Jan. 29, 1946. T. MILLER 2,393,861

HAND GRENADE

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FIG. 1.

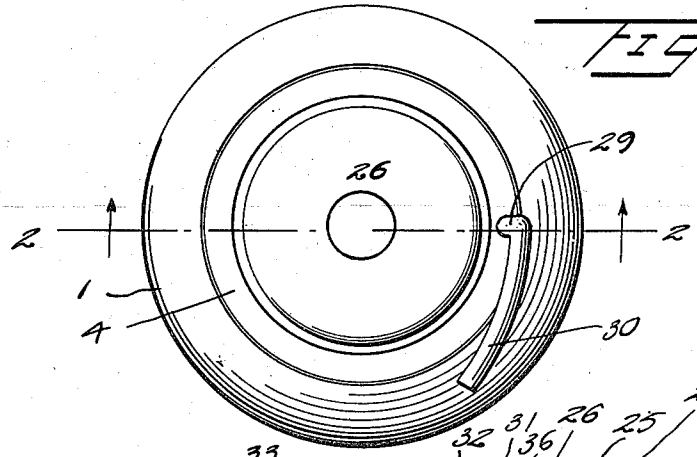


FIG. 2.

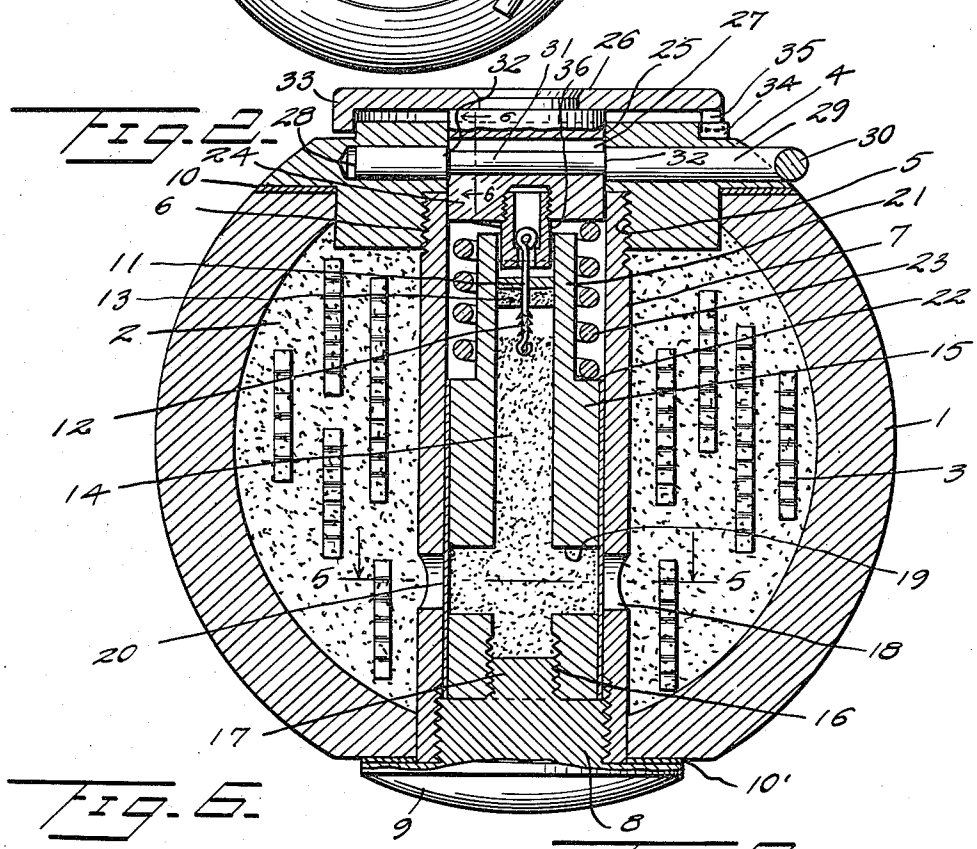


FIG. 6.

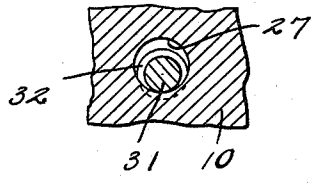
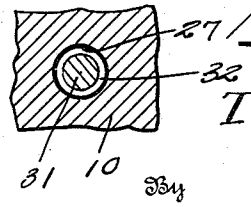


FIG. 7.



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FIG. 3.

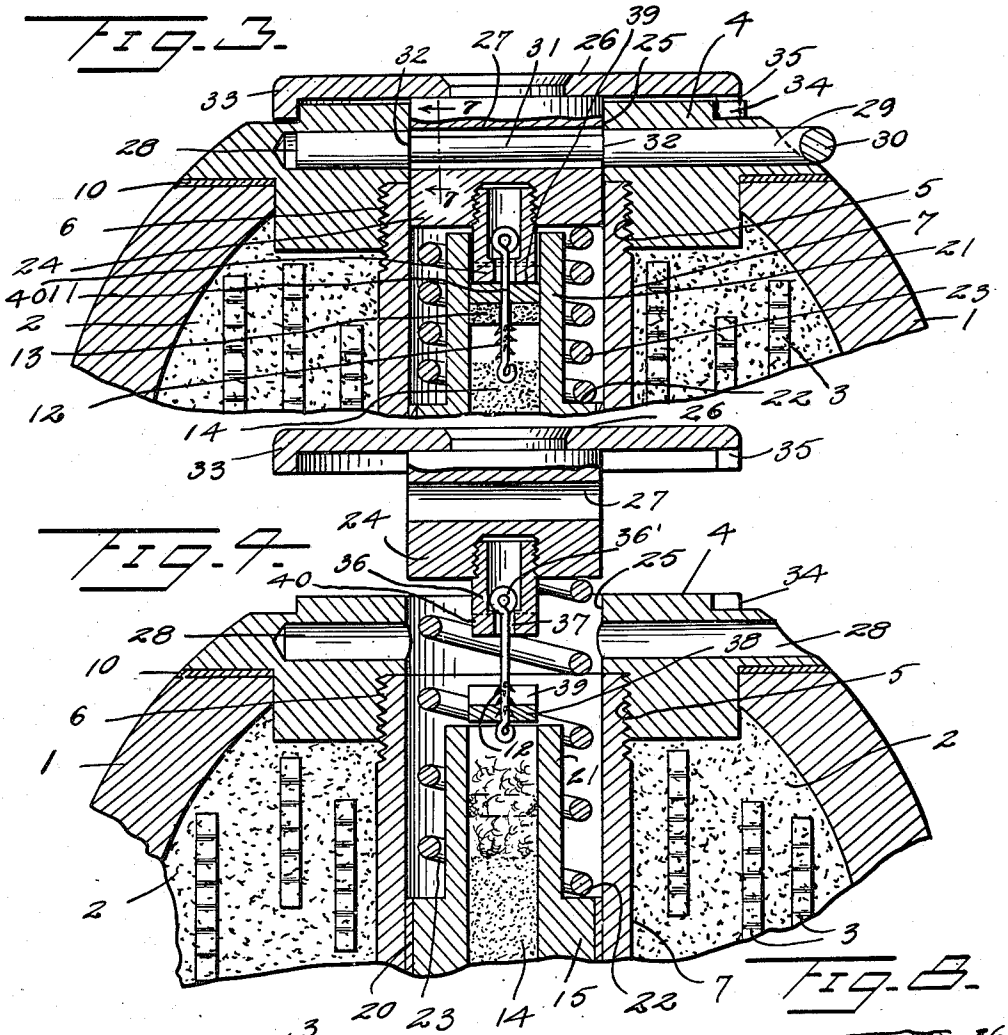


FIG. 4.

FIG. 5.

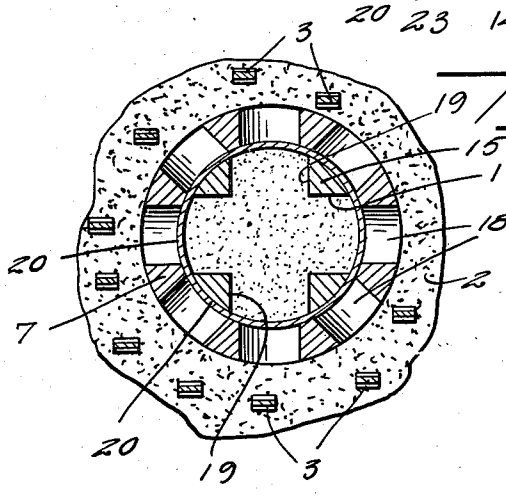
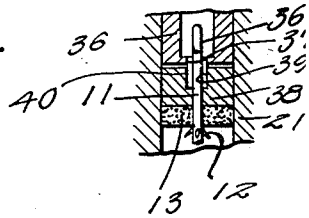


FIG. 6.



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UNITED STATES PATENT OFFICE

2,393,861

HAND GRENADE

Tobias Miller, Point Lookout, N. Y.

Application June 10, 1941, Serial No. 397,481

1 Claim. (Cl. 102—64)

This invention relates to hand grenades or other missiles of a similar character comprising a casing containing an explosive, incendiary, or gas producing material for the purpose of explosion fragmentation, or emission of smoke, flame or gases.

One object of my invention is to provide a device of the character above described with improved means for preventing the premature firing thereof.

Another object of my invention is to provide a device of this character with means for preventing the firing of the device while still in the hand of the user.

Still another object of the invention is to provide a device of this character of such design and construction as to be more readily handled and thrown than the present known and used grenade.

Still another object of my invention is to provide a device of this character with an improved firing mechanism which will permit the grenade to be shipped or stored away when not in use without danger of the firing mechanism accidently setting off the explosive mixture contained therein.

Still another object of the invention is to provide a device of this character which is light in weight and which can be easily and accurately thrown by the user in a manner similar to throwing a baseball.

Still another object of the invention resides in the provision of a device which is simple in construction, comparatively inexpensive to manufacture and one which will be very efficient in operation.

With these and numerous other objects in view, my invention consists in the novel features of construction, combination and arrangement of parts, as will be hereinafter referred to and more particularly pointed out in the specification and claim.

In the accompanying drawings, forming a part of this application:

Figure 1 is a top plan view of a hand grenade embodying my invention;

Figure 2 is an enlarged vertical section taken on line 2—2 of Figure 1, showing the position of parts when the device is assembled;

Figure 3 is an enlarged sectional view of the upper portion of the grenade, with parts broken away, and showing the position of parts prior to removal of the safety pin;

Figure 4 is a similar view showing the position of parts immediately after the grenade has been thrown by the user;

Figure 5 is a horizontal section, with parts broken away, as seen on the line 5—5 of Figure 2;

Figure 6 is a vertical section, with parts broken away, as seen on the line 6—6 of Figure 2;

Figure 7 is a vertical section, with parts broken away, as seen on the line 7—7 of Figure 3; and

Figure 8 is a vertical section with parts broken away, showing the position of parts when the firing mechanism is being assembled.

In describing the invention, I shall refer to the accompanying drawings in which similar reference characters designate corresponding parts throughout the several views and in which the numeral 1 designates the casing or shell of the grenade which is substantially spherical in shape and which may be made of metal, plastic, pressed paper or any other suitable material.

The casing 1 contains a suitable explosive substance such as blank firing powder 2 which is caused to explode in a manner hereinafter more fully described. Loose strips 3 of metal are placed within the casing intermingled with the powder, which causes a shrapnel effect of the grenade when the same is exploded.

The casing 1 has a portion cut therefrom on a plane surface to provide an opening through the medium of which the explosive substance is introduced into the shell. A filling cap 4 fitting over the opening is provided with an internally threaded bore 5 extending within the casing a distance sufficient to permit the threaded bore of the filling cap to engage the externally threaded portion 6 of a cylindrical sleeve 7 which extends wholly within the casing 1. The opposite or lower end portion of the sleeve 7 is internally threaded and engages the threaded shank portion 8 of a closing cap 9. The cap 9 extends over an opening formed in the wall of the casing, opposite the filling cap. By this arrangement of parts, the filling cap 4 and the closing cap 9 are effectively retained on the casing. Suitable washers 10 and 10' are interposed between the filling and closing caps, respectively, and the wall of the casing in order to effect a tight connection between these parts.

The firing mechanism for the grenade comprises a friction wire 11 provided with barbs 12 at its lower end, a friction primer composition 13 of any suitable combustible material formed on the friction wire and a power train 14 of compressed black powder or any other suitable slow burning composition.

The friction primer composition and the powder

train are contained wholly within a cylinder member 15 which extends within the cylindrical sleeve 7 and the lower end of the cylinder 15 is provided with internal threads 16 which engage a reduced threaded shank portion 17 of the closing cap 9.

A plurality of openings 18 are provided in the wall of the cylindrical sleeve 7, adjacent the lower portion thereof and a plurality of similar openings 19 are formed on the same plane in the wall of the cylinder 15. It will be noted that considerably more openings are provided in the wall of the sleeve 7 and of smaller diameter than the openings in the wall of the cylinder 15. For this reason, when the device is assembled and the cylinder 15 is threaded on the reduced shank portion 17 of the closing cap 9, the openings in the wall of the cylinder will always be in registration with some of the openings in the wall of the sleeve, thereby forming a means of communication between the interior of the cylinder and the interior of the casing, externally of the sleeve, as clearly illustrated in Figures 2 and 5 of the drawings.

A paper liner 20 extends between the cylinder 15 and the sleeve 7 covering the openings 19 in the wall of the cylinder thereby retaining the compressed black powder 14 entirely within the cylinder, and also preventing the explosive material from intermingling with the compressed black powder.

The upper portion of the cylinder 15 is reduced in diameter externally as shown at 21, forming a shoulder member 22.

A coil spring 23 surrounds the reduced end portion 21 of the cylinder and the lower end thereof bears against the shoulder 22 while the upper end bears against the under surface of a circular plug 24 which extends through a circular opening 25 provided in the central portion of the filling cap 4. The plug 24 is riveted or otherwise secured to the inner face of a depressible plate 26 and is provided with a bore 27 extending diametrically therethrough. A bore 28, of the same diameter as the diametric bore 27 provided in the plug, extends from one side of the filling cap to a point adjacent the opposite side thereof. A locking member in the form of a pin 29 extends in the bore 28 and through the diametric bore 27 of the plug 24. In this manner, the depressible plate 26 and plug 24 are effectively retained on the filling cap. A handle member 30, for the locking pin, extends outwardly beyond the wall of the casing and is bent inwardly and curved to conform to the contour of the casing, as shown in Figure 1 of the drawings.

The locking pin 29 is reduced centrally as shown at 31 forming shoulders 32. The shank portion 31 extends the length of the diametric bore 27 of the plug 24 and when the parts are in assembled relation as shown in Figure 2 of the drawings, the coil spring 23, bearing against the under surface of the plug, urges the same outwardly, thereby causing the shoulders 32 to engage the periphery of the plug at ends of the diametric bore 27. In this manner, the locking pin is effectively locked in the bore 28 of the filling cap and the diametric bore 27 of the plug member and the same cannot be removed therefrom until the plate 26 and plug 24 are pressed inwardly a distance sufficient to align the bore 28 of the filling cap and the diametric bore 27 of the plug, as shown in Figures 3 and 7 of the drawings, whereupon the shoulders 32 will disengage the side of the diametric bore and the locking pin then being free to be removed.

A depending flange 33 extends about the periphery of the depressible plate 26 and the inward movement of said plate and plug 24 is limited by reason of the flange contacting the top surface of the filling cap. The innermost movement of the plate and plug, however, will align the bore 28 of the filling cap and the diametric bore 27 of the plug 24, whereupon the locking pin may be removed.

The filling cap 4 is provided on its upper face with a radial lug 34 which is in vertical alignment with the bore 28 and the flange 33 of the plate 26 has a recess 35 formed therein to receive said lug when the parts are in assembled relation, thereby preventing any rotation of the depressible plate 26 on the filling cap 4. The lug 34 and recess 35 also serve as guide means for aligning the bore 28 of the filling cap and the diametric bore 27 of the plug when the device is being assembled.

The friction wire 12 is slidably retained within a cup member 36 by means of an eye member 36' formed at the outer end of said wire. One end of the cup member engages by threads the under surface of the plug 24 at the central portion thereof and an opening 37 is provided in the opposite end thereof through which extends the friction wire. A soft metal plug 38 provided with a recess 39 at the upper end thereof is formed on the friction wire and snugly fits within the cylinder 15, thereby forming a closure for the upper portion of the cylinder and maintaining the friction primer composition and powder train within said cylinder.

The cup member 36 is provided at its lower end with a rib member 40 which normally projects within the recess 39 of the soft metal plug and adapted only to engage the bottom of said recess when the device is being assembled, as shown in Figure 8 of the drawings. Thus, the friction wire and friction primer composition may be readily placed within the cylinder without forcing the friction wire through the friction primer composition and any premature firing of the grenade when the same is being assembled is avoided.

The grenade is assembled in the following manner.

The sleeve 7 is first threaded on the shank portion of the closing cap 4. The paper liner 20 is then inserted in the sleeve 7 and the cylinder 15 containing the compressed black powder is secured to the reduced shank portion 17 of the closing cap. After this has been accomplished, a suitable explosive substance 2 is placed within the casing 1 along with material to cause a shrapnel effect such as loose strips 3 of metal. Then, the closing cap 4 is threaded on the upper portion of the sleeve 7. The coil spring 23 is then placed about the upper reduced portion 21 of the cylinder and then the depressible plate 26, plug 24 and cup member 36 supporting the friction wire 11 is assembled in one unit by forcing the plug member inwardly against the action of the coil spring. The innermost movement of the unit, however, will align the diametric bore 27 of the plug with the bore 28 of the filling cap whereupon the locking pin 29 may be inserted therein and the unit permitted to extend outwardly under the action of the coil spring, thereby causing the diametric bore 27 of the plug 24 to engage the reduced shank portion 31 of the locking pin. At such time the shoulders 32 of the locking pin engage the periphery of the plug at ends of the diametric bore 27, thus effectively locking the firing mechanism within the casing and also preventing any accidental removal of the locking pin.

When the device is to be thrown, it is held in the palm of the hand with the fingers or thumb over the depressible plate. Then, by depressing the plate until the bores **27** and **28** are aligned, the locking pin may be withdrawn and the grenade thrown. At the instant it leaves the hand, the plate **26**, plug **24** and cup member **36** carrying the friction wire with the soft metal plug **38** formed thereon, are forced outwardly of the casing, as shown in Figure 4 of the drawings. This causes the friction wire to be drawn through the friction primer composition and igniting the same which in turn ignites the black powder contained within the cylinder. The removal from the casing of the plate **26**, plug **24**, together with the soft metal plug formed on the friction wire, permits air to enter the cylinder and provide proper combustion of the black powder. When the black powder burns down to points opposite the openings in the wall of the cylinder, the paper liner will burn thereby permitting the flames to ignite the explosive charge contained within the casing. The loose strips of metal within the casing will cause a shrapnel effect of the grenade when the same is exploded.

While I have particularly described the elements best adapted to perform the functions of the invention, it is apparent that various changes in form, proportion and in the minor details of construction may be resorted to without departing from the spirit of the invention.

Having thus described my invention, what I claim is:

In a grenade, a casing, an explosive substance within said casing, a filling cap in the wall of said casing, a removable plug mounted in and operable through said filling cap, means within the casing urging said plug outwardly and manually removable means for restraining the outward movement of said plug, a cylindrical sleeve removably secured to said filling cap and communicating with the interior of the casing, a cylinder within said cylindrical sleeve, an inflammable substance within said cylinder, a friction-ignited primer in said cylinder in cooperating relation to the inflammable substance and a friction wire carried by said removable plug in position for frictional rubbing engagement with said primer to ignite the primer and thereby ignite said inflammable substance as said plug moves outwardly from the filling cap.

TOBIAS MILLER.