firing pin resiliently biased toward its firing position,

a rotatable shaft operatively coupled to said firing pin such that said firing pin may produce a first moment of force upon said shaft in a first rotational direction,

a first pivotally mounted sear having its center of gravity displaced from its pivotal axis and fixedly secured to said rotatable shaft such that said first sear may produce a second moment of force upon said shaft in a second rotational direction opposite that of said first moment of force, and

a second pivotally mounted sear having its center of gravity displaced from its pivotal axis, said second sear being so positioned with respect to said first sear as to bear against said first sear and thereby form an interdependent compound lever system therewith,

whereby the centrifugal forces exerted upon said sears may collectively produce said second moment of force,

the improvements comprising:

said first sear having a thickness sufficiently less than said second sear as to interfit within a slot formed within said second sear such that said first sear may be significantly encapsulated by said second sear, and

a plasticized explosive booster lead-in positioned at a point spaced from said firing pin.

3. In a fuze for firing an ordnance device in response to a decrease in its rotational velocity from a first predetermined value to a second predetermined value, having

a firing pin resiliently biased toward a firing position,

a rotatable shaft having a flat surface formed thereon for restraining said firing pin when said shaft is in its initial position,

a first sear fixedly secured to said shaft for rotation therewith, said first sear having its center of gravity displaced from the axis of said shaft, and

a second sear pivotally mounted at one end thereof about an axis parallel to the axis of said shaft, said second sear being positioned between and contacting each of said first sear and a slider,

whereby movement of said sears, and thereby said shaft is prevented by said slider until said fuze is armed at a rotational velocity of said first predetermined value and, thereafter, by centrifugal forces acting upon said sears until the rotational velocity decreases from said first predetermined value to said second predetermined value,

the improvements comprising:

said first sear having a thickness sufficiently less than said second sear so as to interfit within a slot formed within said second sear such that said first sear may be significantly encapsulated by said second sear, and

a plasticized explosive booster lead-in positioned at a point spaced from said firing pin.

4. A fuze for firing an ordnance device in response to a decrease in its rotational velocity from a first predetermined value to a second predetermined value, having

a firing pin resiliently biased toward a firing position,

a rotatable shaft having a flat surface formed thereon for restraining said firing pin when said shaft is in its initial position,

a first sear fixedly secured to said shaft for rotation therewith, said first sear having its center of gravity displaced from the axis of said shaft, and

a second sear pivotally mounted at one end thereof about an axis parallel to the axis of said shaft, said second sear being positioned between and contacting each of said first sear and a slider such that said first sear and said second sear cooperate to form a compound lever system acting upon said shaft in such a manner that the centrifugal forces exerted upon said sears produce a moment of force upon said shaft in a direction opposite to the moment of force produced by said resiliently biased firing pin,

whereby movement of said sears, and thereby said shaft, is prevented by said slider until said fuze is armed at a rotational velocity of said first predetermined value, and, thereafter, by centrifugal forces acting upon said sears until the rotational velocity decreases from said first predetermined value to said second predetermined value,

the improvements comprising:

said first sear having a thickness sufficiently less than said second sear as to interfit within a slot formed within said second sear such that said first sear may be significantly encapsulated by said second sear, and

a plasticized explosive booster lead-in positioned at a point spaced from said firing pin.

5. In fuze for arming an ordnance device in response to a predetermined rotational velocity and for firing the weapon in response to a predetermined decrease in rotational velocity below the arming velocity, having

a support block rotatable about an axis and having a radial channel formed therein,

a slider received within said channel for movement therein from a unarmed position to an armed position,

said slider having its center of gravity displaced radially from the axis of said block,

slider locking means for restraining said slider in said unarmed position and for releasing said slider for movement to said armed position in response to a first predetermined rotational velocity,

a firing pin resiliently biased toward its firing position by a stored-energy spring,

a stab detonator mounted within said slider for movement therewith and being nonaligned with the firing pin when said slider is in said unarmed position and being aligned with the firing pin when the slider is in said armed position, and

firing-pin-restraining means for preventing movement of the firing pin until said slider has moved to said second position and said fuze is rotating at a second predetermined rotational velocity which is less than said first predetermined rotational velocity, said firing-pin-restraining means including

a shaft mounted for rotation within said block and having a flat surface formed thereon to engage a firing pin housing,

a first sear fixedly secured to said shaft for rotation therewith and having its center of gravity displaced from the axis of said shaft, and

means engaging said first sear for preventing movement of said first sear when the slider is in said unarmed position and for releasing said first sear for movement by said stored-energy spring when the slider is in said armed position, said means for preventing movement of said first sear comprising

a second sear pivotally mounted at one end thereof upon said support block about an axis parallel to the axis of said shaft,

said second sear being positioned between and contacting each of said first sear and a slider weight,

whereby movement of said sears is prevented by said slider weight until said slider has been moved to its armed position,

whereby the fuze arms in response to a predetermined rotational velocity and fires upon a predetermined decrease in rotational velocity below the arming velocity upon impact with the target irrespective of the orientation of the fuze the the time of impact,

the improvements comprising:

said first sear having a thickness sufficiently less than said second sear so as to interfit within a slot formed within said second sear such that said first sear may be significantly encapsulated by said second sear, and

a plasticized explosive booster lead-in positioned at a point spaced from said firing pin.