H. E. ASBURY.

HAND GRENADE.

APPLICATION FILED FEB. 18, 1916.

1,234,713.

Patented July 31, 1917.

3 SHEETS—SHEET 1.

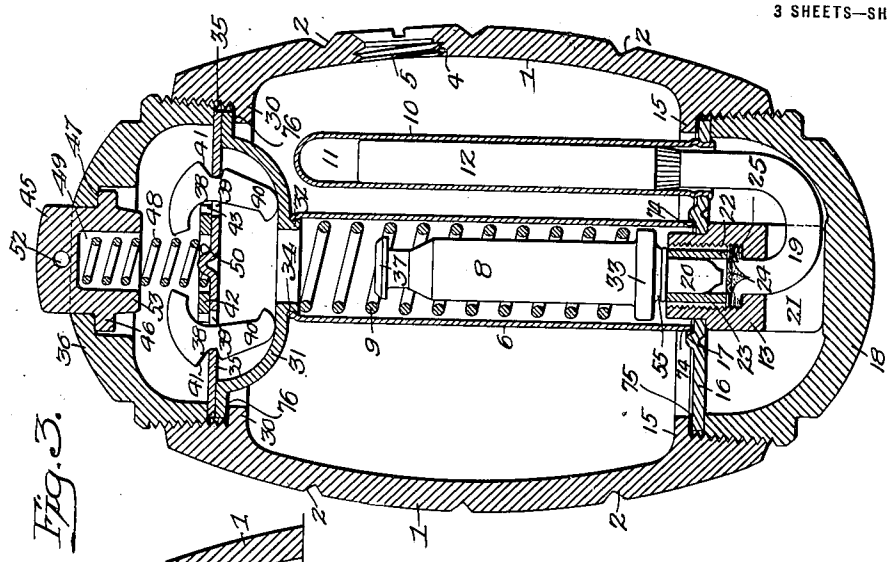


Fig. 3.

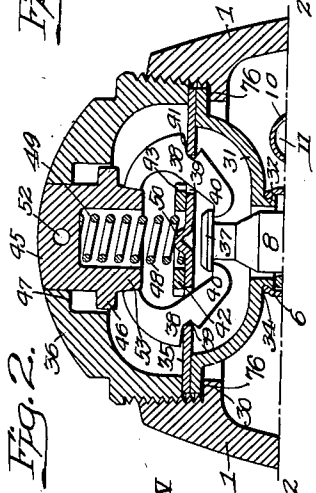


Fig. 2.

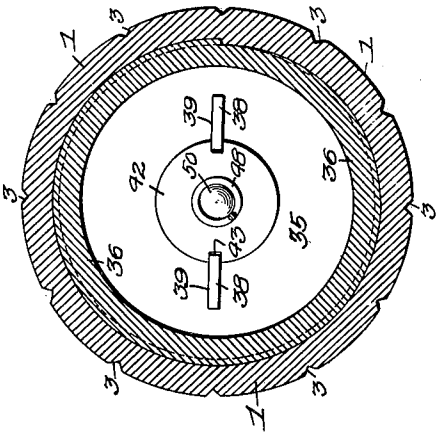


Fig. 4.

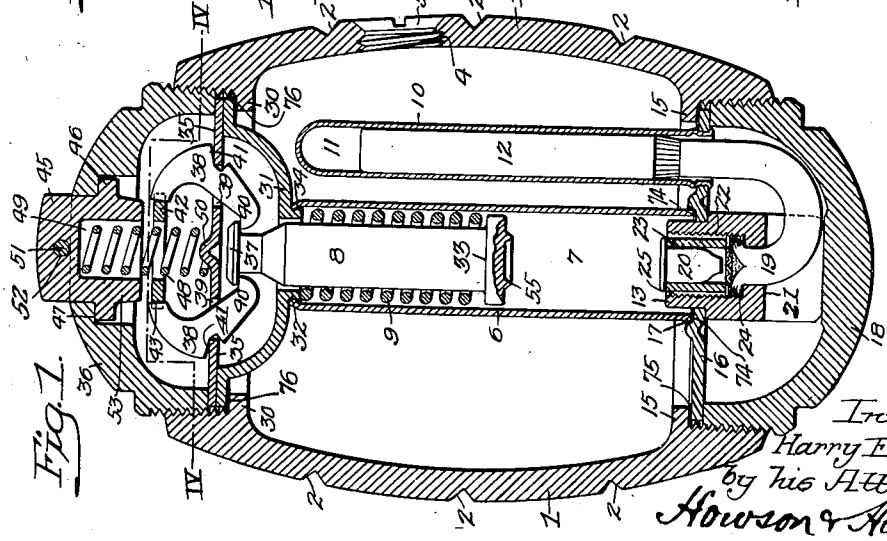


Fig. 1.

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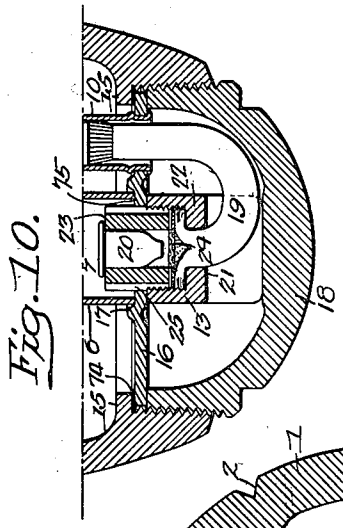


Fig. 10.

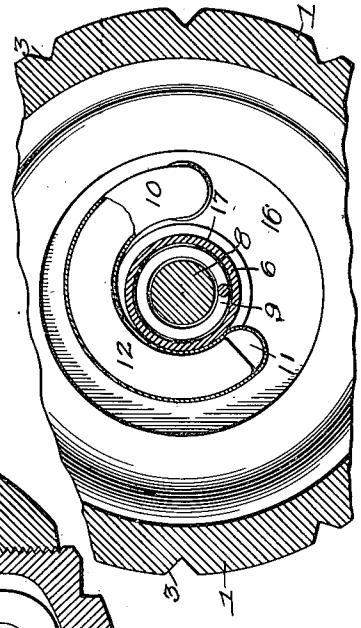


Fig. 12.

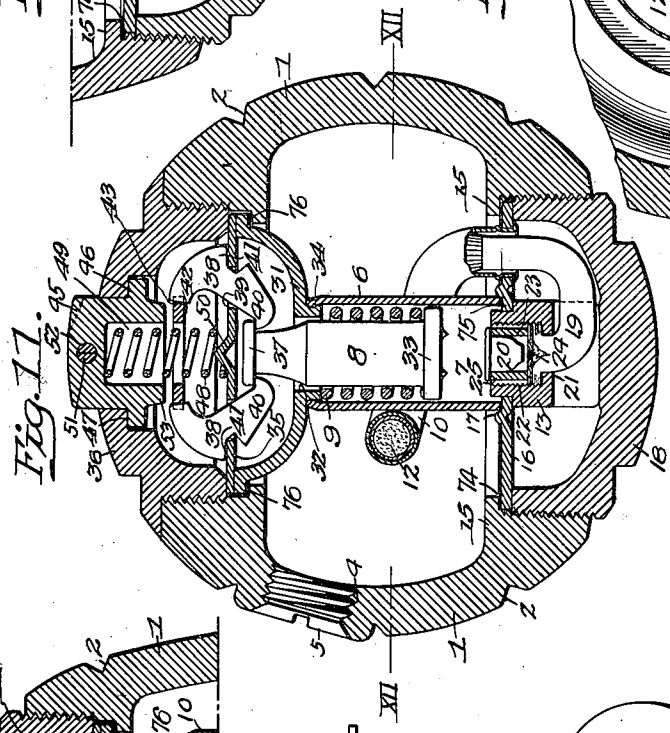


Fig. 11.

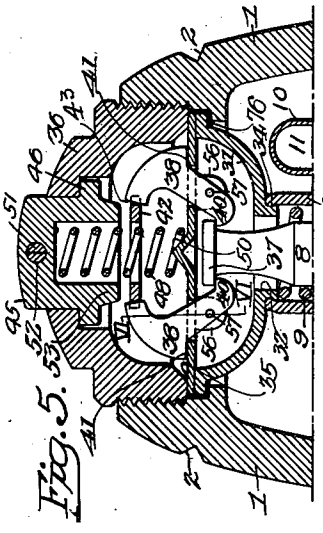


Fig. 5.

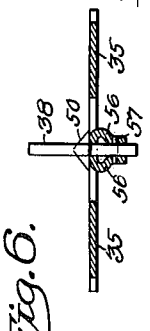


Fig. 6.

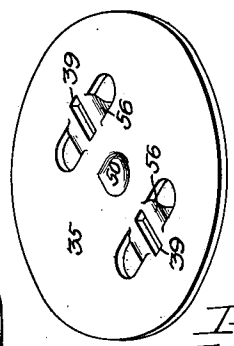


Fig. 7.

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3 SHEETS—SHEET 3.

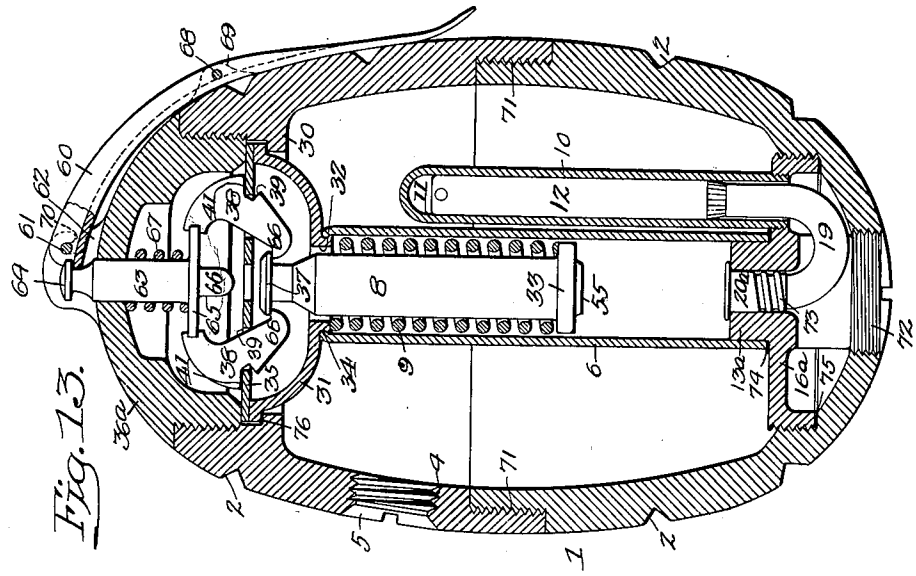


Fig. 13.

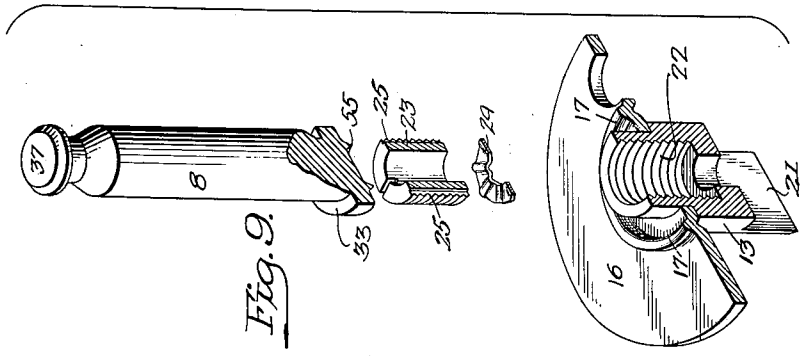


Fig. 9.

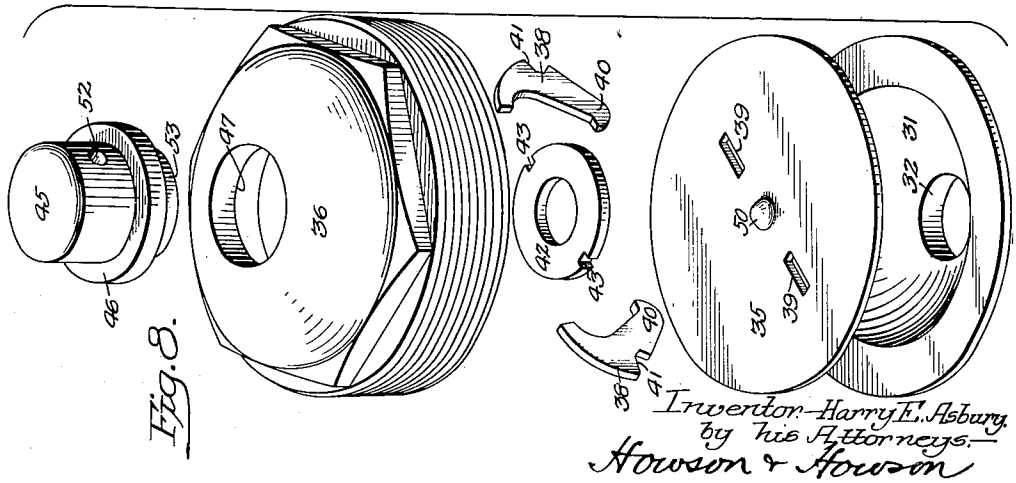


Fig. 8.

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UNITED STATES PATENT OFFICE.

HARRY E. ASBURY, OF PHILADELPHIA, PENNSYLVANIA.

HAND-GRENADE.

1,234,713. Specification of Letters Patent. Patented July 31, 1917.

Application filed February 18, 1916. Serial No. 79,140.

To all whom it may concern:

Be it known that I, HARRY E. ASBURY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Hand-Grenades, of which the following is a specification.

My invention relates to munitions of war and more particularly to explosive devices of the self-contained type. It consists of certain improvements in the mechanism for controlling the firing pin, or bolt, and an improved form of anvil, particularly applicable for use with that form of explosive device known as a "hand grenade"; the same comprising a hollow metal shell suitably formed and which may contain some form of high explosive material; such explosive material being set off by detonating means normally held out of action when the structure is not in use, but automatically brought into action by the release of means retaining a firing pin or bolt, which release is effected just prior to the hurling by hand or other projection of the structure. While particularly applicable to structures of the hand grenade type, the mechanism constituting my invention, or simple modifications of the same within the scope of my invention, may be applied to other forms of explosive missiles; shrapnel and the like.

My invention relates more particularly to the means for holding the actuating mechanism in a quiescent state, or out of action prior to the projection of the structure; such means including an externally operable button or trigger, which may be manually operated or controlled, and which is designed to cock the retaining means and hold the same temporarily before they are released to permit the desired action of the firing pin or bolt. This release takes place after the grenade, shell, or other explosive structure has left the hand or other hurling member. A further object of my invention is to provide an improved form of anvil for the primary cap; such anvil having means whereby the time fuse will be positively retained and held against dislodgment due to the force of the explosion of such primary cap; with provision for venting the gases evolved by such explosion.

These and other features of my invention are more fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a vertical section through one form of hand grenade showing the releasing mechanism in the set and inactive position;

Fig. 2, is a sectional view of one end of the grenade showing the manner of cocking the releasing or firing mechanism;

Fig. 3, is a view similar to Fig. 1, showing the releasing mechanism displaced and the firing pin or bolt in contact with the primary firing cap;

Fig. 4, is a sectional plan view on the line IV—IV, Fig. 1;

Fig. 5, is a sectional view of one end of the grenade illustrating a modified arrangement within the scope of my invention;

Fig. 6, is a sectional view on the line VI—VI, Fig. 5;

Fig. 7, is a perspective view of a portion of the structure shown in Figs. 5 and 6;

Fig. 8, is a perspective view of the parts of one end of the hand grenade, detached;

Fig. 9, is a perspective view of the firing pin and anvil, detached;

Fig. 10, is a sectional view illustrating a modified form of anvil;

Fig. 11, is a sectional view illustrating a modified shape of hand grenade within the scope of my invention;

Fig. 12, is a sectional view on the line XII—XII, Fig. 11, and

Fig. 13, is a sectional view illustrating still another form of hand grenade within the scope of my invention.

In Figs. 1 and 3 of the drawings, 1 represents the shell of a hand grenade of suitable size and weight, which may be made of cast metal, iron for instance; preferably scored or grooved externally in a plurality of directions as indicated at 2 in Figs. 1 and 3, and at 3 in Fig. 4, so that upon bursting, due to explosion of any contained material, the shell will separate into a great number of fragments. The shell may be provided with a loading opening 4 normally closed by a screw plug 5.

Within the shell a casing 6 is mounted, having a chamber 7 for the reception of a firing pin 8, to which motion may be transmitted by a coiled spring 9 when the firing pin is released; such spring being normally compressed and held by means hereinafter described.

Adjacent the casing 6 is a casing 10 forming a tubular chamber 11, which contains a detonating cap 12, while below the chamber 7 of said casing 6 is an anvil member 13,

At the rear end of the grenade shell, I provide a shoulder 15 for the reception of a disk-like member or plate 16, which is preferably provided with a seat 17 for said casing 6. In addition, the plate 16 carries the casing 10 having the chamber 11 receiving the detonating cap 12.

Interposed between a closing plug 18 for the rear end of the grenade shell and said plate 16, which latter is also held in place by said closing plug, is the anvil 13 receiving one end of a time fuse 19 and a primary cap 20, and on which said cap may be exploded when struck by the firing pin 8. Because of the danger of the fuse being displaced or blown away from the anvil upon explosion of said primary cap, I preferably split the end of the fuse and provide means for holding the split end to the anvil.

The anvil is notched on the under side as shown at 21 for the passage of the time fuse, and provided on the upper side with a recess 22; the split end of the fuse being arranged to be held in the bottom of this recess. The split portion of the fuse is spread apart as shown in the several views, and this is held in place by an axially disposed threaded plug 23, which actually receives the primary cap 20; a washer 24 being interposed between the end of said plug and said split end of the fuse. The latter is firmly confined in place by said plug so that the force of the explosion can not drive it from the anvil. The washer is preferably corrugated as indicated, providing vent channels for the passage of gases generated by the explosion, and the plug 23 inserted in the anvil is preferably provided with channels 25 whereby such gases may vent into the chamber 7 of the casing 6. Before setting the primary cap in place, it may be desirable to drop a few grains of powder in the space formed by the split end of the time fuse, and latter is of a regulable length so as to set off said detonating cap 12 within a predetermined lapse of time.

At the opposite end of the grenade shell, a shoulder 30 is provided, and seated on this shoulder is a cupped member 31 having a tubular flange 32 fitting within the upper end of the casing 6 and between which and a shoulder 33 on the firing pin 8 the coiled spring 9 is confined. The flange 32 is preferably recessed at 34 and the end of the casing 6 may be spun into said recess. Mounted on top of the cupped member is a disk or plate 35 which is held in position and confined in place by a screw cap or plug 36 closing the end of the shell.

The upper end of the firing pin 8 is provided with a shouldered head 37 and, as indicated in the structure shown in Figs. 1, 2, *et seq.*, this head is engaged by supporting members or latches 38 of a peculiar shape, which are disposed in slots 39 formed in the plate 35; each of said latches having a foot 40 adapted to engage the head of the firing pin, and a shoulder 41 resting upon said disk or plate 35. The supporting members or latches 38 are spread apart at their upper ends and held in the operative position by an interposed member which may be in the form of a ring washer 42, notched at 43 to receive said latches; thereby insuring that the latter will be maintained in proper position to hold the firing pin out of action.

Centrally disposed with respect to the closing plug 36 is an externally operable releasing member or button 45 which projects beyond the grenade shell and may be manually movable; said button having a flange 46 engaging a seat 47 in said plug, which button is held with its manually operable portion outwardly disposed by means of a coiled spring 48 interposed between the same (fitting a recessed portion 49 thereof,) and the disk or plate 35; the latter having a central projection 50 whereby the spring may be maintained in proper position. Prior to use of the grenade structure and the operation of the button, the latter is held against movement by a key or cotter pin 51 which may be passed through an aperture 52 in said button, externally of the shell.

Upon pressing the button 45 as indicated in Fig. 2, after removing the key 51, the retaining ring 42 for the latches 38 is displaced. The latches, however, are still held in their separated position, maintaining the firing pin out of action, by a depending tubular portion 53 of said button 45 which will occupy the position and perform the function of the displaced ring 42. Upon hurling the grenade, however, the spring 48 will restore the button to its normal position, thereby releasing the latches which in turn release the firing pin; said latches dropping down as illustrated in Fig. 3, whereupon the firing pin will be forcibly moved by the spring 9 into contact with the primary firing cap 20; such firing pin being preferably provided with contact points or a striking rim 55 for engagement with said primary cap. The explosion of the primary cap ignites the fuse 19 which in turn ignites or sets off the detonating cap 12, and the material within the shell is exploded by pressure created thereby.

In the structure shown in Figs. 5, 6 and 7, I have illustrated an arrangement in which the latches 38 supporting the firing pin 8 are pivoted to the disk 35 within the head of the grenade structure, and for this purpose the said disk may be provided with ears 56 struck up from the same, which ears are downwardly depressed to form bearings for pivot pins 57 passing through said ears and through said latches 38.

The form of hand grenade shown in Figs. 1 and 3, is ovoidal in shape, but it will be

understood that other forms of grenades may be employed, and in Figs. 11 and 12, I have shown a structure substantially spherical in shape, which may be of the dimensions of a base ball or cricket ball; fitting the hand and comprising an object of familiar size and shape. The internal mechanism will be the same or substantially the same as that illustrated in Figs. 1, 2 and 3, with or without the modified details shown in Figs. 5, 6 and 7; excepting that some portions of such mechanism will be relatively smaller. In view of the shortening of the chamber of the casing 6, in the structure shown in Figs. 10 and 11, it may be desirable to wrap or partially coil the casing for the detonating cap 12 around said casing 6, since otherwise the length of the detonating cap would be seriously contracted.

In Fig. 10, I have shown a modified form of anvil in which the recess 22 is slightly larger than that illustrated in Figs. 1, 3, *et seq.;* the plug 23 also being larger and therefore more easily handled. In this arrangement the upper end of the plug 23 will center the anvil in the plate 16. The other parts are the same as shown in Figs. 1, 3, *et seq.*

In the structure shown in Fig. 13, which is of the same general character as those shown in Figs. 1 and 3, the release of the latches 38 is controlled by an external lever 60, which is provided with a pin 61 whereby it may be pivotally mounted in ears 62 carried by a closing plug 36ª. In this structure the cupped member 31 is provided, with the disk or plate 35, and the latches 38 supporting the firing pin 8. Instead of a member 45 to cock the latches by releasing a spreader for the same, the plug 36ª receives a pin 63 having a head 64 engaged by the end of the lever 60; the inner end of said pin 63 having a flange 65 for separating the latches, and a projection 66 for engagement with the striking pin 8 when said pin 63 is released from the external lever 60.

The pin 63 is maintained in the set position shown, by said lever 60 against the action of a stiff spring 67, interposed between the screw plug 36ª and the flange 65. Immediately the lever is released, the pin 63 will be forcibly moved inwardly by said spring 67; releasing the latches 38 which in turn release the firing pin or bolt 8 which thereupon strikes the primary cap 20 for igniting the time fuse 19, as in the other structures.

The lever 60 is held in the inactive position by a pin 68 passing through ears 69 formed at the side of the shell, and when it is to be thrown this pin 68 is removed. Upon release from the hand, the lever will be displaced and the pin 63 will be moved inwardly by the spring 67, displacing the flange 65, spreading the latches 38, and releasing the firing pin. The ears 62 receiving the pin 61 whereby the lever is pivoted to the screw plug 36ª are slotted at 70 so that the lever may be released therefrom when its disengagement with the pin 62 is effected.

While I have shown grenades in which the central portion is in one piece, Fig. 13, shows a form in which the shell is in two pieces; threaded together as at 71.

In the structure shown in Fig. 13, I may also provide an anvil 13ª that is in one piece with a disk or plate 16ª, and is screwed into the end of a shell. In this arrangement, the anvil may be backed by a screw plug 72 in the end of the grenade shell and the anvil may project above the disk or plate 16ª and receive the end of the casing 6. The primary cap 20ª receiving the end of the time fuse 19 may be corrugated or threaded as indicated at 73 so as to retain said fuse against displacement upon explosion of the primary cap.

If desired, to protect the firing mechanism and the anvil from gases, fumes or other deteriorating influences emanating from the charge of explosive within the chamber of the shell 1 and surrounding the casing 6 and 10, washers of suitable material may be interposed between the end of the casing 6 and its seat on the plate 16, as indicated at 74; between the shoulder 15 of said casing and said plate 16, as indicated at 75, and between the cup 31 and its seat on the shoulder or flange 30 of the shell, as indicated at 76.

The internal shell 6 and various other parts of the internal mechanism may be made of aluminum, and preferably are made of such material, although the use of such material is not essential to the operation of the structure.

In some instances it may be unnecessary to fill the explosive shell with any explosive material, high explosive or not, since I have found in practice that it is possible to shatter the shell with the use of detonating caps of a high explosive character.

While I have shown and described certain elements of my improved structure with more or less particularity, it will be understood that I do not wish to be limited to the precise construction or arrangements illustrated, and the claims are designed to cover the constructions shown as well as all mechanical equivalents of the same.

I claim:

1. In a hand grenade, the combination with a shell having a detonating cap, a firing pin and a slotted plate confined to said shell, means for actuating said firing pin, of means for supporting said firing pin against the operation of its actuating means including a plurality of latches loosely mounted in the slots of said plate, a ring for maintaining said latches in supporting position, a manually operable button for displacing said ring, and a spring for restoring said button to its normal position.

2. In a hand grenade, the combination with a shell having a detonating cap, a firing pin and means for actuating said firing pin, of means for supporting said firing pin against the operation of its actuating means including a plurality of latches, a notched ring for maintaining said latches in supporting position, and a manually operable button for displacing said ring.

3. A hand grenade comprising a hollow shell, separable caps closing the ends of said shell, annular partition members confined in place by said caps, chambers carrying explosive members between said partitions, said explosive members including a primary cap, a striking bolt for exploding said cap, retaining means for said bolt loosely mounted in one of said annular partition members, and an externally projecting member for releasing said retaining means.

4. The combination, in a hand grenade, of a casing, an anvil mounted in said casing arranged to receive the split end of a fuse, means in engagement with said split end for retaining said fuse in place, and a primary cap mounted in said anvil.

5. In a hand grenade, the combination with a shell having within the same a detonating cap, a time fuse and a primary cap, of an anvil for said primary cap, said anvil having a recess receiving the end of the fuse, and a threaded plug receiving the cap for holding said time fuse in place.

6. The combination, in a hand grenade, of a shell, a detonating cap, a fuse and a primary cap mounted in said shell, an anvil receiving said cap, means for confining the fuse to said anvil, and a venting washer disposed in said anvil over the fuse.

7. The combination, in a hand grenade, of a striking bolt, an anvil, a primary cap mounted in said anvil and exploded by the striking bolt, a fuse ignited by said primary cap, and means for holding said fuse to the anvil including a vented plug.

8. In a hand grenade, the combination with a shell having within the same a detonating cap, a time fuse and a primary cap, of an anvil for said primary cap, said anvil having a recess receiving the end of the fuse, a threaded plug receiving the cap for holding said time fuse in place, and a venting washer interposed between said fuse and plug.

9. The combination, in an explosive shell, of a hollow body, detachable closures for the ends of the same, partitions disposed within said hollow body, a tubular member confined between said partitions and spun into engagement with one of the same, a two-part anvil interposed between one of the closures and a partition, a primary cap carried by said anvil, a detonating cap, a fuse interposed between said caps, means for confining one end of the fuse within the two-part anvil, a movable plunger within the tubular member, a spring for impelling the same, latches movably mounted in one of said partitions for supporting said movable plunger, a spreader for maintaining said latches in the active position, and a movable member, externally operable, for displacing said spreader to release said movable plunger.

10. The combination, in an explosive shell, of a hollow body, detachable closures for the ends of the same, partitions disposed within said hollow body, a tubular member confined between said partitions, said shell containing explosive members with means for exploding the same and means for controlling the operation of the exploding means, and washers interposed between the partitions and the seats in the shell for the same and between the tubular member and the partitions.

11. The combination with an explosive member including a detonating cap, of a firing pin for said cap, means for imparting movement to said firing pin, a plate secured within the explosive member at one end of the same, latches movably mounted in said plate for retaining said firing pin in the inactive position, means for holding said latches in the active position, an externally operable member for displacing said latches whereby the firing pin may be released, and a spring for maintaining said externally operable member projected outward and for restoring it to such position after the latch holding means have been displaced whereby the latches can release the firing pin.

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