

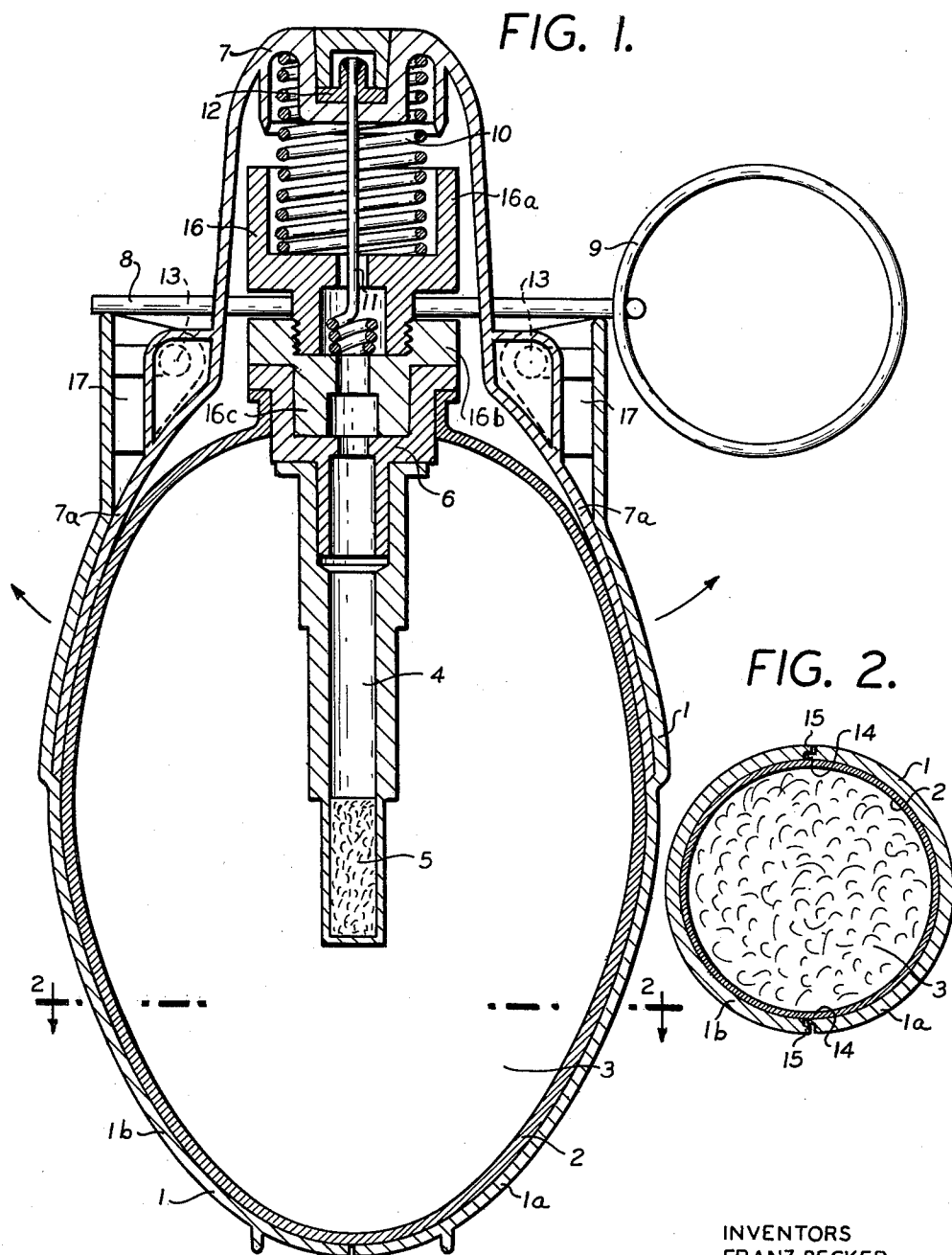
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HAND GRENADE

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HAND GRENADE

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Pyrotechnic devices exist, which are intended for practice purposes, such as hand grenades having a body which consists, like a practice signal cartridge, of powder, such as clay powder, which is surrounded by a waterproof, thin covering such as plastic, and is provided with a spring-loaded cap which is secured on the grenade during non-use, and which cooperates with an igniting device consisting of a friction igniter, and is associated with legs or limbs acting as leaf springs. These grenades are so constructed that, when the cap is placed on the grenade body, the legs of the cap lie against the body and elastically clutch it, but only in such a manner that their elastic clutching force will be overcome by the force of a spring which, after a safety device has been removed, and after the hand of the thrower has released the legs in throwing the grenade, hurls the cap away from the body and operates the friction igniter. Such hand grenades have not proven entirely satisfactory in actual practice, especially because premature ignition can be produced by the premature release of the cap due to the great deformability of the body.

The subject of the present invention is pyrotechnic devices, such as hand grenades, for practice purposes, which are filled in a known manner with powders, colored liquids or the like, and are provided with a spring loaded, self-ejecting cap which cooperates with an igniting device characterized by a plurality of shell segments, preferably two half shells, articulated on the cap and held in assembled relation so as to form a shell by the safety pin, while at the same time the shell segments are urged to an open or spread condition by spring means which, upon removal of the pin, become operative to spread the shell segments. Expediently, the shell segments are held in the proper assembled relation by guiding means provided on their sides and engaging one another. The signal material is in a waterproof, thin container, preferably made of an elastic plastic such as polyethylene, or of impregnated paper or fabric. The igniter can be a tearing, percussion or friction igniter. All parts, with the exception of the cap ejecting spring and certain parts of the igniter, can be made of plastic.

The hand grenade according to the present invention, considered purely externally, is a solid body which does not differ in appearance from a standard hand grenade. Before throwing, it is armed in the customary manner, in that the throwing hand envelops the grenade body while the other hand pulls out the safety pin. As long as the shell segments or two half shells remain enveloped by the thrower's hand, the igniter cannot be operated, i.e., the hand grenade can be held in the hand for an unlimited length of time in this state. Not until the grenade is thrown do the half shells fly apart under the effect of coil or leaf springs, the cap being drawn off of the grenade body under the influence of a helical spring, so that the igniter simultaneously goes into operation. Ignition is started at the moment the shells fly apart and is carried on through a delay charge, so that the actual explosion of the plastic body depends only on the burning time of the delay charge.

Thus, the invention provides a grenade including an outer casing, a throw-off cap mounted on one end of the

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casing, and means biasing the cap, urging it off the casing. This biasing means can be arranged so that it works axially of the casing, in the conventional manner for operation of a helical spring utilized with a throw-off cap. Further, the grenade includes a removable retainer means for holding the cap mounted on the casing against the force of the biasing means. Also included are a plurality of arms articulated to the throw-off cap and extending from the cap about the casing to adjacent the other end of the casing. The arms are disposed for being clutched in a hand holding the grenade. The arms can be shell segments which together form a protective covering for the casing. Spring means which work radially of the casing and urge the arms away from the casing are provided. The spring means can be leaf springs connected to the throw-off cap. The grenade also includes removable retainer means holding the arms, or shell segments, about the casing in opposition to the force of the radially acting springs. Thus, upon release of the first-mentioned and second-mentioned retainer means and release of the grenade from the hand, said springs and the biasing means cooperate to eject the throw-off cap and the arms or shell segments from the casing. A pin, as is conventionally used on grenades, can serve as the means for restraining the cap against the pressure of the cap biasing means, and also as the means for restraining the force of the radially working springs. Where shell segments are provided, they are preferably in abutting relation along axially extending edges thereof, and means are disposed along abutting portions of the segments for aligning the segments to provide a uniform protective covering for the casing.

The invention is further described in reference to the accompanying drawing, wherein:

FIG. 1 is an elevated view in cross-section of a device according to the invention; and

FIG. 2 is taken along line 2—2 in FIG. 1.

In the drawing, an example of the embodiment of the invention is represented schematically. 1 indicates the protective shell made up of two half shells 1a and 1b, 2 the hand grenade casing, 3 the filler, 4 the delay charge, 5 the explosive charge, 6 the plug, 7 the throw-off cap, 7a the leaf spreading springs, 8 the safety pin, 9 the pull ring, 10 the helical spring for ejecting the cap, 11 the tearing igniter, and 12 the fastening of the igniter tearing wire.

The leaf springs 7a can be integral with the cap 7 and need only extend about a portion of the circumference of the shell 3. The half shells are hinged to the cap by hinge connections 13. The pin 8 clamps the shell halves 1 together and biases the leaf springs 7a so that, upon removal of the pin and release of a hand grip on the half shells 1, the leaf springs throw the half shells out from the grenade casing 2, while simultaneously the helical spring 10 thrusts the cap off the grenade body, so that the cap and half shells are thrown off and the ignition is effected.

The manner in which the half shells are provided in proper assembled relation is indicated in FIG. 2. Half shell 1a is provided with step edges 14 along each of the axially extending boundaries thereof and half shell 1b is provided with tongues 15, which complement the step edges 14 of shell half 1a so that suitable assembled relation of the shell halves is obtained. Thus the half shells are provided in aligned relation so that together they form a uniform covering for the casing 2.

In the embodiment shown, the pin 8 passes through fitting 16, which is mounted on the casing 2, and through the cap 7, so that it serves as a retainer for the cap. Further, pin 8 is in abutting relation with the extensions 17 of the half shells 1a and 1b, and thus the pin serves

to restrain movement of the half shells in response to urging of the leaf springs 7a.

As shown in the drawing, the fitting 16 can consist of two parts 16a and 16b which are screwed together or otherwise connected but it can also be made in one single piece. The plug 6 is fastened in the casing 2 by means of a fixed press fit or a screw connection whilst the fitting 16 with its attachment 16c is held in plug 6 only by means of a light press fit or sliding fit so that when the casing 2 is ejected by the force of the helical spring 10, the casing 2 together with plug 6 are disconnected from the remaining parts.

It has proved particularly advantageous to manufacture cap 7 and the leaf springs 7a in one piece from polypropylene by injection moulding. It is advisable to have the leaf springs 7a rectilinear and located in such a way that subtended leaf springs form an angle approximately of 75° to 90°.

For a hand grenade with a casing 2 of the biggest diameter of approximately 60 mm. and when cap 7 and leaf springs 7a were made in one piece from polypropylene, it has proved sufficient to construct the leaf springs 7a in a thickness of approx. 1 mm. and in a width of approx. 8 mm. in the peripheral direction of casing 2, if provision is made for three reinforcing ribs approx. 1 mm. width and 0.5 mm. height, in longitudinal direction at the inner sides of each of the two springs. Depending on the conditions, pin 8 extracted, the half shells 1a and 1b could be joined together by a light pressure of finger, whereby the free ends of the leaf springs 7a not touching casing 2, were pressed together to such an extent that the assumed chords between the ends of each of the two leaf springs formed an angle of approx. 45°.

The half shells 8, preferably also made from polypropylene, had a wall thickness of 1 mm. in this case.

It is evident that, depending on the kind of material used and size and type of the hand grenade, other dimensions and proportions are possible too.

What is claimed is:

1. A hand grenade comprising:

- (a) an outer casing deformable by a manual manipulation of the grenade,
- (b) a throw-off cap mounted on one end of the casing,
- (c) means biasing the cap, urging it off the casing,
- (d) removable retainer means for holding the cap mounted on the casing against the force of the biasing means,
- (e) a plurality of arms articulated to the throw-off cap and extending from the cap about the casing to adjacent the other end of the casing and for being clutched in a hand holding the grenade, said arms forming a protective covering for said outer casing, resistant to deformation by manual manipulation of the grenade,
- (f) leaf springs connected to the throw-off cap urging the arms away from the casing, and
- (g) removable retainer means holding the arms about the casing in opposition to the force of the said springs,

whereby, upon release of the first-mentioned and second-mentioned retainer means and release of the grenade from the hand, said springs and the biasing means cooperate to eject the throw-off cap and the arms from the casing.

2. Hand grenade according to claim 1, and a fitting on said casing, the throw-off cap being mounted on the fitting, and extensions on said arms, a removable pin extending through said cap and said fitting serving as the first-mentioned retainer means, and abutting with said extensions serving as the second-mentioned retainer means.

3. A hand grenade comprising:

- (a) an outer casing deformable by manual manipulation of the grenade.
- (b) a throw-off cap mounted on one end of the casing,

(c) means biasing the cap, urging it off the casing,
(d) removable retainer means for holding the cap mounted on the casing against the force of the biasing means,

(e) a plurality of shell segments articulated to the throw-off cap and extending from the cap about the casing to adjacent the other end of the casing, providing a protective cover for the casing and for being clutched in a hand holding the grenade, said protective covering being resistant to deformation by manual manipulation of the grenade,

(f) leaf springs connected to the throw-off cap urging the shell segments away from the casing, and

(g) removable retainer means holding the shell segments about the casing in opposition to the force of the said springs,

whereby, upon release of the first-mentioned and second-mentioned retainer means and release of the grenade from the hand, said springs and the biasing means cooperate to eject the throw-off cap and the shell segments from the casing.

4. Hand grenade according to claim 3, and a fitting on said casing, the throw-off cap being mounted on the fitting, and extensions on said shell segments, a removable pin extending through said cap and said fitting serving as the first-mentioned retainer means, and abutting with said extensions serving as the second-mentioned retainer means.

5. Hand grenade according to claim 3, said shell segments being in abutting relation, and means disposed along abutting portions of the shell segments for aligning the segments to provide a uniform protective covering for the casing.

6. Hand grenade according to claim 4, said shell segments being in abutting relation, and means disposed along abutting portions of the shell segments for aligning the segments to provide a uniform protective covering for the casing.

7. Hand grenade according to claim 6, there being two of said shell segments each covering half of the casing.

8. A hand grenade comprising:

- (a) an outer casing deformable by a manual manipulation of the grenade,
- (b) a throw-off cap mounted on one end of the casing,
- (c) means biasing the cap, urging it off the casing and working axially of the casing,
- (d) removable retainer means for holding the cap mounted on the casing against the force of the biasing means,
- (e) a plurality of arms articulated to the throw-off cap and extending from the cap about the casing to adjacent the other end of the casing and for being clutched in a hand holding the grenade, said arms forming a protective covering for said outer casing, resistant to deformation by manual manipulation of the grenade,
- (f) spring means working radially of the casing and urging the arms away from the casing,
- (g) removable retainer means holding the arms about the casing in opposition to the force of the said springs,

whereby, upon release of the first-mentioned and second-mentioned retainer means and release of the grenade from the hand, said springs and the biasing means cooperate to eject the throw-off cap and the arms from the casing.

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