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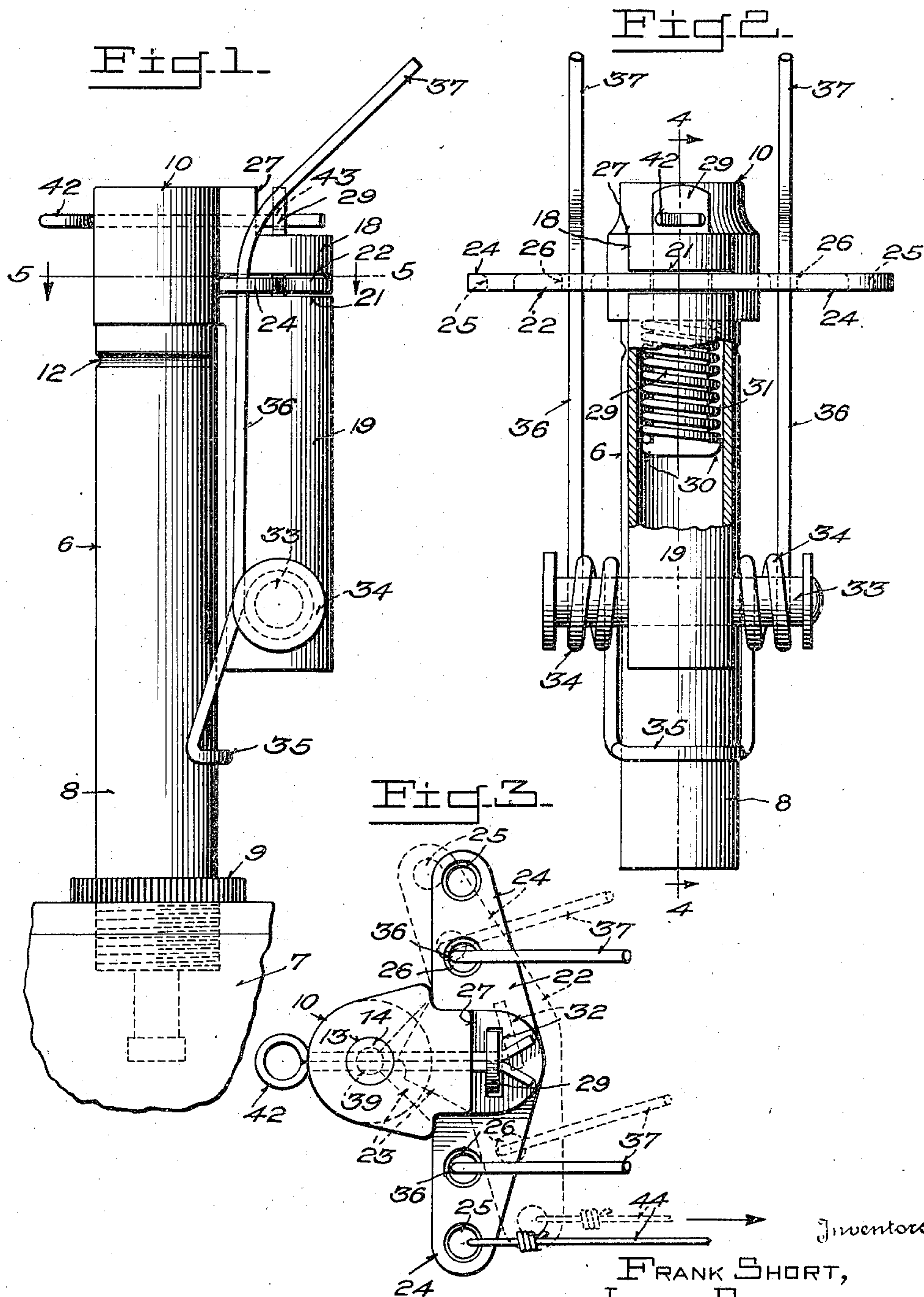
F. SHORT ET AL

2,427,371

FUSE FOR LAND MINES

Filed Jan. 16, 1945

2 Sheets-Sheet 1



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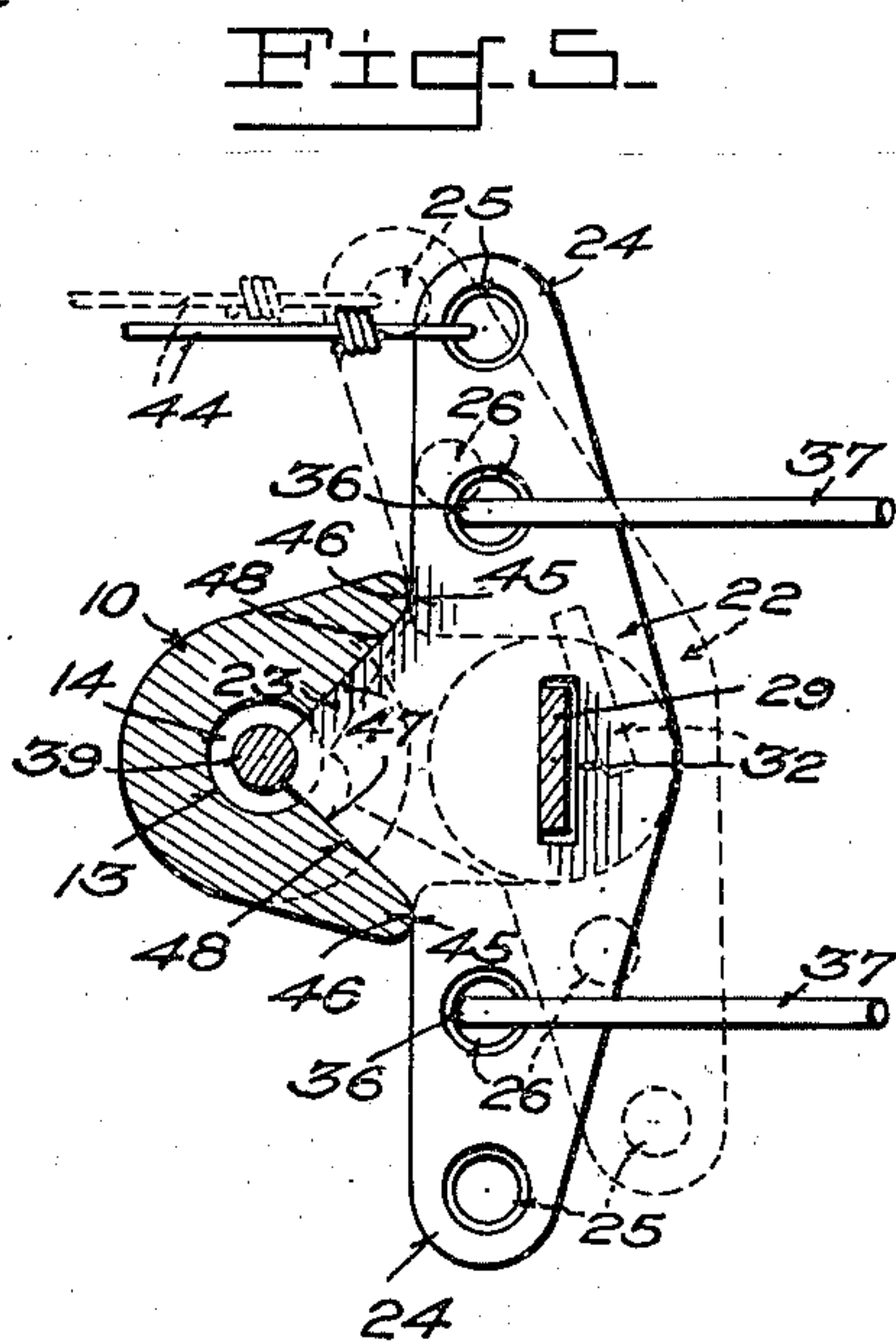
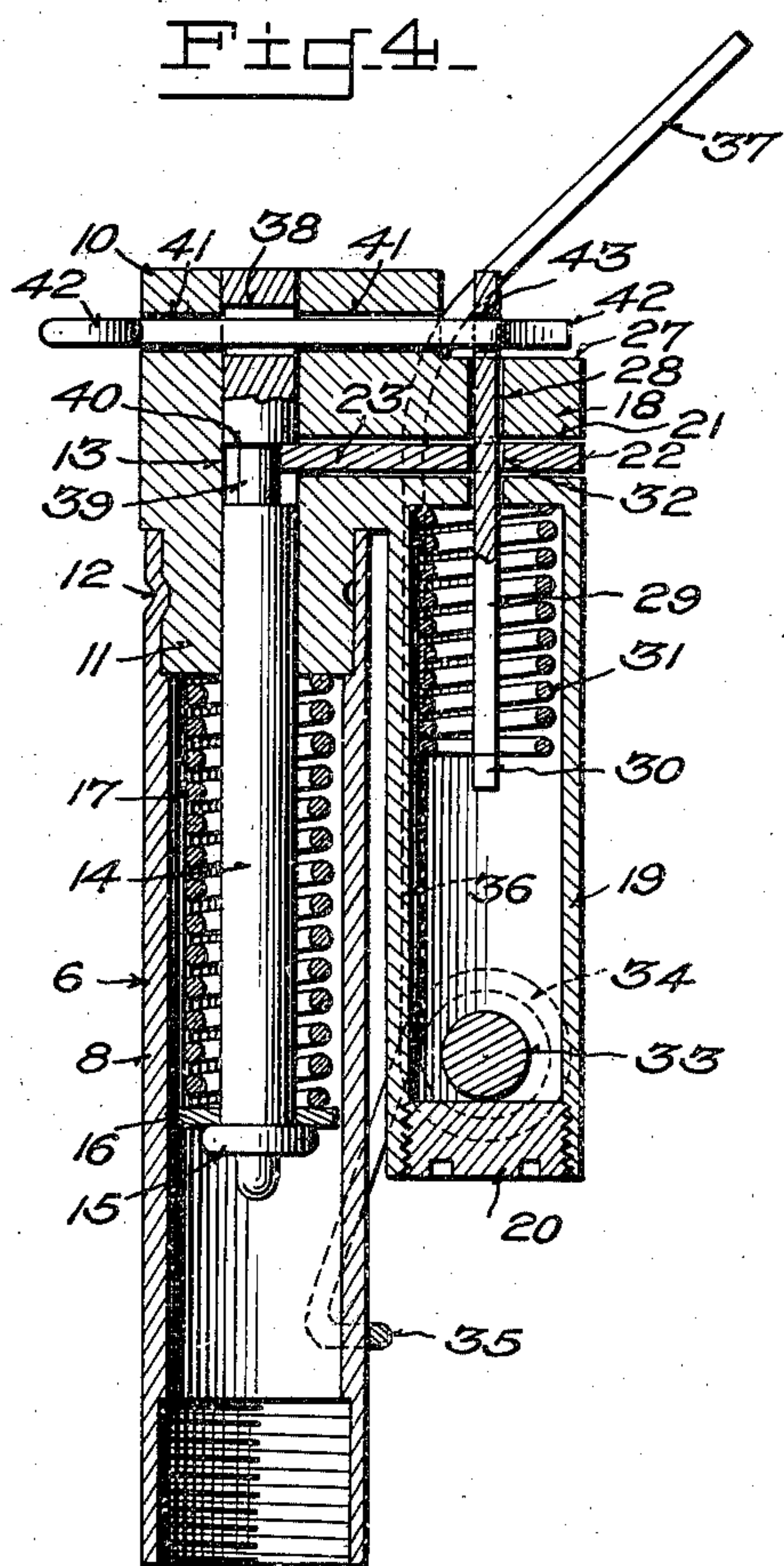
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2 Sheets-Sheet 2



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FUSE FOR LAND MINES

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10 Claims. (Cl. 102—73)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to a novel construction of fuse for land mines and which is especially adapted for use with anti-personnel mines.

More particularly, it is an aim of the invention to provide a combination type fuse which may be activated by either a pull, push or a force exerted in a downward direction and at substantially right angles to the components of the first two mentioned forces.

Another object of the invention is to provide a fuse having a detent yieldably retained in engagement with a firing pin, for holding the firing pin in a cocked position, wherein the yieldable means additionally functions as antennae to receive a downward pressure for moving the detent to a released position.

Still a further object of the invention is to provide a novel construction of detent for holding a firing pin in a cocked position, which can be operated, to release the pin, by a pulling force from any direction on a given plane or by a pushing force from any direction on the same plane.

Another object of the invention is to provide a mine fuse having a novel safety feature including a spring-urged key for holding a detent in an operative position, when the key is in a retractable position, and a detachable safety pin which retains the key in a retracted position and which also functions as a positive safety for holding the firing pin in a cocked position after the key has been released and should the detent then be moved to an operative position; said pin being thereafter capable of disengagement from the firing pin for completely arming the fuse.

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment of the invention, and wherein:

Figure 1 is a side elevational view showing the fuse in cocked, disarmed position;

Figure 2 is an edge view in elevation and partly in section of the same, looking toward the right hand side of Figure 1;

Figure 3 is a top plan view of the fuse;

Figure 4 is a longitudinal sectional view taken substantially along the plane of the line 4—4 of Figure 2; and

Figure 5 is a cross-sectional view taken substantially along the plane of the line 5—5 of Figure 1.

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Referring more particularly to the drawings wherein like reference characters designate like or corresponding parts throughout the different views, 6 designates generally the fuse in its entirety and 7 indicates a portion of a mine, which forms no part of the present invention, to which the fuse is connected, to illustrate one application of the invention.

The fuse 6 includes a barrel 8 of conventional and standard size and shape common to nearly all types of anti-personnel mine fuses, which is provided with an interiorly threaded end for receiving a standard base 9 which contains, in its upper portion, a primer or percussion cap, not shown, of conventional construction.

As seen in Figure 1, the base 9 is screwed into a well of the mine 7 in a conventional manner.

A casting 10 is provided with a reduced projection 11 which extends into the opposite end of the barrel 8 and which is permanently connected thereto as by means of the pressed fitting 12. Casting 10 is provided with bore 13, which is in axial alignment with the bore of the barrel 8 and which has one end opening into the bore of the barrel and its opposite end opening outwardly of the outer end of the casting 10. A firing pin 14 slidably engages the bore 13 and has one end extending into the barrel 8, which end is provided with a firing pin head 15 forming a seat for a washer 16 which in turn provides a stop or an abutment for a spiral expansion spring 17 which is mounted on firing pin 14, within barrel 8 and which has its opposite end bearing against the casting portion 11.

Casting 10 is provided with a laterally projecting integral extension portion 18 having an integral depending tube portion 19 which is disposed substantially parallel to the barrel 8 and which is provided with an internally threaded lower end to receive a plug or closure 20. Casting 10 is provided with a transverse slot 21 which opens into the bore 13 and which opens outwardly of three sides of the casting portion 18, for a purpose which hereinafter will become apparent.

A lever 22 has an intermediate portion which is normally disposed in the portion of the slot 21 which is formed in the casting portion 18, and the intermediate portion of said lever 22, along the inner edge thereof, is provided with a tapered extension, forming a detent 23, which extends inwardly of the slot 21 and into the bore 13. Lever 22 is provided with corresponding substantially opposed end portions or extensions 24 which project outwardly from the slot 21 and laterally from the casting 10, and which are provided with

eyes 25, adjacent their free ends, and with corresponding eyes 26, intermediate of their ends.

The casting portion 18 is recessed at its outer end, as seen at 27, and is provided with a longitudinally extending, relatively wide bore 28 having one end opening into the tube 19 and its opposite end opening outwardly of the recessed portion 27, with its intermediate portion extending through the slot 21. An elongated, relatively wide key 29 slidably engages the bore 28 and has one end extending into the tube 19, which end is provided with lateral extensions or ears 30, as best seen in Figure 2, to seat one end of an expansion spiral spring 31, which is carried by said fore-mentioned end of the key 29, and which has its opposite end bearing against casting portion 18 for urging the key 29 inwardly of the tube 19. As seen in Figure 4, key 29 extends through an opening 32 in the lever 22 for holding said lever positioned in the slot 21 and with the detent 23 extending into the bore 13, as best seen in Figure 5.

A pin 33 extends through and is fixed in the lower part of the tube 19 and has headed ends which project outwardly therefrom and around each of which is wound several convolutions of a spring 34. The intermediate portion 35 of spring 34 bears against the barrel 8 for providing a purchase for spring 34. Spring 34 is provided with corresponding arms 36 which extend from the outer convolutions thereof, in opposite directions to the intermediate portion 35 and on opposite sides of the tube 19 and casting portion 18, and through the eyes 26, for bearing against the lever 22 to urge it inwardly of the slot 21 for holding lever 22 resiliently in its position, as seen in Figures 4 and 5. Above the lever 22, the spring ends 36 are bent to project at oblique angles to the longitudinal axis of the fuse 6 and in a direction away from said fuse to form antennae 37.

The firing pin 14, adjacent the end thereof opposite to that provided with the head 15, is provided with an opening 38, and adjacent thereto and intermediate of its ends, firing pin 14 is provided with a restricted portion 39 forming an inwardly or downwardly facing shoulder 40 which is disposed substantially at a right angle to the longitudinal axis of the firing pin 14. The upper portion of the casting 10 is provided with a transverse opening 41 which extends through the bore 13 and which opens outwardly of the casting 10 at one of its ends and which has its opposite end opening outwardly of the casting and into the recessed portion 27. A cotter pin 42 extends through the opening 41 and through an opening 43 in the outer end of the key 29 for retaining key 29 in its retracted, operative position of Figure 4.

As best seen in Figure 4, when the firing pin 14 is in a retracted, cocked position, with its outer end flush with the outer end of the casting 10, the opening 38 will be aligned with the opening 41 so that the cotter pin 42, when positioned in opening 41, will extend loosely through the larger opening 38. With the firing pin 14 thus positioned, the restricted portion 39 thereof registers with the inner end of the slot 21 to receive the tapered flat formed end of the detent 23 which engages under the shoulder 40 for retaining the firing pin 14 in a cocked position, against the action of the spring 17. It will thus be seen that when the key 29 is in its operative position, as illustrated and described and as best seen in Figure 4, said key will function, through engagement with the lever 22, as a safety for holding the detent 23 against the shoulder 40 to prevent

release of the firing pin 14. Likewise, cotter pin 42, when in its fully operative position, as previously described and as best shown in Figure 4, engages the key 29 to retain it against disengagement from the lever 22 and thus combines with the key 29 in its function of retaining the fuse in a disarmed condition. By closing the spread free ends of the cotter pin 42, said pin can be withdrawn out of engagement with the key 29 to permit spring 31 to act upon key 29 and retract it into tube 19 and out of engagement with lever 22 to release said lever so that the detent 23 is held in engagement with the shoulder 40 only by the resilient action of the spring ends 36. When this is done, the cotter pin 42 is initially not removed from the opening 41 so that it still extends loosely through opening 38, thus in case a force is being exerted against lever 22 that will move the detent 23 out of engagement with shoulder 40, pin 42 can function as a positive safety to prevent the firing pin 14 from being fully projected by its spring 17 to prematurely discharge the fuse 6 and set off the mine 7, to which it is attached.

Fuse 6 and the mine to which it is attached, after it has been buried or otherwise suitably concealed and camouflaged, may be activated by any one of a number of wires 44 which lead to trip wires not shown. These lead wires 44 may extend in any direction from the eyes 25, to which they are attached, and will release the detent 23 from engagement with the shoulder 40, when a pull is exerted thereon from substantially the same plane as that occupied by the lever 22, due to the fact that the lever portions 45, as best seen in Figure 5, bearing against the casting portions 46, form fulcrums on opposite sides of the casting 10 to transmit an oscillating motion in either direction from either lever extension 24 to the detent 23. In addition, the tapered edges 47 of the detent 23 engage the inwardly converging side walls 48 of the slot 21 to form coacting cam surfaces for camming the detent 23 out of engagement with the shoulder 40 in response to a pushing force on either extension 24 or a pulling force in a direction corresponding to the longitudinal axis of either extension 24.

Thus it will be seen that substantially any force exerted upon the lever extensions 24 will release the detent 23 to activate the fuse 6, except a direct downward pressure from above the fuse, and to provide for activating the fuse by such a force, the antennae 37 are provided. The antennae 37 are adapted to be disposed just above the ground and suitably concealed so that the weight of a man stepping upon either antenna, due to the direction in which they are bent, will either move the lever 22 directly outwardly or will rock lever 22 on one of the fulcrums 45, 46 to move detent 23 out of engagement with shoulder 40.

In arming the fuse 6, after it has been attached to a mine and concealed and camouflaged therewith, and all the lead wires 44 connected, cotter pin 42 is disengaged from the key 29 to allow said key to be disengaged from lever 22, as previously described, and if the outer end of the firing pin 14 does not move from its position, flush with the surface of the casting 10, as seen in Figure 4, this will indicate that the firing pin 14 is still cocked, and the soldier, arming the fuse, can then move a safe distance away from the fuse and remove the cotter pin by means of any flexible member not shown, connected to the eye of the cotter pin, to thus fully arm the fuse. If, when the key is released, the outer end of the firing

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pin 14 moves out of flush relationship to the casting 10, this will indicate that the detent 23 is disengaged from the shoulder 40 and that the firing pin 14 is being held only by the positive safety 42, to show that the fuse is defective and should be discarded after first spreading the ends of the cotter pin 42 to insure that it will not be accidentally detached from the opening 41.

Various modifications and changes are contemplated and may obviously be resorted to, provided they fall within the spirit and scope of the invention as hereinafter defined by the appended claims, as only a preferred embodiment of the invention has been illustrated and described.

We claim:

1. A mine fuse comprising a housing having a bore therein, a firing pin in said bore having a downwardly facing shoulder, said housing having a slot communicating with the bore and opening outwardly of the housing, a lever loosely mounted in the slot and having a detent engaging under the shoulder for holding the firing pin retracted in cocked position, spring means yieldingly urging the lever inwardly for releasably holding the detent in engagement with the firing pin shoulder, said lever having an extension projecting laterally from the slot and having a bearing against a portion of the housing to provide a fulcrum upon which said lever may be rocked for disengaging the detent from the firing pin when the lever is rocked in one direction relative to the housing.

2. A mine fuse as in claim 1, said detent having tapered edges, said slot having inwardly converging side walls engaged by the tapered edges of the detent and combining therewith to form cam portions for camming the detent away from the firing pin shoulder when the lever extension is pushed or pulled relatively to the housing.

3. A mine fuse comprising in combination with a housing containing a spring propelled firing pin for exploding a primer; a downwardly facing shoulder formed on the firing pin, said housing having a slot communicating with the firing pin, a lever loosely mounted in the slot and having an integral detent engaging under the shoulder to releasably retain the firing pin in a retracted, cocked position, spring means urging the lever inwardly of the slot, said lever having portions bearing against portions of the housing, on opposite sides of the slot, to form fulcrums for the lever, and said lever having opposed extensions projecting from the housing to receive a force exerted from any direction, on substantially the same plane as the lever, for rocking the lever relatively to the housing, to move the detent out of engagement with the shoulder.

4. A mine fuse as in claim 3, said slot having inwardly converging side walls, and said detent having tapered edges engaging the side walls and combining therewith to form coacting cam surfaces, for camming the detent out of engagement with the shoulder when either of the lever extensions is pushed or pulled relatively to the housing.

5. A mine fuse as in claim 3, said spring means including upwardly projecting spring tines, said

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tines extending through the lever and having free end portions disposed thereabove and at an angle obliquely away from the housing, said oblique portions of the tines forming antennae adapted to be disposed above the ground to receive a downward pressure, for moving the lever outwardly from the slot to disengage the detent from the shoulder.

6. A mine fuse as in claim 3, a spring actuated key slidably engaging said lever for holding the lever in an operative position in the slot of the housing, and a safety pin removably mounted in the housing and engaging the key to hold the key in an operative position, in engagement with the lever, against the action of the key spring, to combine with the key to form a safety for retaining the firing pin in a cocked position.

7. A mine fuse comprising a housing, a spring actuated firing pin slidably mounted in the housing, a detent movably mounted in the housing and engaging the firing pin to hold it in cocked position, spring means engaging the detent and yieldingly urging said detent into engagement with the firing pin, said spring means including an antenna of resilient material having a portion bearing against the housing and having upwardly extending ends operatively connected with the detent and disposed so that a downward pressure on the antenna will move the detent out of engagement with the firing pin.

8. A mine fuse as in claim 7, said detent having lever portions projecting from the housing and bearing thereagainst to form fulcrums therewith to cause the detent to be swung out of engagement with the firing pin by a rocking movement of the levers, and said detent and housing having coacting cam surfaces for camming the detent away from the firing pin in response to a pushing or pulling force on either of the lever portions.

9. A mine fuse as in claim 7, a spring actuated key detachably engaging the detent, for holding it in engagement with the firing pin, and means removably engaging the key for holding the key in engagement with the detent.

10. A mine fuse as in claim 7, a spring actuated key detachably engaging the detent, for holding it in engagement with the firing pin, and means removably engaging the key for holding the key in engagement with the detent, said last mentioned means detachably engaging the firing pin to form a safety, and being removable from the key without detachment from the firing pin to provide a positive safety to prevent premature firing of the fuse should the detent be disengaged, when released by the key.

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REFERENCES CITED

The following references are of record in the file of this patent:

FOREIGN PATENTS

Number	Country	Date
130,523	Great Britain	Aug. 7, 1919
125,420	Great Britain	Apr. 24, 1919