March 3, 1970 KARL-ERIK ANDERSSON ET AL 3,498,223

LEVER-CONTROLLED FUSE FOR HAND GRENADES

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Fig. 1

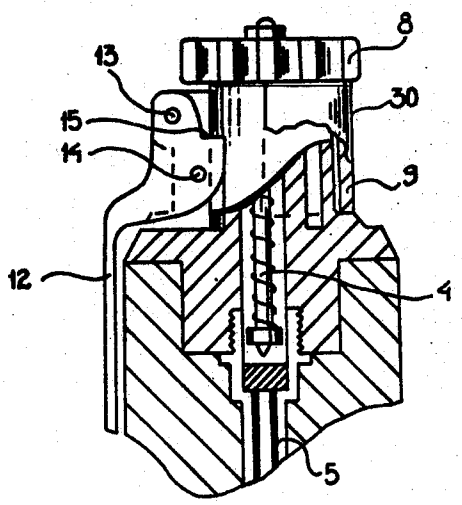


Fig. 2

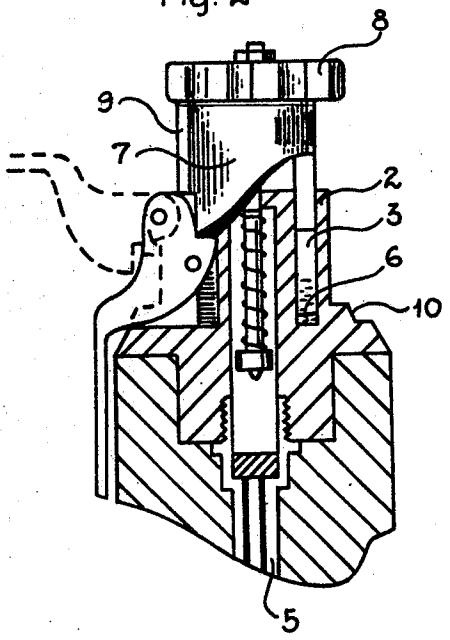
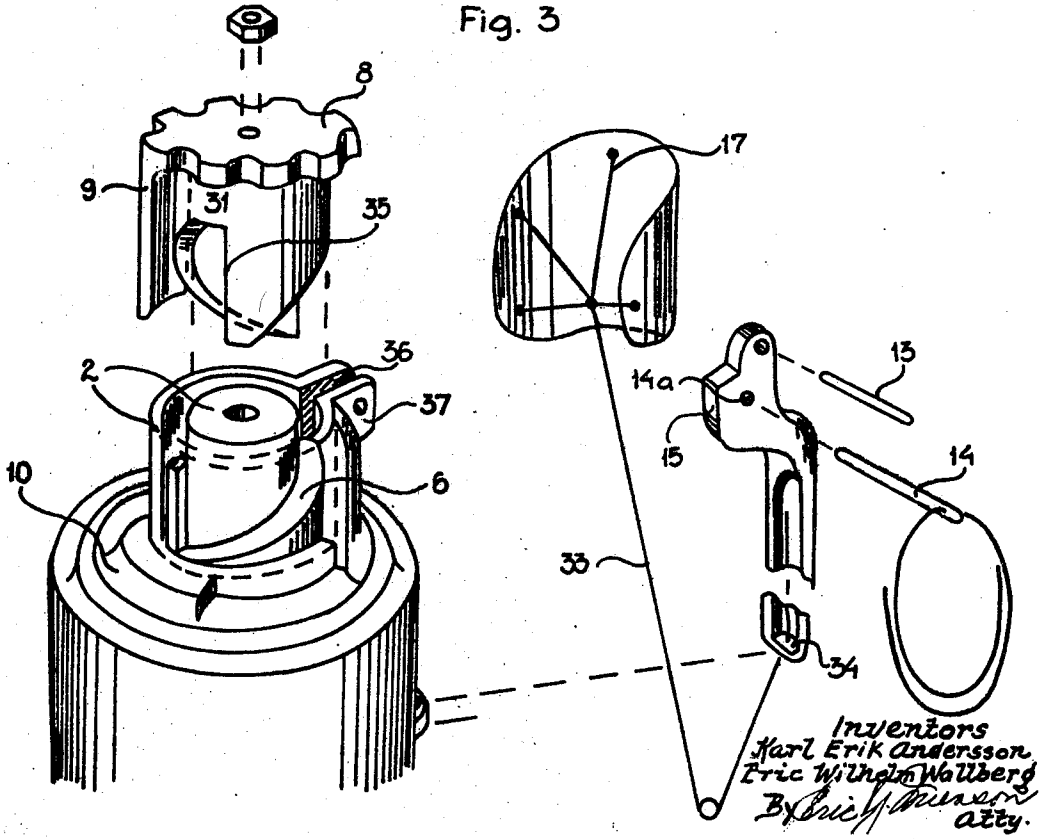


Fig. 3



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LEVER-CONTROLLED FUSE FOR HAND GRENADES

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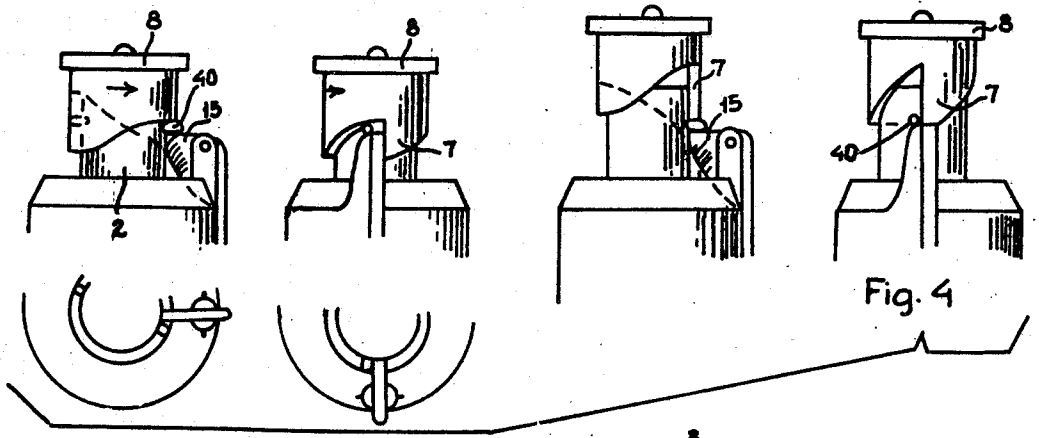

Fig. 4

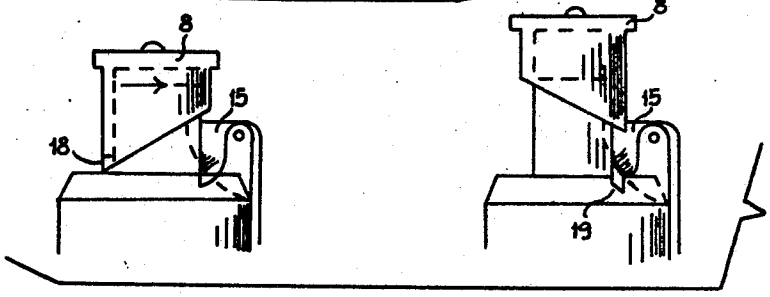

Fig. 5

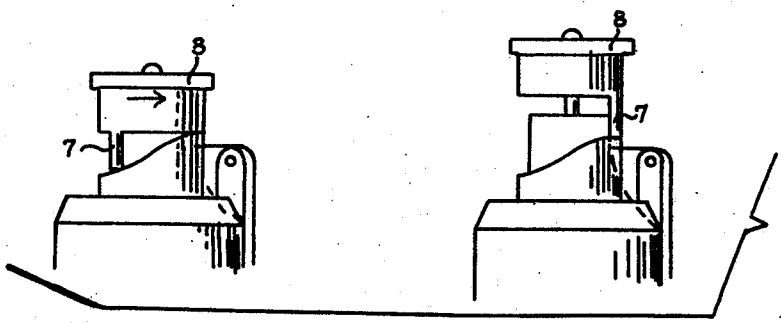

Fig. 6

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Fig. 7

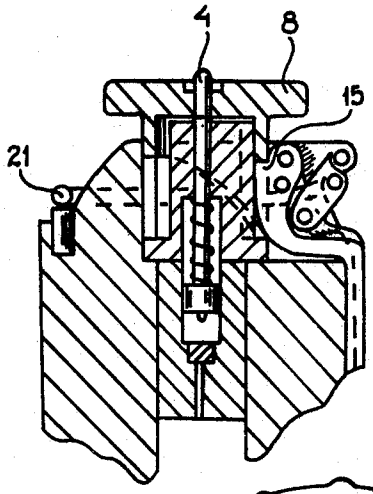
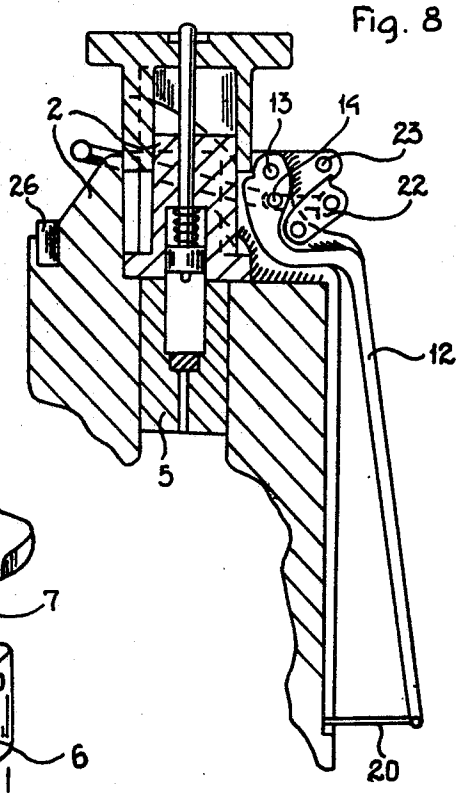


Fig. 8



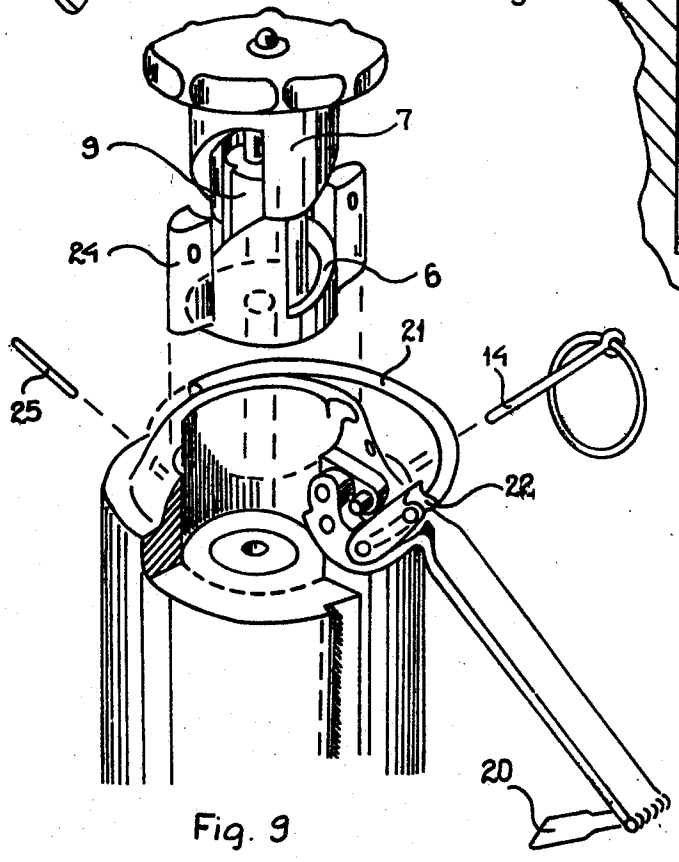


Fig. 9

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United States Patent Office 3,498,223 Patented Mar. 3, 1970

3,498,223

LEVER-CONTROLLED FUSE FOR HAND GRENADES

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U.S. Cl. 102—64 5 Claims

ABSTRACT OF THE DISCLOSURE

The invention relates to a hand grenade fuse which is armed by the operation of a rotatable knob transforming a turning motion to an axial loading motion of a firing pin fixed to the knob. The end of the knob and/or its contact surface in the fuse head are shaped like screw threads with such a pitch that arming is completed in about a 180° turn of the knob. The knob then rests entirely upon the heel or shoulder of a locking lever that is inserted radially into the head, and also having a drop safety released by the acceleration of the grenade when the grenade is launched, or by its friction with the air.

Fuses for hand grenade or land mines are usually made with either friction type igniters, as in the old stick grenades, or hammer igniters usually found in the egg type hand grenades. Hammers can either be built into an impact sensitive body or be released when the grenade is launched and must then, of course, have some type of delay charge or clock-work mechanism. A design problem for the latter type is how to load the spring which actuates the firing pin and a problem with respect to all fuses is how to design a safety mechanism having a rigid element for transport safety and also having a sensitive member that is able to distinguish the accidental drop of an armed grenade from a real intentional launch.

One of the objects of the present invention is to provide means for arming a hammer type fuse by transforming a turning or rotative motion into the axial motion of a firing pin. The fuse of the present invention has a cap or head that is provided with a rotatable knob, the free end of which and/or its contact surface in the fuse body is shaped like a screw thread with such a pitch that the firing pin is pulled out when the knob is turned for about 180°. When the fuse is fully armed the knob rests entirely upon a heel or shoulder forming a part of a locking lever that is pivotally mounted on the head of the fuse. The heel or shoulder swings away from under the knob or cap when the locking lever is released, permitting the knob or cap and the firing pin carried thereby, to be retracted. For a hand grenade this takes place when a special drop mechanism is released by the air or by the acceleration when the grenade is launched.

Several embodiments will now be described with reference to the accompanying drawings in which:

FIG. 1 shows a main section of the fuse as its parts are in position for transport;

FIG. 2 is a similar view, showing the grenade in its armed condition;

FIG. 3 shows an exploded view of the fuse with a wall portion cut away for the sake of clarity;

FIGS. 4 to 6 show some minor modifications as seen in front, from one side and from above;

FIGS. 7 and 8 are views similar to FIGS. 1 and 2 showing another embodiment, and

FIG. 9 shows an exploded view of the structure of FIGS. 7 and 8.

The fuse body includes a base plate **1** provided with

a projecting short cylinder or head having a central hole for the reception of a spring-loaded firing pin **4** and a tube **5** with an ignition cap. The head **2** is divided by means of a slit **3** into a core with a surrounding wall. The slit **3** is provided at the bottom with a surface **6** forming an inclined spiral ramp that follows a saw-tooth pattern in the following manner. The depth of the slit **3** in a rotational sense varies from a maximum to a minimum; is constant for a small portion and then it falls abruptly to the maximum again along an edge or axial jump parallel to the firing pin and the cycle is repeated at least once. The rotatable arming knob is in the form of a cap having a short tube that is provided at its open end with a pair of deep slots **35** between which tongues **7** are formed. The slots **35** and tongues **7** have such a shape that the tube end, when introduced into the slit **3**, will follow the bottom **6** of the slit **3**. The opposite end of the tube is covered by a disk **8** that is corrugated along its peripheral edge and to which a rectangular spacing member **9** is attached. One end of the firing pin **4** is fixed to the disk **8** and a coil spring, wound around the pin **4** and resting on a support in the head **2**, brings the screw surfaces **6** and **7** in close contact with each other.

The base plate **1** is provided with a supporting flange **10** extending around the head **2** for the free end of the member **9**. This flange is omitted or else has a countersunk portion **11** for a portion of its length and which corresponds to the position the member **9** occupies when the grenade is armed as in FIG. 2.

The tubular wall around the core of the head **2** has an axial slit **36** with a projecting ear or lug **37** along each side and through which a journal pin **13** for a locking lever **12** is inserted. Slightly below the pin **13** is a hole **14***a* for a safety pin **14** having an attached pull ring. The lever **12** has a heel **15** forming a shoulder that projects into the slit **3** so that its one side is in contact with one of the jumps of the bottom surface **6**.

The operation of the device is substantially as follows:

During transport, the arming knob **8** is in such a rotational position that the spacing member **9** rests on the supporting flange **10**. The firing pin **4** cannot then reach the ignition cap and one can even slip when turning the arming knob causing it to only slide back to the position of FIG. 1 without causing any damage.

When the arming knob **8** is given about half a turn, the axial jumps of the screw surface **6** and the tongues **7** will be in juxtaposition to each other and one of the tongues **7** will snap down somewhat so that the knob will then rest solely upon the heel shoulder **15** as shown in FIG. 2. The safety pin **14** is now withdrawn and the grenade is ready to be launched. If one should happen to lose his grip around the lever **12** or should drop the grenade, a piano wire **33** will prevent the lever **12** from outward swing, the wire being drawn through an ear **34** in one end of the lever **12** and through another ear in the grenade body. Not until the grenade is launched will the wire be pulled out by way of a parachute body **17** made of aluminum sheet about 2 x 3" in size and curved to follow the body of the grenade. The body **17** is attached to the wire by four small strings running to its periphery, and said body is clamped between the grenade body and the safety pin **14**. When the pin **14** is drawn out and the grenade is launched, the wire will be drawn out by the air resistance force of the body **17** and the lever **12** with its heel **15** will be free to swing outwardly. The firing pin **4** is then able to be forced back to pierce into the primer with full power because the spacing member **9** (see FIG. 3) on the rotatable knob **8**, is able to penetrate further into the head because the flange **10** is omitted in this rotational position.

FIG. 4 shows one or more pins **40** inserted in the

jacket surface of the cylinder **2**, bringing the tongues **7** of the knob or cap out of the head. When the knob has been given about half a turn, one of the tongues will snap down over the pin so that it will rest entirely upon the shoulder of the heel **15** as seen in the right view in FIG. 4. These pins have the same function as the screw surface in the bottom of the slit **3**.

FIG. 5 shows a knob that is cut in one single plane inclined to the axis so that only one tongue is formed. The heel **15** alone will bring the knob up or out and the knob is turned until a small notch **18** in the tongue snaps over the shoulder on the heel **15**. The tongue acts as a spacing member normally resting against a supporting flange as in FIGS. 1, 2 and 3. The base plate has a notch **19** under the heel **15** that is so deep that the arming knob can penetrate downwardly enough for the firing pin to reach the ignition cap.

FIG. 6 shows a supporting element in the head of the grenade consisting of a screw surface with the same shape as the bottom of the slit **3** with the difference that the surrounding outer tubular wall is omitted. The tongues 7 of the arming knob in this embodiment may consist of simple rods, bars or something of similar nature. It will be clear that either or both of the supporting elements **6** and **7** have screw surfaces or only one of them can be so provided.

FIGS. 7 to 9 show another embodiment with the contact surface **6** in the fuse head designed as a plug-in unit. This unit is fixed to the head by means of a lug-and-pin mounting, as indicated at **24** and **25**. Another feature of this embodiment is that the spacing member **9** is designed as an axial flange located on the jacket surface of the detachable fuse head.

The drop safety is based upon an inertia member in the shape of a ring **21** around the head, said ring being loosely held by a permanent magnet **26**. The ring **21** is fixed to a member journalled around a pin through the locking member close to the heel **15**. The member **22** has a tooth that will engage a pin **23** if the grenade is dropped or if the arm **12** is released unintentionally. If on the other hand, the grenade is launched, the ring will be flung forwardly because of its inertia, thus overcoming the attraction of the permanent magnet **26**. The tooth of the member **22** is now in such a position that it can no longer reach the pin **23** and thus it cannot prevent the lever from fully swinging out assisted by the spring **20**. The heel **15** slides to the side and the knob **8** then moves in, enabling the firing pin to strike the ignition cap as previously described. All or most of the parts of the device can in most instances be composed or moulded plastic.

What we claim is:

1. A fuse for a hand grenade comprising, a grenade body having a head provided with a central opening, a cap fitted over the opening and carrying a spring-loaded firing pin which extends through the opening, said cap being rotatively carried on the head, complementary guiding means on the head and cap by which the cap is moved axially and in a direction away from the head by the rotation of the cap, a pivoted lever having a shoulder against which the cap is brought to rest when the cap is first moved to an extended position by rotative movement, means for holding the lever in cap-maintaining position, said means being releasable to permit outward swing of the lever to allow the return of the cap to a retracted position, the head of the grenade having a tubular section with V-cuts surrounding a core having a vertical flange that surrounds the core and acts as a spacing member, the tubular part and the core constituting a plug-in unit attached to the head of the grenade by means of a pin mount, the locking lever having a drop safety consisting in a member journalled in the lever, said member having a tooth for engagement with a pin, said member also having a ring disposed around the head of the grenade, and a magnet for engagement with the ring to hold the ring closely adjacent to the head.

2. A hand grenade fuse with a pivoted lever controlling a spring-loaded hammer and comprising, a fuse head having an axial piercing hole for said hammer, a cap to which the hammer is attached, the cap being rotatably carried on the fuse head, the fuse having guiding means on the head and cap and by which the cap is given an axial displacement away from the head by rotation of the cap, the pivoted lever having a stop shoulder against which a free end on the guiding means is brought to rest when the cap is first moved to an extended position by manual rotation, and releasable means for holding the lever in cap-maintaining position.

3. A fuse according to claim **2**, wherein the guiding means comprises a tubular knob notched in an open end with a saw-toothed pattern to form oblique or inclined surfaces having tongues, and a spiral ramp on the head engaged by the tongues to reduce the force required to axially displace the knob.

4. A fuse according to claim **2**, wherein the head is provided with an annular slit which divides said into a centrally-apertured core and a surrounding tubular wall, said slit having an inclined bottom ramp forming a saw-tooth pattern, the cap having a flange with a lower edge complementary to the saw-tooth pattern of the bottom ramp of the head.

5. A fuse according to claim **2**, wherein there are radial pins projecting from the jacket surface of the head to reduce the force required to axially displace the knob.

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ROBERT F. STAHL, Primary Examiner

U.S. Cl. X.R.

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