

Dec. 14, 1965

R. SIMMEN

3,223,035

Filed June 2, 1964

2 Sheets-Sheet 1

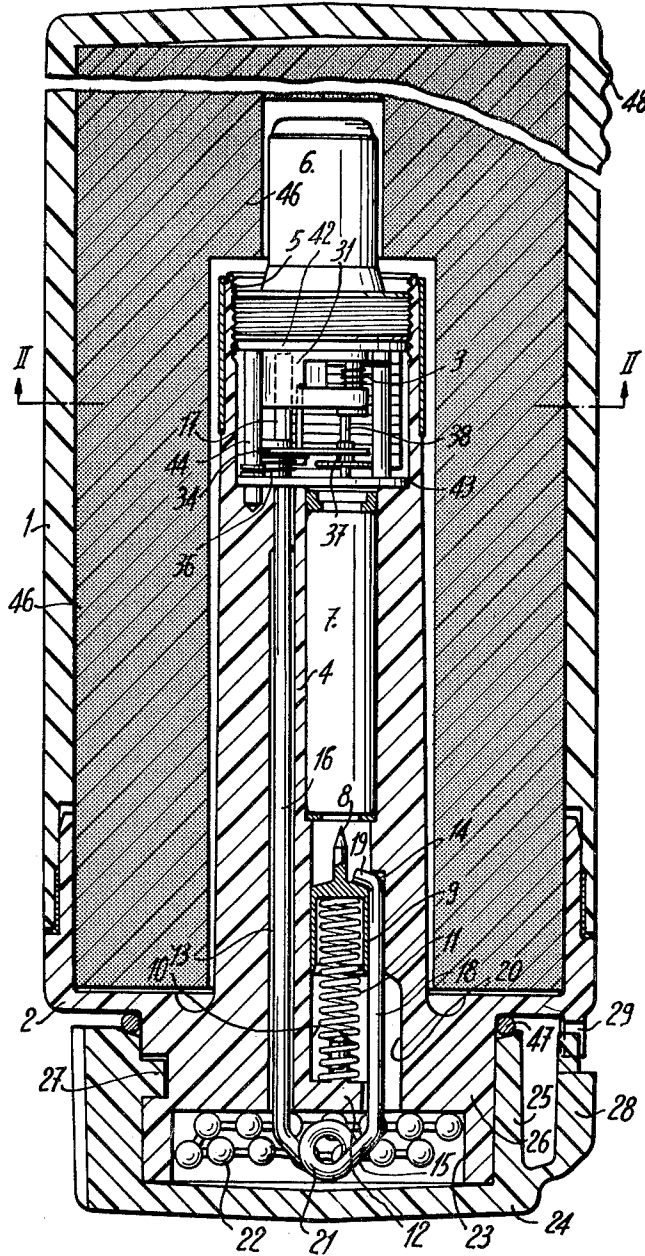


FIG. 1

INVENTOR

ROBERT SIMMEN

BY *Emory L. Groff*
ATTORNEY

Dec. 14, 1965

R. SIMMEN
HAND GRENADE

3,223,035

Filed June 2, 1964

2 Sheets-Sheet 2

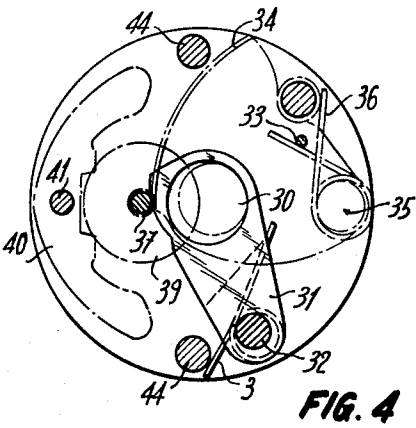
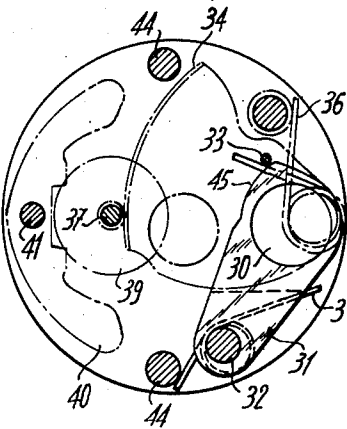
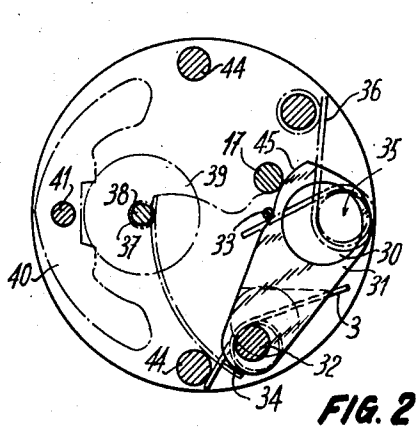
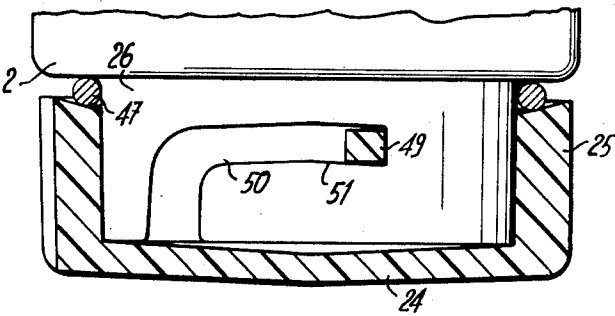


FIG. 5



INVENTOR

ROBERT SIMMEN

BY *Emory L. Hoff*
ATTORNEY

1

3,223,035

HAND GRENADE

Robert Simmen, Geneva, Switzerland, assignor to
Mefina S.A., Fribourg, Switzerland, a corporation of
Switzerland

Filed June 2, 1964, Ser. No. 371,893

Claims priority, application Switzerland, June 14, 1963,
7,433/63

5 Claims. (Cl. 102—64)

The present invention relates to a hand grenade of the kind comprising a body enclosing an explosive charge, a detonator, a primary pyrotechnic time fuse for firing the detonator, a striker capable of being subjected to the action of a spring in the armed position, and a locking pin.

Hand grenades are known provided with a pyrotechnic time element between the lighting fuse and the detonator which causes the charge of the hand grenade to explode. This delay in firing enables the grenade to be thrown without danger to the thrower, the delay being of the order of three to four seconds.

These known constructions, apart from complicated and difficult ones, have the following disadvantages:

(1) It may happen that the delayed firing element is short-circuited for some reason, that is to say, the grenade explodes at the very moment the fuse is fired.

(2) These grenades are not provided with a safety detonator, which gives rise to danger in storage and handling.

The object of the present invention is to surmount these disadvantages in a simple manner, without the cost price of the grenade being greatly increased.

According to the invention a hand grenade of the kind referred to is provided with a safety device for the detonator comprising an intermediary fuse secured to a fuse carrier kept in a position remote from the detonator in the unarmed position by at least one locking member, and a delay mechanism for bringing the intermediary fuse into the armed position after the locking pin is withdrawn.

The accompanying drawings are a schematic embodiment of an example of the present invention in which:

FIGURE 1 is an axial section through a grenade;

FIGURE 2 is a cross-section of a safety device for the detonator on the line II—II of FIGURE 1, the device being in the safe position;

FIGURE 3 is a view similar to the foregoing, showing the device in the course of operation;

FIGURE 4 is a view similar to FIGURES 2 and 3, showing the device at the end of operation; and

FIGURE 5 shows a detail of an alternative cover.

The hand grenade shown in the attached drawings comprises a body 1 in the form of a cylindrical container closed by a part 2. The part 2 is intended to be mounted on the part 1 of the body by high frequency welding or by cementing. In the embodiment shown these parts 1 and 2 are formed of injection moulded synthetic plastics material.

The part 2 of the body of the grenade is connected to a centre tubular part 4 extending coaxially in the cylindrical container 1. This centre part 4 supports a detonator 6 at its free end 5. A primary pyrotechnic time fuse 7 is disposed in the median part of the centre part 4. The fuse 7 is intended to be fired by a striker 8 connected to a part 9 in the form of a piston. The part 9 is adapted to slide in the cylindrical bore 10 formed in the centre part 4 of the body of the grenade. A coil spring 11 bears, at one end, against the bottom 12 of the bore 10 and, at the other end, against the piston 9 carrying the striker 8.

The centre part 4 also has a passage 13 and a passage 14 on each side of the bore 10 adapted to receive a locking pin 15 which is formed by a steel wire in the form of

2

an elliptic spring. The steel wire has the general shape of a capital U, one of the branches 16 of which has an extension 17 extending beyond the primary fuse 7 into the vicinity of the detonator 6. The other branch 18 of the pin 15 has a bent back end 19. It should be noted that the passage 14 has an enlargement 20 over a portion of its length for hiding the bent end 19 of the branch 18 after the arming movement of the striker 8.

The pin 15 in the form of a clamp spring has at least one turn 21 serving as a link between the two branches 16 and 18. Hooked in this turn is a fuse chain 22 of the grenade. A seat 23 is formed in the centre part 4 to receive the chain 22. A removable cover 24 covers, in the storage position, the seat 23. The cover 24 has a cylindrical portion 25 engaging round a boss 26 provided on the centre part 4 of the body of the grenade. The cover 24 is retained on the boss 26 by a bayonet closing device 27. Two resilient lugs 28, only one of which is shown in FIGURE 1, are adapted to co-operate with the stud 29 connected to the body of the grenade to prevent any angular displacement of the cover 24 on the boss 26 in the direction permitting disengagement of the third cover. This operation of disengagement can be effected only by pressing the lugs 28 radially inwardly so that they can avoid the respective studs 29 and thus enable the cover 24 to be angularly displaced for removal.

The grenade also comprises a safety device for the detonator located between the primary fuse 7 and the detonator 6. This safety device for the detonator is of the type comprising an intermediary fuse 30 (see FIGURE 2) fixed to a fuse carrier 31 adapted to oscillate about an axis 32. A spring 3 tends to pivot the fuse carrier 31 in anti-clockwise direction, with reference to FIGURE 2 in order to bring the intermediary fuse 30 in the centre position in the firing path between the primary fuse 7 and the detonator 6. The fuse carrier 31 is retained in a remote position by a peg 33 carried by a toothed sector 34 forming part of a delay mechanism having a clockwork movement for permitting the intermediary fuse 30 to be brought into the armed position with a certain delay which is controlled mechanically.

The toothed sector 34 is capable of pivoting over an axis 35 under the bias of a spring 36, in clockwise direction relatively to FIGURE 2. This toothed sector 34 meshes with a pinion 37 carried by a spindle 38. The spindle 38 also carries an escapement wheel 39 co-operating with an oscillating mass 40 pivoting on an axis 41. The pivotal axes 32 of the fuse carrier 31, 35 of the toothed sector 34, 38 and 41 are fixed between two plates 42 and 43 connected together by columns 44. The two plates 42 and 43 are both provided with a centre opening for the passage of the flame at the moment the primary fuse 7 is fired. Furthermore the plate 43 has an opening located opposite the passage 13 to permit the passage of the extension 17 of the branch 16 of the locking pin 15. As shown in FIGURE 2, in the safe or storage position this extension 17 of the pin 15 is located in front of the toothed sector 34, similarly as on the path of the fuse carrier 31, in order to lock these two members in the safe position.

The operation of the above described grenade is as follows:

The first operation before the throwing of the grenade consists in removing the cover 24 by pressing radially on the lugs 28 in order to displace the cover 24 angularly and thus permit its removal. When the cover 24 is removed, the thrower of the grenade pulls on the chain 22, the pin 15, engaged by the said chain, displaces towards the bottom 12 the piston 9 connected to the striker 8, stretching the spring 11. Simultaneously the branch 16 of the pin 15 is progressively removed from the safety device of the detonator. As soon as the turned over end 19 of the

branch 18 of the pin 15 arrives opposite the engaged portion 20 of the passage 14, this end 19 becomes hidden in the enlarged portion 20 and frees the piston 9 which, under the action of the spring 11, causes the displacement of the striker 8 in the direction of the primary fuse 7. After engagement of the bent-over end 19 in the enlarged portion 20 the end 17 of the branch 16 of the pin 15 frees the toothed sector 24 which begins its movement of angular displacement under the action of its spring 36. This angular displacement of the toothed sector 34 is braked by the escapement device 39, 40. During the entire movement of angular displacement of the toothed sector 34, the peg 33 carried thereby, retains the fuse carrier 31 in the safe position.

FIG. 3 shows precisely the position occupied by the toothed sector 34 after approximately two seconds of the operation of the clockwork movement. It will then be seen that the peg 33 is still opposite a zone 45 of cylindrical shape presenting the fuse carrier 31. When the peg 33 goes beyond the zone 45, it allows the fuse carrier 31 to be pivoted by its spring 3 which brings the intermediary fuse 30 into a centre position, as shown in FIGURE 4. As the primary fuse 7 is a pyrophoric time fuse, it is only when the intermediary fuse 30 has been brought to the centre position that the flame from the primary fuse 7 can reach it. At that moment the intermediary fuse 30 is fired causing the chain firing of the detonator 6 and then of the explosive charge 46 disposed in the cylindrical container 1 about the centre part 4 of the body of the grenade.

It should be noted that, to ensure the tightness of the grenade during storage, the joint 47, for example of rubber, is squeezed between the part 2 of the body of the grenade and the cylindrical part 25 connected to the cover 24.

The cylindrical part 1 of the body of the grenade also has a thread 48 for screwing a metal bush round the part 1. In fact, the grenade described with reference to the attached drawings presents, preferably a body 1, 2, of moulded or injected synthetic plastics material. The use of the grenade provided only with the body 1, 2 with moulded or injected synthetic plastics material is made, in principle, only when the grenade is intended for an offensive object. In fact, when it is intended to be used as a defensive weapon, it is preferable to engage round the body 1, the metal bush, not shown, the bursting of which will be much more lethal at the moment of use.

FIGURE 5 shows a variant of the cover 24, according to which it has an inner stud 49 intended to engage in the groove 50 formed in the centre boss 26 connected to the part 4 of the body of the grenade. This groove 50 has a corresponding slope in its terminal portion 51. The stud 49 and its groove 50 constitute in fact a bayonet type fixing device with resilient locking of the said device as soon as the stud 49 is in contact with the reversed slope 51. The resilience of the locking operation is due to the squeezing of the rubber joint 47 between the part 2 of the body of the grenade and the part 25 of the cover 24.

I claim:

1. A hand grenade comprising a body, an explosive charge and a detonator housed in the body, a primary pyrotechnic time fuse for the firing of the detonator, a striker movably mounted on the body between an armed and an unarmed position, a spring on the striker adapted to urge the striker when in the armed position and a locking pin movably carried on the body against the striker in the armed position, in which a detonator safety device is carried in the body and comprises a fuse carrier carried movably in the body between an armed and an unarmed position, an intermediary fuse secured to the fuse carrier, locking means for locking the fuse carrier in a position remote from the detonator in the unarmed position and a delay mechanism connected to the locking pin and the locking means and adapted to bring the fuse carrier into the armed position after the locking pin is withdrawn from the striker, said locking pin having two parts, one of which forms the locking means of the delay mechanism and the other being adapted to be carried against the striker in the armed position.

2. A grenade according to claim 1, in which the locking pin has a U shape with two branches, an extension on the first branch being connected to the delay mechanism and the fuse carrier for locking them in the unarmed position, a curved end on the second branch adapted to arm the striker at the beginning of withdrawal movement of the locking pin.

3. A grenade according to claim 2, having a tubular centre body portion connected at one end to the rest of the body and carrying the detonator at its other end, the primary time fuse, the striker and its spring and the detonator safety device being mounted in the centre body portion, the detonator safety device being mounted between the primary time fuse and the detonator, two parallel passages formed in the centre body portion one of which is adapted to permit passage of the first branch of the locking pin, an enlargement provided over a portion of the length of the other passage to accommodate the curved end of the second branch of the locking pin after movement of the latter to arm the striker.

4. A grenade according to claim 3, in which the locking pin is in the form of a clamp spring at least one turn of which links its two branches, a fuse chain of the grenade being engaged in said turn.

5. A grenade according to claim 4, having a seat adapted to receive the fuse chain in the tubular centre body portion, a removable cover being provided over the seat.

References Cited by the Examiner

UNITED STATES PATENTS

2,872,866 2/1959 Brown et al. ----- 102—64

BENJAMIN A. BORCHELT, *Primary Examiner*,

FRED C. MATTERN, JR., *Examiner*.