United States Patent

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[54] **HAND GRENADE WITH PERCUSSION DETONATION**
8 Claims, 1 Drawing Fig.

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F42b 27/10
[50] **Field of Search** 102/64

[56] **References Cited**
UNITED STATES PATENTS

2,216,587	10/1940	Cardini	102/64
2,365,246	12/1944	Cardini et al.	102/64
3,103,171	9/1963	Jans	102/64
3,194,161	7/1965	Becker et al.	102/64

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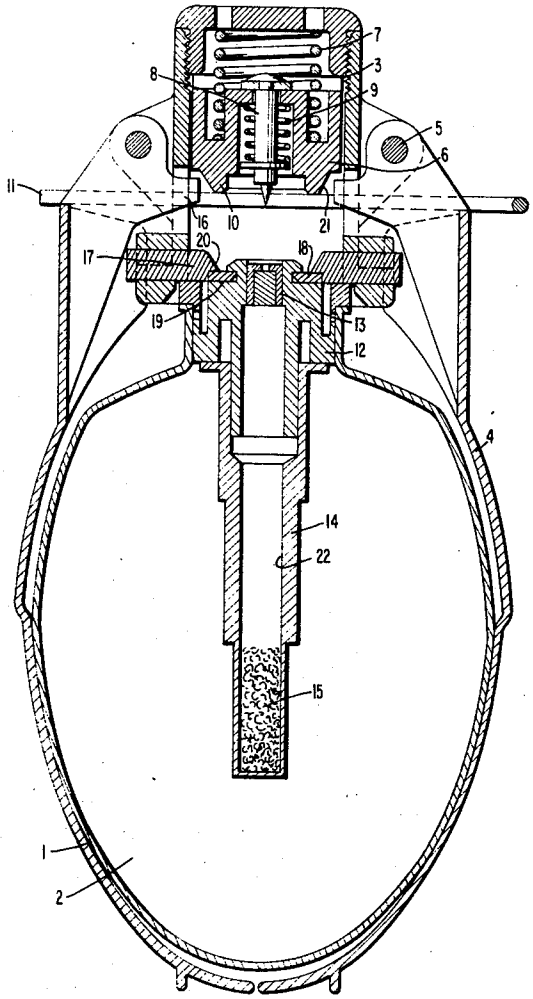
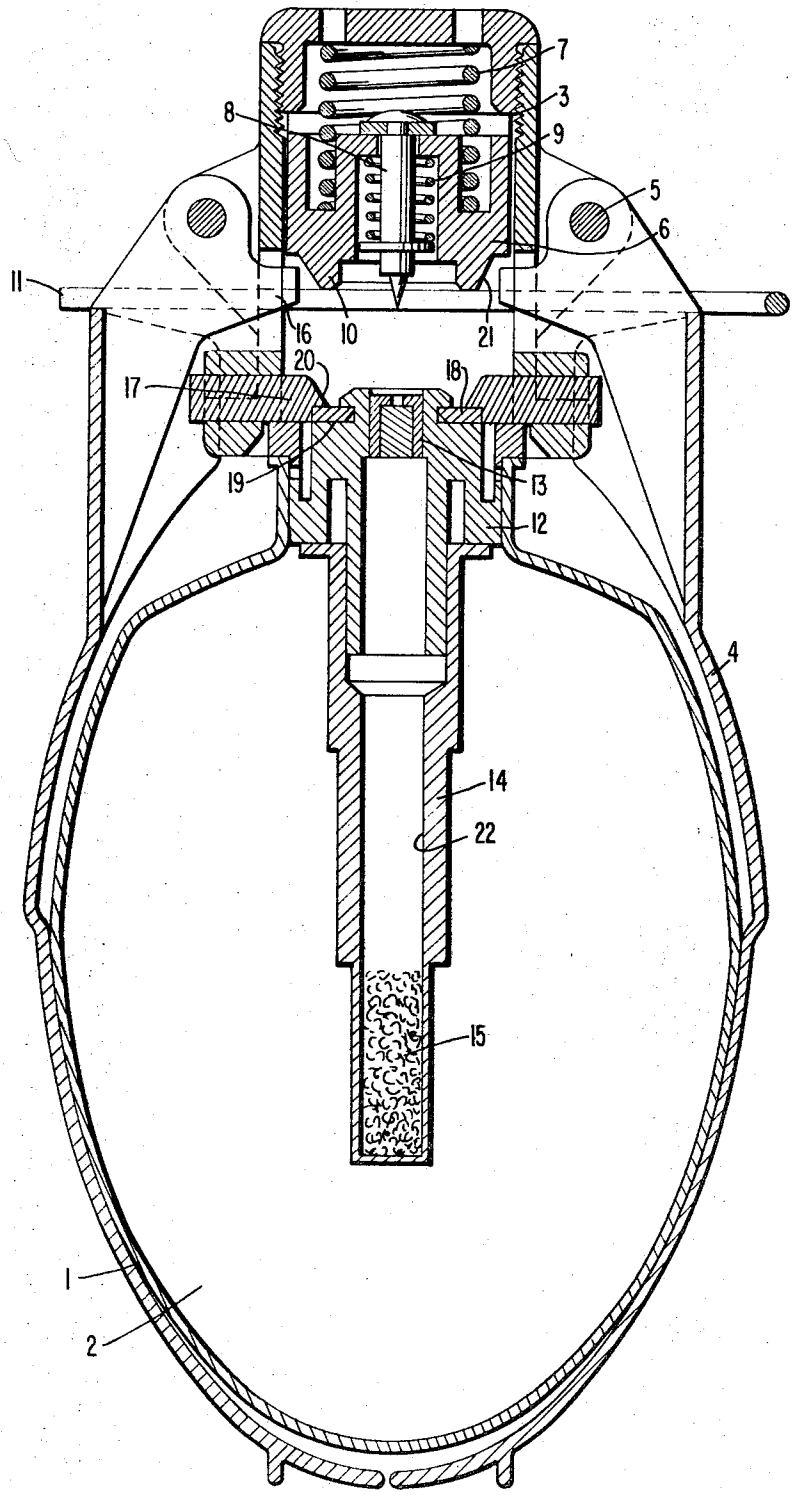
ABSTRACT: A hand grenade with a projectile body spring urged away from a drop cap having pivotally mounted half shells encompassing the projectile body and a safety bolt normally holding the shells in their encompassing position, is provided with a firing pin containing slide spring urged into engagement with the percussion sensitive primer and held against its spring bias by the safety bolt. After the firing pin strikes the primer, the slide member continues further under its spring bias into engagement with cam jaws for releasing the secure connection between the cap and projectile body.





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HAND GRENADE WITH PERCUSSION DETONATION

BACKGROUND OF THE INVENTION

Hand grenades have been provided with drop caps that will separate from the powder containing projectile body after the assembly is thrown, which drop cap is held in its assembled position by means of a safety element against the force of a precompressed spring disposed between the projectile body and the drop cap. It is also known to provide the drop cap with pivotally mounted half shells that in the normal position encompass the projectile body.

This type of known hand grenade has been provided with a friction primer in the cap and under the effect of spring tension. After the hand grenade is thrown, the safety element being removed, the half shells flip open under the effect of the associated spreader springs. At the same time, the pretension spring in the cap pulls the friction wire through the friction primer and thus initiates ignition. At the same time, separation of the projectile body and the cap also takes place. Accordingly, the ignition is transmitted to a body which is moving away from it, which is wrong in principle and also has the effect in practice that even when the ignition jet of the friction primer cap is unusually strong and even if an especially sensitive primer is employed in the projectile body, a substantial percentage of failures cannot be prevented.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the above-mentioned disadvantages by providing a percussion sensitive primer disposed in the rear end of the projectile body to be ignited by a firing pin axially aligned with the primer and mounted in a slide member that is held against a spring bias toward the primer by means of a safety element, which firing pin and slide member are a part of the drop cap. Also, a locking member is provided to securely hold the projectile body and the drop cap together until being released by movement of the slide member only after the firing pin has first struck the percussion sensitive primer to a predetermined depth sufficient for ignition thereof.

Preferably, the locking device is constructed of two opposed jaws on the drop cap and spring urged into locking engagement with the projectile body. The slide jaws and slide member have cam wedge cooperating surfaces that will spread the jaws apart when the slide member moves toward the primer under the bias of its spring beyond the point of the firing pin striking the primer, which spreading apart will release the projectile body from the drop cap. Also, the slide member will engage the half shells to pivot them away from the projectile body during its movement toward the primer.

THE DRAWING

Further objects, features and advantages of the present invention will become more clear from the following detailed description of the drawing, wherein the single figure is an axial cross-sectional view through a hand grenade embodying the principles of the present invention.

DETAILED DESCRIPTION OF THE DRAWING

The projectile body **1** is provided with a suitable filling **2**, for example, an explosive powder, a liquid, or the like. The drop cap **3** is provided with the half shells **4**, which are pivotally mounted about the pins **5** at the centers of gravity, which half shells **4** surround or encompass the projectile body **1**.

The cap **3** is also provided with an axially slidably mounted slide member **6**, which is spring biased by means of the spring **7** downwardly with respect to the drawing, which spring **7** is disposed between the upper wall of the cap **3** and the slide member **6**. A firing pin **8** is slidably mounted in the slide member **8** under the influence of its spring **9**. The forward end of the slide member is provided with cam projections **10** that axially rest upon the transversely removable safety bolt or element **11**, which holds the spring **7** precompressed. In the normal safety position of the safety bolt **11** as shown in the drawing, the bolt not only blocks the slide member **6** in its illustrated position, but also engages the outer walls of the half shells **4** to maintain the half shells in encompassing engagement with the projectile body **1**.

At its upper or rearward end, the projectile body **1** is closed off by means of a stopper **12**, which contains therein the percussion sensitive primer cap **13**. Depending from the stopper **12**, there is provided a sleeve portion **14**, which is provided with a bursting charge **15** therein. In order to transmit the ignition flash from the primer cap **13** to the bursting charge **15**, it is preferable to provide a delay charge (not shown) and optionally also a booster charge (not shown), which delay charge and booster charge would be disposed in the axially extending ignition channel **22**. It is also contemplated that the detonator construction could be quite different, except for the presence of the percussion sensitive primer and firing pin. In particular, for live ammunition it would be desirable to fill the projectile body with an explosive charge.

Each of the half shells **4** is provided with a bellcrank-type of cam projection **16** that extends axially beneath or forward of the slide member **6**, in the normal position of the hand grenade, with a very small spacing therebetween.

The flangelike lower end of the cap **3** is provided with transversely extending grooves slidably receiving therein slide jaws **17** that are mounted to be biased inwardly under the force of suitable springs (not shown), which springs would preferably engage also the half shells **4** to urge them outwardly. The integral flattened inner end portion **18** of each slide jaw **17** engages in a similarly formed annular groove **19** at the upper or rearward end of the stopper or sealing piece **12** of the projectile body, to secUrely connect the projectile body with the cap **3** in the illustrated position. Wedge surfaces **20** are provided on the inner and rearwardly extending surfaces of the flattened portions **18** of the slide jaw **17** for cooperative ultimate engagement with the counter wedge surfaces **21** that are formed on the forward end of the slide member **6**.

When it is desired to use the hand grenade, the safety bolt **11** is first pulled transversely out of the unit and discarded. As soon as the safety bolt **11** is thus removed, the slide member **6** will move axially downwardly, with respect to the drawing, under the influence of its spring **7** until it engages the cam projections **16** of the half shells **4**. If the person who is to throw the grenade has his hand tightly wrapped around the half shells **4**, the half shells **4** will not pivot and thus the cam projections **16** will prevent any further movement of the slide member **6** toward the primer **13**.

Upon throwing the grenade, the half shells **4** will flip open with pivotal movement about their pivot axes **5** under the combined effect of the cam portions **10** of the slide member **6** engaging the cam projections **16** under the influence of the spring **7** and any air friction contributing to the spreading action of the half shells **4**. Thus, the slide member **6** will be free to continue its axial movement toward the projectile body **1** and the primer **13** under the influence of its spring **7**. During this further movement of the slide member **6**, the firing pin **8** will first strike and penetrate the primer cap **13** for ignition thereof, which primer ignition will successively transmit ignition to the delay charge and ultimately to the bursting charge **15**.

Only after the firing pin has penetrated sufficiently a predetermined distance into the primer cap **13**, the slide member will move sufficiently toward the projectile body **1** so that the wedge surfaces **21** of the slide member **6** will engage the correspondingly shaped cam wedge surfaces **20** of the slide jaws **17** and thus transversely spread the slide jaws **17** away from each other against their spring bias. As the slide jaws **17** move transversely away from each other, their flattened portions **18** will be withdrawn from the annular groove **19** of the stopper or locking piece **12**, which will ultimately release the secure connection between the projectile body **1** and the drop cap **3**. Once this release has become effective, the residual force of the compression spring **7**, which is still

quite considerable, will force the projectile body 1 and the cap 3 away from each other, whereby the intended separation of these two parts is completed.

Since the entire above-described process takes place within a relatively short period of time from the instant of throwing, it is insured that the drop cap 3 together with the parts mounted thereon traverse only a short flight path, which is particularly short because of the breaking effect or high wind resistance of the spread apart half shells 4 during the flight of the cap. However, the mechanical stresses exerted on the drop cap 3 and the parts mounted thereon are only relatively minor, so that the cap and parts mounted thereon do not suffer any damage and can accordingly be employed again in many cases in connection with new projectile bodies. While only a single preferred embodiment has been described in detail for purposes of illustrating the present invention, further modifications, embodiments and variations are contemplated.

I claim:

1. A hand grenade with a projectile body, a drop cap having two pivotally mounted half shells encompassing and spring urged away from the projectile body, and a safety element preventing their separation until use, wherein the improvement comprises: a percussion sensitive primer in said projectile body; a slide member mounted in said cap for movement toward and away from said primer; spring means biasing said slide member toward said primer; said safety element normally preventing movement of said slide member towards said primer against the bias of said spring means; said slide member having a firing pin mounted to strike said primer when said slide member moves toward said primer; locking means securely connecting said cap and said projectile body together and being actuated by movement of said slide member toward said primer to release the connection between said cap and said projectile body only after said firing pin has first struck said primer.

2. The grenade according to claim 1, wherein said locking means includes two jaws slidably mounted in said cap and spring biased into locking engagement with said projectile body, said jaws and said slide member having cooperating cam means to force said jaws apart against their spring bias out of engagement with said projectile body in response to movement of said slide member towards said primer.

3. The grenade according to claim 2, wherein said spring means biasing said slide member toward said primer also provides the spring bias forcing said cap and said projectile body apart, said spring means consisting of only one coil spring.

4. The grenade according to claim 2, wherein said slide member and said half shells have cam means for pivoting said half shells away from each other in response to movement of said slide member toward said primer.

5. The grenade according to claim 4, wherein said spring means biasing said slide member toward said primer also provides the spring bias forcing said cap and said projectile body apart, said spring means consisting of only one coil spring.

6. The grenade according to claim 1, wherein said spring means biasing said slide member toward said primer also provides the spring bias forcing said cap and said projectile body apart, said spring means consisting of only one coil spring.

7. The grenade according to claim 1, wherein said slide member and said half shells have cam means for pivoting said half shells away from each other in response to movement of said slide member toward said primer.

8. The grenade according to claim 7, wherein said half shell cam means axially engage said slide member after removal of said safety element to prevent further movement of said slide member toward said primer in a position of said slide member firing pin axially spaced from said primer.