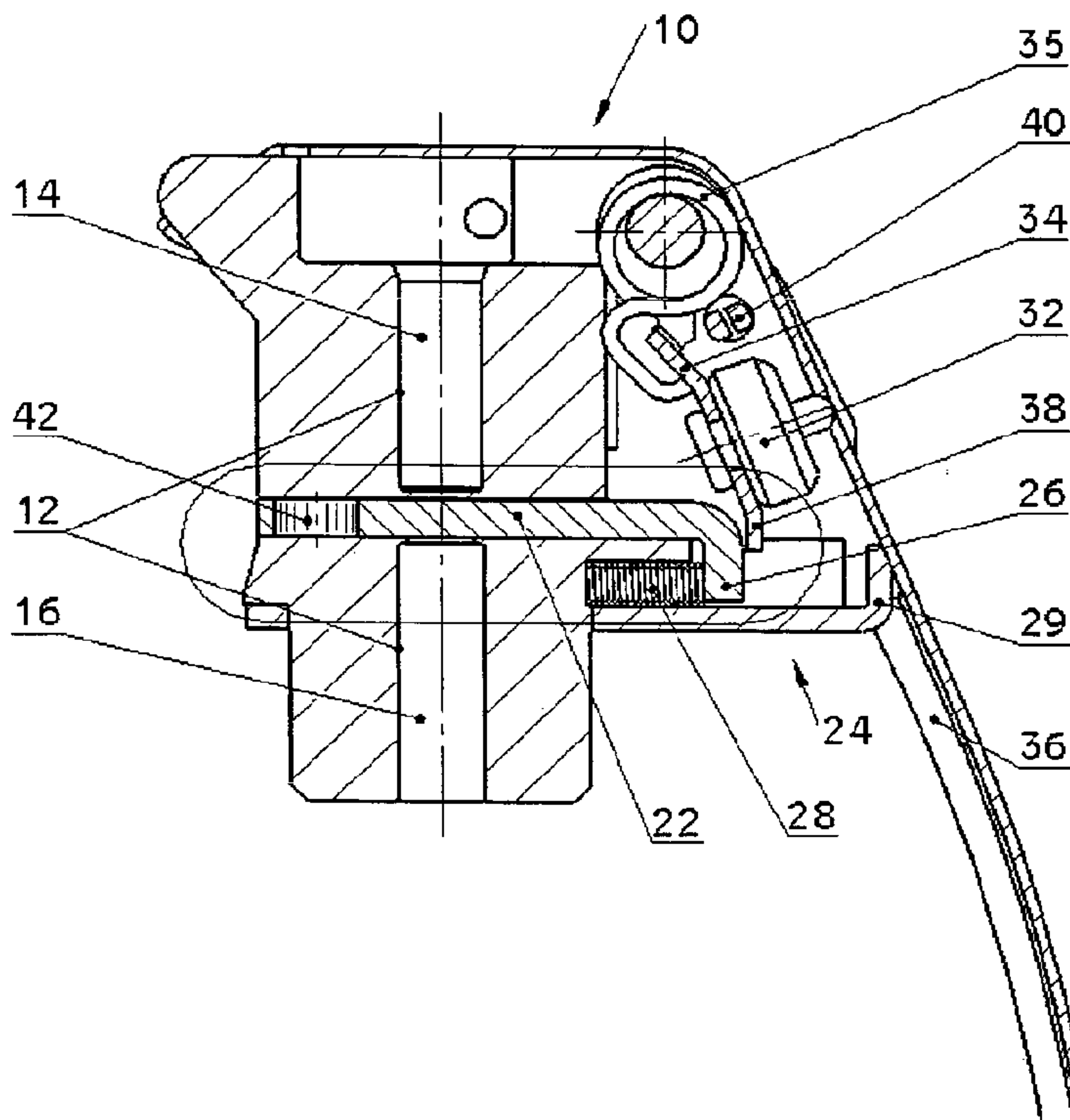




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(57) Abrégé/Abstract:

An auxiliary safety mechanism for a grenade that will prevent detonation from Shockwaves, heat, fragments, etc., said grenade comprising a fuse housing (10) containing a delay detonator (14) and explosive train (16), characterized in that said fuse housing comprises a reversible slider element (22) interposed between the delay detonator and the rest of the explosive train to form a barrier therebetween when the grenade is in an unarmed condition, and when the slider element is withdrawn the barrier between the delay detonator and explosive train is removed leaving the grenade in an armed condition.

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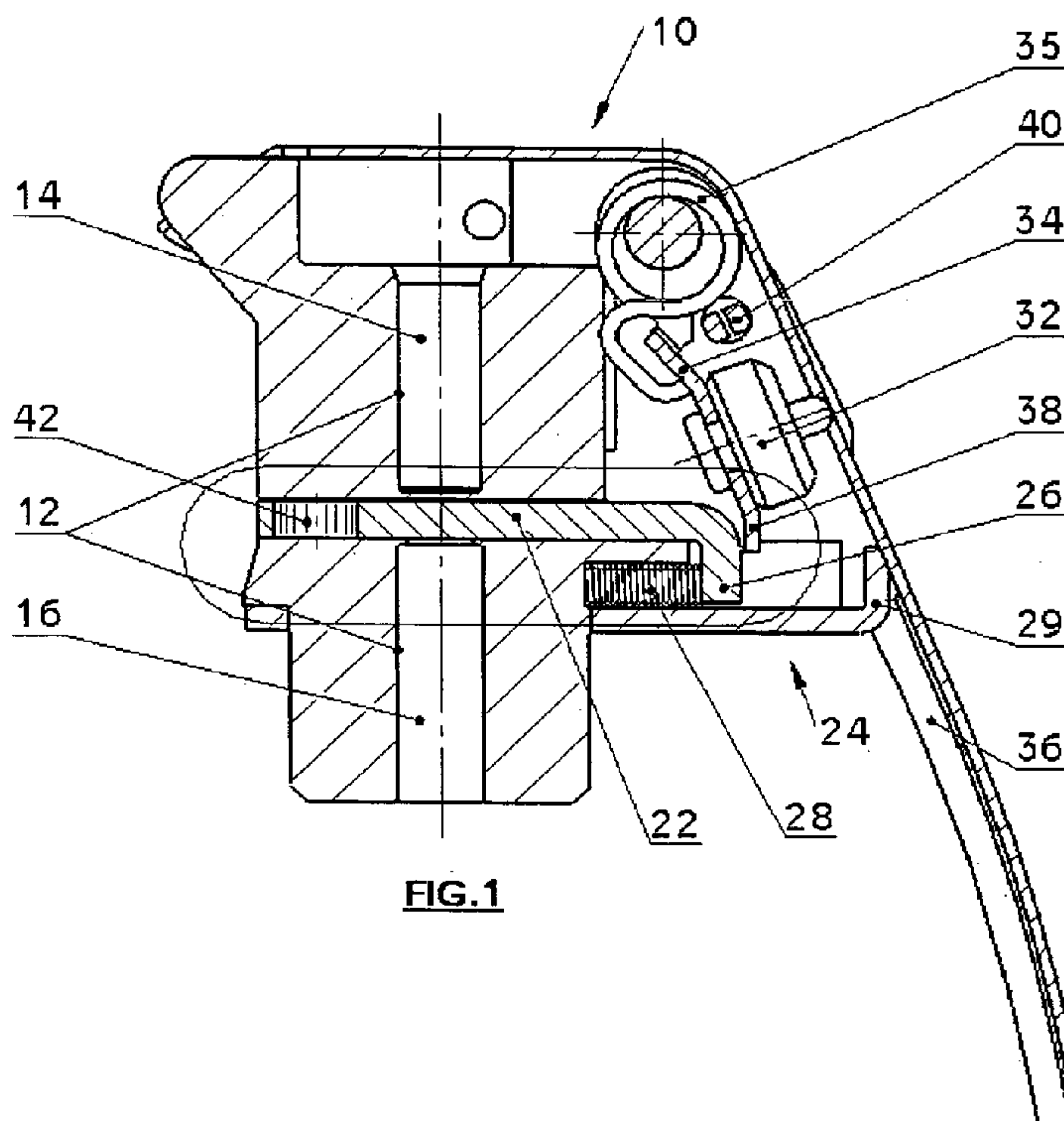


FIG.1

(57) Abstract: An auxiliary safety mechanism for a grenade that will prevent detonation from Shockwaves, heat, fragments, etc., said grenade comprising a fuse housing (10) containing a delay detonator (14) and explosive train (16), characterized in that said fuse housing comprises a reversible slider element (22) interposed between the

[Continued on next page]

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delay detonator and the rest of the explosive train to form a barrier therebetween when the grenade is in an unarmed condition, and when the slider element is withdrawn the barrier between the delay detonator and explosive train is removed leaving the grenade in an armed condition.

GRENAD

FIELD OF THE INVENTION

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

BACKGROUND OF THE INVENTION

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.
10 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.

In typical present day hand grenades, the outer shell of the grenade is
15 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.

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
20 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
25 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.

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
5 unintentionally explodes, the entire storage area could explode and cause great damage.

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
10 be needed at any time.

SUMMARY OF THE INVENTION

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
15 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.

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

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

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

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

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.

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.

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.

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.

The invention also relates to a grenade having such an auxiliary safety
5 mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

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:

10 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

15 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

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
20 body housing a main charge is not shown.

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
25 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
5 explosive column 16.

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
10 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.

The essence of the invention is thus, in the auxiliary safety
15 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
20 is concerned, and comprises simple and inexpensive components.

It should be understood that the above description is merely exemplary and that there are various embodiments of the present invention that may be devised, *mutatis mutandis*, and that the features described in the above-described embodiments may be used separately or in any
25 suitable combination; or the invention can be devised in accordance with embodiments not necessarily described above.

What is claimed is:

1. An auxiliary safety mechanism for a grenade to prevent detonation, the grenade including a fuse housing containing a delay detonator, explosive train, safety lever, spring activated striker mechanism, and a safety pin, the auxiliary safety mechanism comprising:
 - a reversible slider element, interposed between the delay detonator and the explosive train, the reversible slider element being configured to form a barrier between the delay detonator and the explosive train when the slider element is under tension, the slider element being maintained under tension by the striker mechanism, and the safety pin being configured to restrain pivoting of both the safety lever and striker mechanism.
2. An auxiliary safety mechanism as claimed in claim 1, further comprising:
 - at least one stop device to engage the terminal end of the slider element to limit extension of the slider element.
3. An auxiliary safety mechanism as claimed in claim 1, wherein the safety pin is configured to restrain the pivoting of both the safety lever and the striker mechanism.
4. An auxiliary safety mechanism as claimed in claim 1, wherein the slider element is held under tension by an end of the striker mechanism.
5. A grenade comprising a fuse housing and auxiliary safety mechanism as claimed in claim 1.
6. A grenade as claimed in claim 5, wherein the fuse housing comprises two interfacing shell sections, wherein an interface formed by the two interfacing shell sections is configured to be sufficiently strong to maintain integrity of the housing and to withstand bursting under ordinary handling and limited pressure, and wherein the interface is configured to burst into separate the two interfacing shell sections when the shell is penetrated or heated to a temperature just below a temperature required to activate any explosive contained in the housing.

7. An auxiliary safety mechanism for a grenade including a fuse housing, a bore containing in series a delay detonator and to explosive train, a safety lever, a spring activated striker mechanism, and a safety pin, the auxiliary safety mechanism comprising:

a slider element, including a relay charge at one end and a terminal end in contact with at least one tension device, the at least one tension device being configured to extend and retract the slider element to provide a barrier between the delay detonator and explosive train when the at least one tension device is compressed, and being configured to align the relay charge with the delay detonator and explosive train when the at least one tension device is released, the safety pin maintaining the spring and striker mechanism under tension and the slider element being held under tension by at least part of the striker mechanism.

8. An auxiliary safety mechanism according to claim 7, wherein the at least one tension device includes a spring.

9. An auxiliary safety mechanism as claimed in claim 8, where the spring is a coil spring.

10. An auxiliary safety mechanism as claimed in claim 7, wherein the slider element is disposed parallel and above the at least one tension device and a terminal end of the slider element engages one end of the at least one tension device.

11. A grenade comprising a fuse housing and auxiliary safety mechanism as claimed in claim 7.

12. A method of constructing a grenade to withstand shock waves without detonating, comprising:
introducing an auxiliary safety mechanism into the grenade to prevent detonation, the grenade including a fuse housing containing a delay detonator, explosive train, safety lever, spring activated striker mechanism, and a safety pin, the auxiliary safety mechanism including a reversible slider element, interposed between the delay detonator and the explosive train, the reversible slider element being configured to form a barrier between the delay detonator and the explosive train when the slider element is under tension, the slider element being maintained under tension by the striker mechanism, and the safety pin being configured to restrain pivoting of both the safety lever and striker mechanism.

13. A method of storing grenades safely without fear of detonation during storage, comprising:
storing said grenades, each equipped with auxiliary safety mechanisms, each grenade including a fuse housing containing a delay detonator, explosive train, safety lever, spring activated striker mechanism, and a safety pin, and each auxiliary safety mechanism including a reversible slider element, interposed between the delay detonator and the explosive train, the reversible slider element being configured to form a barrier between the delay detonator and the explosive train when the slider element is under tension, the slider element being maintained under tension by the striker mechanism., and the safety pin being configured to restrain pivoting of both the safety lever and striker mechanism.

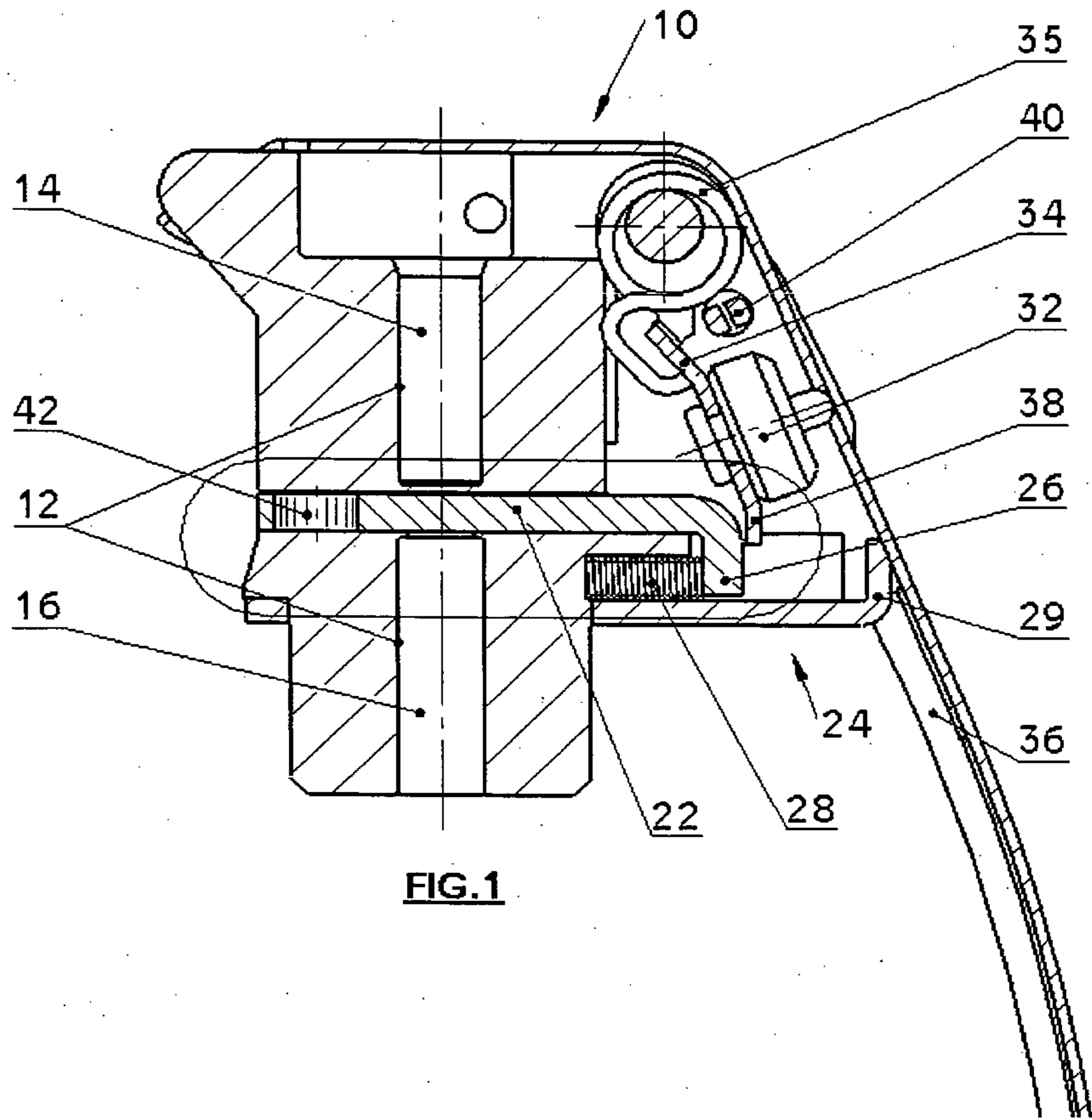


FIG. 1

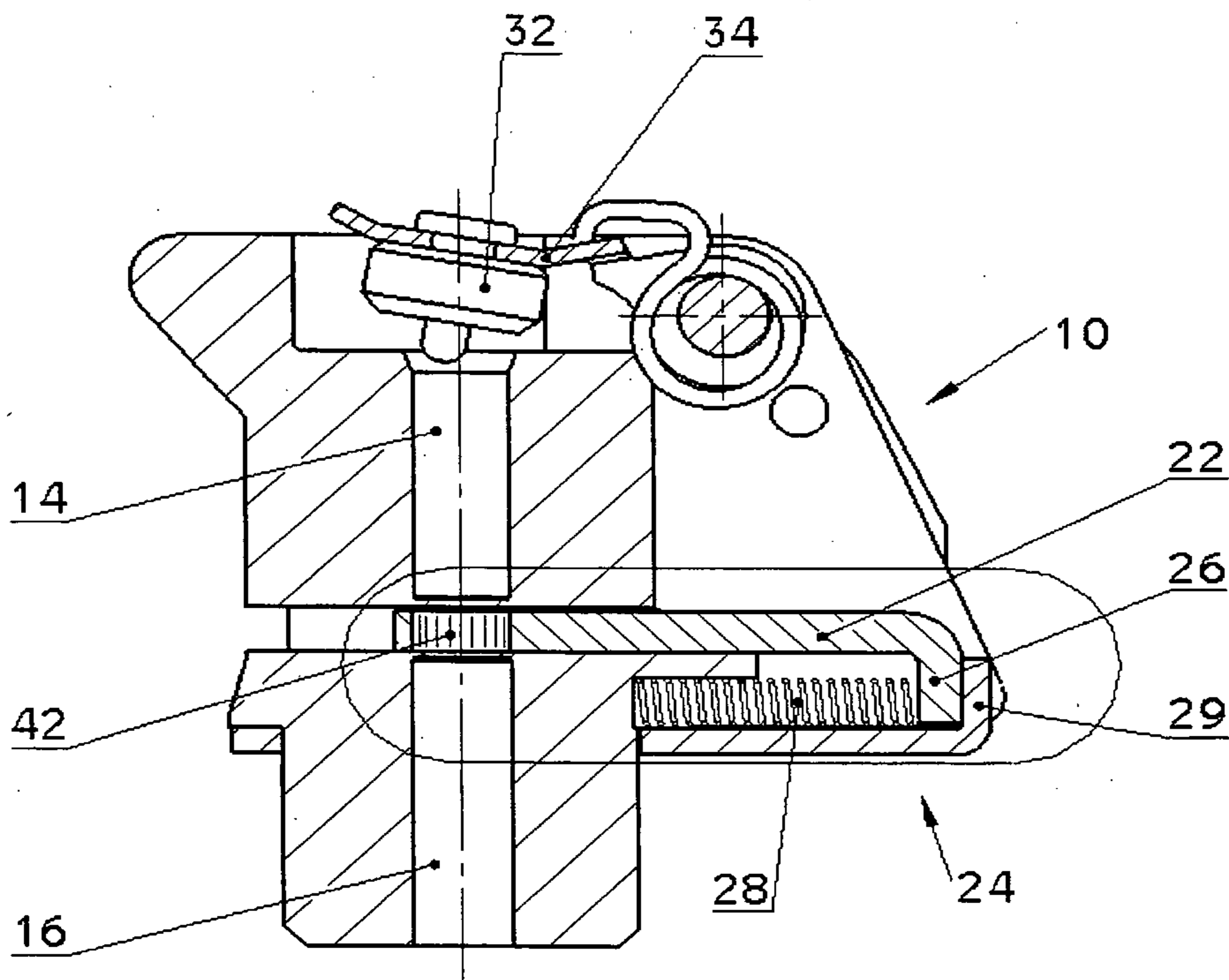


FIG. 2

