

(19) **DANMARK**

(10) **DK/EP 2649404 T3**



(12)

Oversættelse af  
europæisk patentskrift

Patent- og  
Varemærkestyrelsen

- 
- (51) Int.Cl.: **F 42 C 14/02 (2006.01)** **F 42 C 15/34 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2015-08-24**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2015-06-03**
- (86) Europæisk ansøgning nr.: **10807673.8**
- (86) Europæisk indleveringsdag: **2010-12-12**
- (87) Den europæiske ansøgnings publiceringsdag: **2013-10-16**
- (86) International ansøgning nr.: **IL2010001044**
- (87) Internationalt publikationsnr.: **WO2012080998**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **Israel Military Industries Ltd., 64 Sderot Bialik , P.O.B. 1044, 47100 Ramat Hasharon, Israel**
- (72) Opfinder: **VEKSLER, Isar, 16 Sarah Malkin Street, 46403 Herzliya, Israel**
- (74) Fuldmægtig i Danmark: **Awapatent A/S, Rigsgade 11, 1316 København K, Danmark**
- (54) Benævnelse: **Granatmekanisme**
- (56) Fremdragne publikationer:  
**EP-A1- 1 548 394**  
**FR-A1- 2 500 620**



# **DESCRIPTION**

## **FIELD OF THE INVENTION**

[0001] The present invention relates to hand grenades, in particular to safety features with respect of the grenades.

## **BACKGROUND OF THE INVENTION**

[0002] The requirement for a safety measure to prevent inadvertent detonation is well known. It is also known to have a second safety measure to prevent inadvertent withdrawal of the safety pin. Thus, U.S. Pat. No. 3,865,027 relates to a hand grenade with a second safety measure. U.S. Pat. No. 3,823,670 relates to double headed cotter pin safety device. U.S Pat. No. 5,886,288 discloses a safety pin that can be restored if circumstances warrant. EP 1548394 A1 discloses an auxiliary safety mechanism for a grenade wherein a slider is restrained only by the safety lever. FR 2 500 620 A1 relates to another safety mechanism.

[0003] In typical present day hand grenades, the outer shell of the grenade is made of serrated steel that holds a pyrotechnic fuse mechanism, which is surrounded by a high explosive material. The grenade has a filling hole for pouring in the high explosive material.

[0004] The firing mechanism is triggered by a spring-loaded striker inside the grenade. Normally, the striker is held in place by a striker lever, which is held in place by a safety pin, usually a cotter pin. The striker lever is held against the body of the grenade and when the pin is pulled out, the firing mechanism is triggered by the spring-loaded striker inside the grenade. With the pin removed, there is nothing holding the striker lever back, which means there is nothing restraining the striker from striking the blasting cap that initiates the delay column which burns slowly. In about four seconds, the delay material burns all the way through igniting the high explosive material that blows the grenade apart.

[0005] If for any reason one of the pyrotechnic components is activated, even unintentionally, it inevitably causes the grenade to explode. Unintended explosion of a hand grenade can cause fatal injuries. If large numbers of grenades are stored in a single or enclosed storage area and if a grenade unintentionally explodes, the entire storage area could explode and cause great damage.

[0006] The aforementioned safety consideration imposes constraints on the storage and transportation of hand grenades and puts the personnel in vicinity of hand grenades at risk. It is also a waste of resources, which may be needed at any time.

## **SUMMARY OF THE INVENTION**

[0007] The present invention relates to an auxiliary safety mechanism that prevents accidental detonation of the grenade when the safety pin is in place. The auxiliary safety mechanism mechanically separates the ignition portion of the grenade from the explosive charge with a slider element while the grenade is in a safe mode. The slider element is withdrawn only by removing the grenade's safety pin. This allows normal use of the grenade without any further activity required by the user.

[0008] The term "grenade" will be used in its broadest sense and include any munitions that are similarly ignited/exploded/operated; for example demolition charges, hand emplaced ordnance.

[0009] It is an object of the present invention to provide an auxiliary safety mechanism for a grenade.

[0010] Another object of the present invention is to provide a grenade with an auxiliary safety mechanism.

[0011] Still another object of the present invention is to provide a method of producing a grenade with auxiliary mechanism.

[0012] It is a particular feature of the auxiliary safety mechanism of the present invention that it requires little or no change to the look and feel of the grenade.

[0013] It is another particular feature of the auxiliary safety mechanism of the present invention that it does not change the method of operating the grenade.

**[0014]** In accordance with one embodiment of this invention there is provided an auxiliary safety mechanism for a grenade that will prevent unintentional detonation, such as from shockwaves, fragments, heat, etc., said grenade comprising a fuse housing containing a delay detonator and explosive train, characterized in that said fuse housing further comprises a reversible slider element interposed between the delay detonator and explosive train to form a barrier between them when the grenade is in a safe condition, and when the slider element is withdrawn the barrier between the delay detonator and explosive train is removed leaving the grenade is in an armed condition.

**[0015]** In particular the invention relates to an auxiliary safety mechanism for a grenade wherein the fuse housing comprises, a spring activated striker, a safety lever held in position by a removable safety pin, a bore containing in series a delay detonator and explosive train, and the auxiliary safety mechanism comprises, a slider element having a relay charge at one end thereof and a flanged edge at the other end, tension means for extending said slider element to form a barrier between the delay detonator and explosive train, and means for releasing the tension means and aligning the relay charge with the delay detonator and explosive train, whereby removing the safety pin and freeing the safety lever will simultaneously release the tension means to withdraw the slider element and free the striker thereby arming the grenade.

**[0016]** The invention also relates to a grenade having such an auxiliary safety mechanism.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0017]** The invention may be more clearly understood upon reading of the following detailed description of non-limiting exemplary embodiments thereof, with reference to the following drawings, in which:

Fig. 1 is a cross-sectional view of a fuse housing of a grenade comprising an auxiliary safety mechanism in accordance with the present invention, in its "safe" condition; and

Fig. 2 is a cross-sectional view of a fuse housing of a grenade comprising the auxiliary safety mechanism of the present invention, in its "activated" or "armed" condition.

#### **DETAILED DESCRIPTION OF THE INVENTION**

**[0018]** Referring first to Figures 1 and 2, there is shown a fuse housing 10 of a grenade with an auxiliary safety mechanism 24 in accordance with the present invention in a safe and armed condition, respectively. The grenade body housing a main charge is not shown.

**[0019]** In Figure 1 the fuse housing 10 is shown in a safe condition and in Figure 2 in an armed condition. The fuse housing 10 has a bore 12 containing a delay detonator 14 near its upper end and an explosive column 16 at its lower end. A striker 32 is attached to a striker lever 34 which is held under tension by a spring 35 and held in its place by the safety lever 36 which presses against it, as long as the safety pin 40 is in place (Figure 1), when in a safe position. An auxiliary safety mechanism 24 consists of the slider element 22 having at one end a relay charge 42 and at the other end a flanged edge 26. A slider spring 28 pushes the slider element 22 against the edge 38 of the striker lever 34 that prevents the slider from moving. The striker lever 34 is held in its place by the safety lever 36 that the safety pin 40 prevents its release. In Figure 1 the slider element 22 traverses the explosive train separating the delay detonator 14 from the explosive column 16.

**[0020]** Figure 2 illustrates the fuse housing 10 with the safety pin 40 removed. The striker spring 35 now urges the striker lever 34 and the striker 32 and safety lever (not shown here) to pivot away from the body so that the striker 32 strikes the delay detonator 14 and ignites it. At the same time the tension is relieved from the slider spring 28 which expands, retracting the slider element 22 till the stopper 29 and bringing the relay charge 42 in alignment with the bore 12, enabling the detonation of the delay detonator 14 to explode the explosive column 16 when the delay detonator 14 detonates.

**[0021]** The essence of the invention is thus, in the auxiliary safety mechanism which comprising a mechanical slider element introduced into the explosive train of the grenade that separates the delay detonator from the rest of the explosive train with little

or no effect on the external look and feel of the grenade, has no effect on its operation as far as the grenadier is concerned, and comprises simple and inexpensive components.

## **REFERENCES CITED IN THE DESCRIPTION**

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

### **Patent documents cited in the description**

- [US3365027A \[0002\]](#)
- [US3923670A \[0002\]](#)
- [US5896288A \[0002\]](#)
- [EP1548394A1 \[0002\]](#)
- [FR2500620A1 \[0002\]](#)

## P A T E N T K R A V

1. Reservesikkerhedsmekanisme til en granat, hvilken reservesikkerhedsmekanisme omfatter:  
et tændsatshus (10), der indeholder en forsinkelsesdetonator (14), en eksplosionskæde (16), et sikringshåndtag (36), en fjeder (35) -aktiveret slagstiftsmekanisme (32, 34, 38), en sikringspind (40) og et reversibelt glideelement (22), der er placeret mellem forsinkelsesdetonatoren (14) og eksplosionskæden (16), hvor glideelementet (22) danner en barriere mellem forsinkelsesdetonatoren (14) og eksplosionskæden (16), når glideelementet (22) er tilspændt, k e n d e t e g n e t ved at glideelementet (22) bevares tilspændt af slagstiftsmekanismen (38), og sikringspinden (40) forhindrer både sikringshåndtaget (36) og slagstiftsmekanismen (32, 34, 38) i at pivotere, hvilken reservesikkerhedsmekanisme forhindrer detonation fra chokbølger, varme og fragmenter.
2. Sikringsmekanisme til en granat ifølge krav 1, hvilken reservesikkerhedsmekanisme omfatter,  
en boring (12), der indeholder forsinkelsesdetonatoren (14) og eksplosionskæden (16) i serie, og hvor glideelementet (22) har en videresendelsesladning (42) ved én, og en afslutningsende (26) i kontakt med et tilspændingsmiddel (28), der udstrækker og tilbagetrækker glideelementet (22) for at tilvejebringe en barriere mellem forsinkelsesdetonatoren (14) og eksplosionskæden (16), når tilspændingsmidlet (28) er spændt, og for at rette videresendelsesladningen (42) ind med forsinkelsesdetonatoren (14) og eksplosionskæden (16), når tilspændingsmidlet (28) frigøres.
3. Sikringsmekanisme til en granat ifølge krav 2, hvor tilspændingsmidlet (28) er en fjeder.
4. Sikringsmekanisme til en granat ifølge krav 3, hvor fjederen (28) er en skruefjeder.
5. Sikringsmekanisme til en granat ifølge et hvilket som helst af kravene 2 til 4, hvor glideelementet (22) er placeret parallelt med og ovenover tilspændingsmidlet (28), og én afslutningsende (26) af glideelementet (22) er bøjet for at indgribe én ende af tilspændingsmidlet (28).
6. Sikringsmekanisme til en granat ifølge et hvilket som helst af kravene 1 til 5, hvilken reservesikkerhedsmekanisme yderligere omfatter et stopmiddel (29), der indgriber med afslutningsenden (26) af glideelementet (22) for at begrænse udstrækningen af glideelementet (22).
7. Sikringsmekanisme til en granat ifølge et hvilket som helst af kravene 1 til 6, hvor glideelementet (22) holdes tilspændt af enden (38) af slagstiftshåndtaget (34).

DRAWINGS

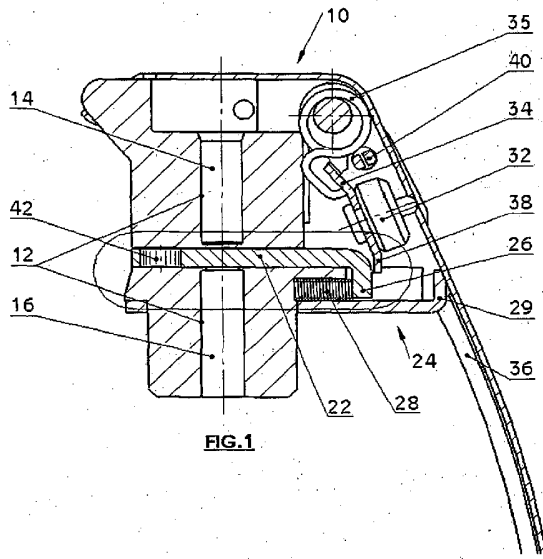


FIG. 1

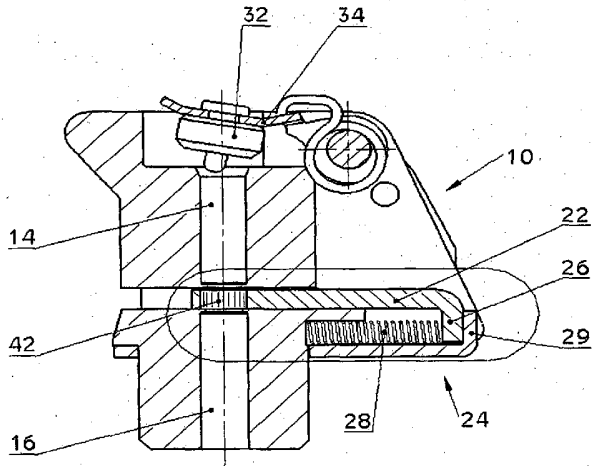


FIG. 2