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GRENADE

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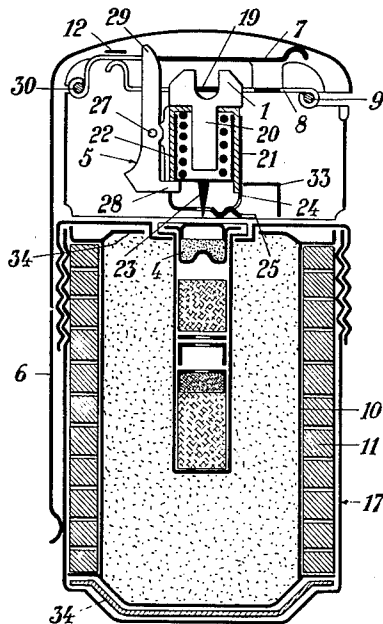
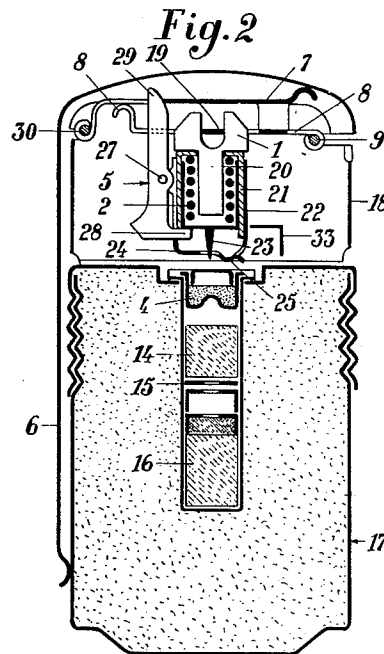
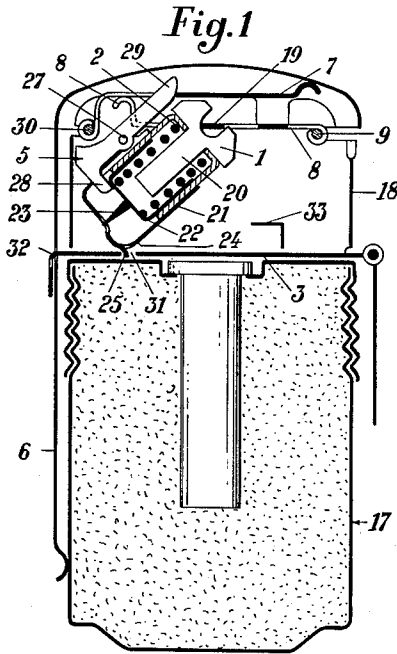


Fig. 3

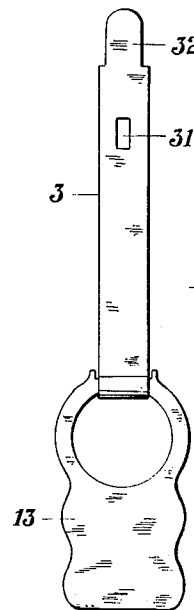


Fig. 4

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The present invention relates to a fuse for grenades and the like, particularly for hand grenades.

In explosives as used by the infantry and particularly in hand grenades, the ignition of the explosive charge is caused by a primer struck by a spring operated firing pin. In conventional firing devices such spring is continuously under load and is generally retained by a safety lever which is in turn engaged by a safety strip which is removed when the hand grenade is thrown. After removal of the safety strip the tension of the firing pin spring acts directly on the safety lever which is therefore strongly urged to move in order to permit the striking of the firing pin. It is therefore necessary to retain the safety lever with sufficient power and careful attention must be directed thereto.

It is an object of the present invention to provide a fuse for grenades or the like wherein the firing arrangement is designed to assume two positions. In the first of these positions the firing pin is inclined and is not in alignment with the axis of the primer and the spring is unloaded while in the second position the spring is loaded and the firing pin is in alignment with the primer.

A further object of the invention is to provide a fuse for hand grenades and the like wherein the safety strip is interposed between the firing pin and the primer and when the safety strip is removed from the grenade the firing device is moved from an inclined position to a position in alignment with the primer while at the same time tensioning the spring.

A still further object of the invention is to provide a fuse wherein the firing device comprises a group of three levers movable angularly with respect to certain pivots and arranged in operative abutment relation to each other so as to reduce the stress exerted by the spring under the tension of the firing pin upon an external lever of such group. The external lever begins its angular movement when the grenade is thrown after removal of the safety strip.

A further object is to provide a fuse for grenades wherein the metallic members forming the firing device fall off during the flight of the grenade after the firing pin has struck the primer.

The invention contemplates the novel construction, combination, location and relative arrangement of the parts as will be fully understood by the detailed explanation set forth below and shown in the drawings in which a preferred embodiment is illustrated as an example:

Figure 1 is an axial cross-sectional view of a grenade in safety position;

Figure 2 is a similar view showing the grenade in firing position;

Figure 3 is an axial cross-sectional view of a modified form of the invention, and

Figure 4 is a plan view of the safety strip.

Referring to Figures 1 and 2 of the drawing, 17 indicates the substantially cylindrical body of a grenade which comprises a lower portion containing the bursting charge

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and an upper portion wherein the firing device is positioned. Between the lower and upper portion of the body there is interposed a first safety member in the form of a strip 3 which covers substantially the primer 4 arranged on the detonator contained in the bursting charge.

In the upper portion of the body there is located a group of three levers, the inner lever 8 and the external lever 6 being pivoted on a single pivot 9 while the intermediate lever 7 is pivoted on the pivot 30 located opposite the pivot 9.

The firing device comprises a shank 20 having a head 1 provided with a recess wherein an element 19 of the lever 8 penetrates. The element 19 acts as a pivot about which the shank 20 and the firing device oscillate. On the shank 20 a spiral spring 2 is mounted which is contained in a cup 22 provided with a firing pin 23. On the cup 22 there is mounted a sleeve 21 which abuts against the head 1 of the shank 20. The spring is located between the bottom of the cup 22 and the sleeve 21. The shank 20 and the members associated therewith are contained in a holder 24 which is provided at the bottom with a hole for the passage of the firing pin 23. The holder 24 is provided with a projection 25 which engages an opening 31 made in the strip 3. At one side of the holder 24 a second safety device in the form of a hook 5 is pivoted at 27. The hook 5 comprises a lug 28 and an arm 29. The lug 28 passes through a slot made in the holder 24 and engages the lower surface of the cup 22 while an arm 29 penetrates an opening provided in the intermediate lever 7.

In the position shown in Figure 1 the firing device is inclined with respect to the axis of the primer and the arm 29 abuts against the lever 7 thereby preventing the latter from locking. In this position the spring 2 is unloaded.

The holder 24 abuts at its lower part against a slotted wall located in the upper portion 18 of the body and flush with the strip 3 which may slide in such slotted wall.

As is shown in Figure 1 the lever 6 journalled at 9 on the upper portion 18 of the body is located externally of the grenade body. The lever 6 has an arm adjacent the body and has a slot wherein the end 32 of the strip 3 penetrates. The end 32 is built to engage the lever 6 in order to prevent the latter from locking. The end of lever 8 abuts against the lever 7 near the pivot point 30 thereof and the lever 7 abuts against the lever 6 near the pivot point 9. It is apparent that the relative location of the abutment points of the levers with respect to their pivot points causes a reduction in the stresses so that only a fraction of the force applied to the inner lever 8 acts on the external lever 6.

The operation of the firing device is as follows. By withdrawing the strip 3 by means of the grip member 13, strip 3 causes through projection 25 the rocking of holder 24 and the members contained therein about the element 19 of lever 8. The rocking occurs till holder 24 abuts against the stop member 33. In this position (Figure 2) the firing pin 23 is in alignment with the primer 4 and strip 3 is fully withdrawn. Since projection 25 moves horizontally, holder 24 during the rocking is caused to move upwardly bringing therewith hook 5 which by abutting, through lug 28, against cup 22 compresses the spring 2. Since arm 29 of hook 5 engages the opening of lever 7 and since no relative motion of the three levers may take place since the arm of lever 6 is kept adjacent the grenade body by the hand of the operator, hook 5 cannot rock although being urged by spring 2 through the reduction of the levers referred to. The hand of the operator has therefore to exert very little strain to oppose the rocking of lever 6. After throwing the grenade, lever 6 is no more retained by the operator and may

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start its rocking. The location of the pivoting points is so arranged that lever 6 has to rock through 45° before lever 7 is raised by such a length as to disengage arm 29 of hook 5. After disengagement of arm 29, hook 5, urged by spring 2, may rock about the pivot 27, thus making free cup 22 which, under the action of spring 2, causes the firing pin to strike against the primer 4.

In order to prevent the metallic members forming the firing device and the three levers from being blown to a great distance during bursting of the grenade which may be dangerous to the operator these members after the striking of the primer fall off during the flight of the grenade and do not form fragments.

In the embodiment shown in Figure 3 there is provided a device indicated at 12 which prevents the members forming the firing device and the lever from falling off during the flight of the grenade and are therefore intended to form fragments. In order to increase the quantity of fragments produced by a grenade the bursting charge is contained in a metal tube provided with two end elements 34 and between the tube and the wall of the grenade there is a metal cylinder 11 provided in the form of a spiral which is intended to be broken into fragments upon bursting of the charge.

The grenade may be thrown by a rifle by the usual devices used therefor. In this case the grip member 13 is made with sufficient weight so as to cause the automatic removal of the strip 3 from the grenade upon the throwing thereof by means of a rifle.

In the grenade disclosed the detonator is introduced into the bursting charge and comprises and plurality of igneous elements 14, 15 and 16 designed to delay the transmission of fire from the primer to the exploding charge. These elements are contained in a tight metal casing which permits better preservation of the grenade.

I claim:

1. A grenade comprising a body, an explosive charge therein, a primer carrying detonator in said charge, a first safety member which substantially covers the said primer, a firing device provided with a firing pin, said firing device in unarmed position being inclined with respect to said primer and engaging with said first safety member, a second safety member, a first lever pivoted on the upper portion of said body providing a pivot for the pivoting of said firing device, a second lever pivoted on the upper portion of said body opposite to the pivoting of said first lever, said second lever being in operative abutment relation with said first lever and engaging said second safety member, a third lever pivoted on the upper portion of said body, said third lever being inoperative abutment relation with said second lever and means interengaging said third lever and said first safety member to prevent displacement of said three levers when in unarmed position.

2. A grenade comprising a body, an explosive charge therein, a primer carrying detonator in said charge, a first safety member in the form of a strip which substantially covers said primer, a firing device for igniting said primer, said firing device in unarmed position being inclined with respect to the axis of said primer and comprising a shank having a head provided with a fork, a spiral spring mounted on said shank, said spring being arranged to be moved from an unloaded to a loaded position, a cup provided with a firing pin mounted on said spring, a ferrule mounted on said cup and abutting said head of said shank, a holder having the lower base provided with a hole for the passage of the firing pin, said holder being provided with a projection for engaging said strip, a second safety member in the shape of a hook pivotally connected to said holder, said hook being formed with a lug and an arm, said lug being arranged to abut against the lower face of said cup, a first lever pivoted on the upper portion of said body providing a pivot for the pivoting of said firing

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device, a second lever pivoted on the upper portion of said body opposite the pivoting of said first lever, said second lever being in operative abutment relation with said first lever and engaging the arm of said hook, a third lever pivoted on the upper portion of said body, said third lever having an arm in operative abutment relation with said second lever and an arm adjacent the lateral wall of said body, said first safety member being bent at one end to engage said third lever.

3. A grenade comprising a body including a lower portion containing an explosive charge therein, a primer carrying detonator in said charge, and an upper portion containing the firing device for the ignition of said primer, a first safety member in the shape of a strip interposed between said lower and upper portion above said primer, said firing device in unarmed position being disposed with its axis inclined with respect to the axis of said primer, means on said strip engaging said firing device for rocking the latter to armed position aligned with the axis of said primer when said strip is withdrawn from said body permitting free communication between said primer and the upper portion of said body, said firing device comprising a shank having a head provided with a recess, a spiral spring mounted on said shank, said spring being normally unloaded in unarmed position and loaded only when in armed position, a cup mounted on said spring and provided with a firing pin, said cup being arranged to compress said spring, a ferrule mounted on said cup and abutting against the head of said shank, a cylindrical holder having a hole for the passage of said firing pin, said holder being provided with a projection for engaging said means on said strip for rocking said firing device, a second safety member in the shape of a hook pivotally connected to said holder, said hook being formed with a lug and an arm, said lug abutting the lower face of said cup, a first lever pivoted on the upper portion of said body providing a pivot for engaging said recess in the head of said shank to permit pivoting of said firing device when the latter is moved from the unarmed position inclined to the axis of the primer to the armed position wherein the axis of said firing pin is aligned with the axis of the primer by withdrawing said strip from said body, a second lever pivoted on the upper portion of said body opposite to the pivoting of said first lever, said second lever being in operative abutment relation with said first lever and being provided with an opening wherein the arm of said hook engages, said second lever being arranged to disengage said arm of the hook when said second lever is permitted to rotate in a vertical plane about its pivot when urged by said first lever, a third lever pivoted on the upper portion of said body on the same pivot whereon said first lever is pivoted, said third lever having an arm in operative abutment relation with said second lever and an arm adjacent the lateral wall of said body having an opening therein, said first safety member being bent at one end to engage said third lever by penetrating into said opening in the arm of said third lever adjacent the lateral wall of said body.

4. A grenade comprising a body including a lower portion containing an explosive charge therein, a primer carrying detonator in said charge, and an upper portion containing the firing device for the ignition of said primer, a first safety member in the shape of a strip interposed between said lower and upper portions above said primer, said firing device in unarmed position being disposed with its axis inclined with respect to the axis of said primer, said strip being provided with a hole whose edge engages said firing device for rocking the latter to armed position aligned with the axis of said primer when said strip is withdrawn from said body permitting free communication between said primer and said upper portion, said firing device comprising a shank having a head provided with a recess, a spiral spring mounted on said shank, said

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spring in unarmed position being arranged to be normally unloaded and to become loaded in armed position only when the firing device is aligned with the axis of said primer, a cup mounted on said spring, a firing pin on said cup, said cup being arranged to compress said spring, a ferrule mounted on said cup abutting against the head of said shank, a cylindrical holder having its lower base provided with a hole for the passage of the firing pin, said holder being provided with a projection for engaging the hole of the said strip, a second safety member in the shape of a hook pivotally connected to said holder, said hook being formed with a lug and an arm, said lug abutting against the lower face of said cup, a first lever pivoted on the upper portion of said body and providing a pivot engaging said recess in the head of said shank to permit the pivoting of said firing device when the latter is moved from the position inclined to the axis of the primer to the position wherein the axis of the said firing pin is aligned with the axis of the primer by withdrawing said strip from said body, a second lever pivoted on the upper portion of said body opposite to the pivoting of said first lever, said second lever being in operative abutment relation with said first lever and being provided with an opening wherein the arm of said hook engages, said second lever being arranged to disengage said arm of the hook when the said second lever is permitted to rotate in a vertical plane about its pivot when urged by said first lever, a third lever pivoted on the upper portion of said body on the same pivot whereon said first lever is pivoted, said third lever having an arm in operative abutment relation with said second lever and an arm having an opening therein adjacent the lateral wall of said body, said first safety member being bent at one end to engage said third lever by penetrating into said opening in the arm of said third lever adjacent to the lateral wall of said body, said holder being arranged to compress said spring of the firing pin upon displacement of the firing device from the position inclined to the axis of the primer to the position aligned with the last mentioned axis, said hook being arranged to keep said spring compressed while the firing device is in the said alignment position and said hook being arranged to rock with respect to said holder to release the firing pin when urged by the compressed spring when the arm of the said hook disengages from said second lever when said second lever rises after withdrawing said strip.

5. A grenade comprising a body including a lower portion, an upper portion and a first safety member in the form of a strip interposed between said two portions, the lower portion containing an explosive charge, a primer carrying detonator, a metal tube surrounding said explosive charge, a top and a bottom element cooperating

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with said tube, a metal cylinder in the form of a spiral interposed between the said tube and the wall of said body, said tube, said elements and said cylinder being adapted to form splinters upon explosion of the grenade, the upper portion of said body containing a firing device provided with a firing pin, said firing device in unarmed position being inclined with respect to the said primer and engaging said first safety member, a second safety member, means in said upper portion of said body to prevent the disjunction of said firing device from said upper portion during the throwing of the grenade, a first lever pivoted on the upper portion of said body and providing a pivot for the rotation of said firing device, a second lever pivoted on said upper portion of the body opposite to the pivoting of said first lever, said second lever being in operative abutment relation with said first lever and being provided with means to engage said second safety member, a third lever pivoted on the upper portion of said body, said third lever being in operative abutment relation with said second lever and means interengaging said third lever and said first safety member to prevent any mutual displacement between said three levers.

6. A grenade comprising a body, an explosive charge therein, a primer carrying detonator in said charge, a first safety member which substantially covers said primer, a firing device with a firing pin, said firing device in unarmed position being inclined with respect to said primer and engaging with said first safety member, a second safety member, a first lever pivoted on the upper portion of said body providing a pivot for the rotation of said firing device, a second lever pivoted on the upper portion of said body opposite to the pivoting of said first lever, said second lever being in operative abutment relation with said first lever and being provided with means engaging said second safety member, a third lever pivoted on the upper portion of the body on the same pivot whereon said first lever is pivoted, said third lever being in operative abutment relation with said second lever, means interengaging said third lever and said first safety member to prevent any mutual displacement of said three levers, said detonator in the lower portion of said body comprising a plurality of igneous elements to delay the transmission of the fire to the charge, said plurality of igneous elements being contained in a tight metal casing.

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