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14

-1-

MECHANICAL MINE-TRIGGERING DEVICE ACTUATED BY
A TRIP WIRE OR THE LIKE

This invention relates to a mechanical mine-triggering device comprising: a casing receiving a striker movable from an armed position to a released position; an arm mounted on the casing and movable from a first position, in which it retains the striker in the armed position, to at least one second position, in which the striker is released towards the released position; and a safety key releasably introduced through a seat in the arm and engaging with a seat in the casing to secure the arm in its first position, the casing with its seat being located below the arm.

The basic requirements for a device of this kind are of course reliable operation - ie the certainty that the mine will explode - and the safety of the person installing the device.

More particularly, mechanical triggering devices for use with trip wires must explode the mine both when the wire is pulled and also when it is cut, otherwise the mine can readily be deactivated. This requirement calls for the presence of an element which can move against spring means and which is connected to the trip wire, such element initiating the explosion when moved from a predetermined inoperative position.

The person installing the mine must be able to adjust the moving element in its inoperative position before activating the mine, otherwise the mine would explode and injure the installer.

5 This is in fact a delicate operation and calls for some sensitivity on the installer's part, since the adjustment of the moving element, which must be very accurate, is carried out against relatively high opposing forces in the form of trip wire tension and the resilience
10 of the spring. Also, the surroundings in which a mine is installed are often difficult, thus increasing the risk of error. Another consideration is the fact that knowing that the slightest error could be fatal may upset the installer
15 psychologically and increase the chance of error.

It is the object of this invention to provide a mine-triggering device which obviates any risk for the installer and protects him against possible mistakes.

20 This object is achieved in accordance with the invention by a mine-triggering device of the kind outlined wherein the safety key for blocking the moving arm has a shank associated with a head larger than the shank, a plane annular
25 shoulder or step which is perpendicular to the

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key axis being provided between the head and the shank, the head projecting in its entirety below the arm when the key is introduced and the shank of the key in the introduced position being above the head and passing through the seat in the arm.

A preferred embodiment of the invention will be described hereinafter with reference to the accompanying drawings wherein:

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Fig. 1 is a perspective view of a mine-triggering device according to the invention at a time at which it has just been activated by cutting of trip wire;

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Fig. 2 is a section through the device of Fig. 1 with the moving arm in the inoperative position and the safety key inserted;

Fig. 3 is a section on the line III - III of Fig. 2;

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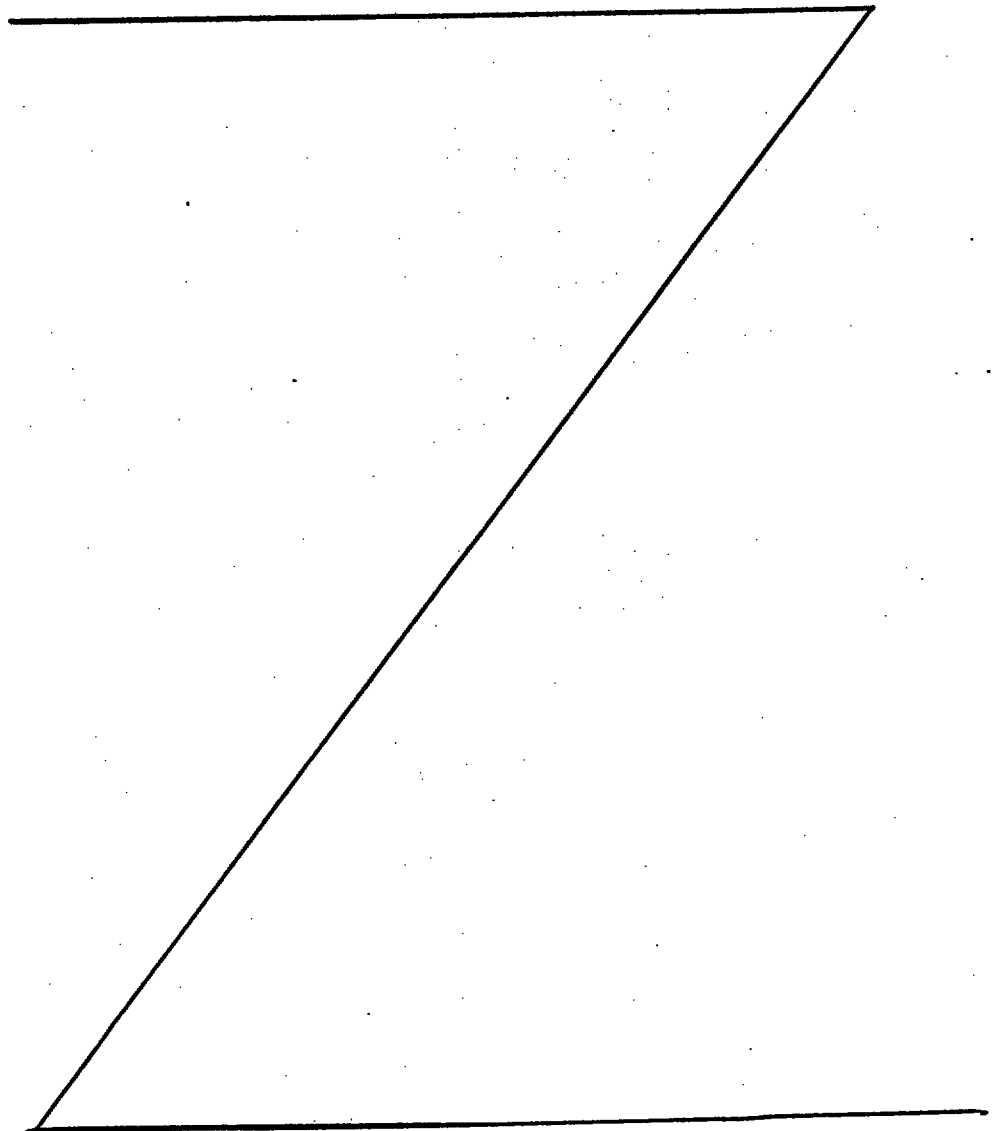
Fig. 4 is a section through the device of Fig. 2 after it has been activated;

- 3a -

Fig. 5 is a diagrammatic view in section of the safety key and of its arrangement in a position in which the key cannot be withdrawn, and

- 5 Fig. 6 is a diagrammatic view corresponding to Fig. 5 in a position in which the key can be withdrawn.

The description will be given with particular reference to the conditions associated with



safety key being in position.

A triggering device according to the invention comprises a casing 1 which is of substantially cylindrical symmetry and which terminates at the top in a circular surface 2. The casing 1 has at the top a substantially cylindrical projection 3 which projects from the surface 2 and which is coaxial of the casing 1.

Two cylindrical orifices - a top orifice 4 of relatively narrow diameter and a bottom orifice 5 of relatively large diameter - which are contiguous with and coaxial of one another extend vertically through the casing 1 and projection 3. The orifices 4, 5 receive a striker 6 guided for vertical movement against the force of a spring 7 compressed between an abutment 8, associated with the junction between the two orifices 4 and 5, and a disc 9 connected to the striker 6. Orifice 5 is closed at the bottom by a screwthreaded cover 10 formed with a central aperture 11 of smaller diameter than the striker 6. The same is therefore movable from a top armed position, in which the spring 4 is fully compressed, and a bottom released position in which it bears on the cover 10.

Projection 3 is formed with a radial aperture

12 which merges with the orifice 4. In the part distal from the aperture 4 the radial aperture 12 is adapted to be closed by a pivoted closure member 13 in shape resembling a C and extending three-quarters of the way around the projection 3. The ends of member 13 are pivotally connected to the projection 3 along a horizontal axis 14; the member 13 can therefore pivot between a substantially horizontal bottom position, in which it closes the aperture 12, and a raised position, in which it clears the aperture 12.

Aperture 12 receives a ball 15 whose diameter is greater than the length of the aperture 12 and which, with the member 13 in its bottom position, extends into the orifice 4 to engage with a rounded throat 16 in the striker 6 to retain the same in its top armed position.

Also secured to the surface 2 is a vertical cylindrical pin 17 which is disposed beside the projection 3 and distal from the aperture 12. An arm 19 is secured by a screw 18 to the pin 17 and can move angularly parallel to the surface 2 against the force of a torsion spring 20 operative between the surface 2

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- 6 -

and the casing 1. The arm 19 is gantry-shaped and has a securing end 21, used to secure it to the pin 17, and an operating end 22, the ends 21, 22 being interconnected by a horizontal crosspiece 23.

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The operating end 22 has a tooth 24 which projects towards the securing end 21. Tooth 24 engages in a recessed part 25 contrived externally in the central part of the closure member 13. The part 25 has a cross section substantially in the shape of a very flat U; the part 25 is bounded at the top by a horizontal edge 26 and by two downwardly inclined edges 27 which extend the edge 26, while at the bottom the part 25 is bounded by a short horizontal edge 28.

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Arm end 22 is formed with a cylindrical vertical aperture 29 and the surface 2 is formed with a rectangular-section groove 30 disposed radially opposite the aperture 12; the aperture 29 has a diameter substantially equal to the width of the groove 30.

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The aperture 29 receives a safety key 31 in the form of a cylindrical shank 32 terminating at the top in an eye 33 and at the bottom in a cylindrical head 34 which is larger than the shank 32 and which engages in the groove 30. A plane annular shoulder or step 35 is

provided between the head 34 and the shank 32. The diameter of the head 34 is substantially equal to the diameter of the aperture 29 whereas the diameter of the shank 34 is slightly less than the distance
5 between the base of the groove 30 and the lower side of arm end 22 when the same is disposed vertically above the groove 30.

The arm 19 is formed with a top longitudinal recess 36
10 which extends in the crosspiece 23 and in the end 22. Near the centre of the crosspiece 23 two transverse apertures 37 are disposed in alignment with one another on either side of the recess 36. The apertures 37 receive a screwthreaded pin 38 which is
15 screwed to a knurled nut 39 placed between the two apertures 37 for adjusting the position of the pin relatively to the arm 19.

A further two transverse apertures 40 are disposed on
20 either side of the recess 36 in the end 22 and are in alignment with the eye 33 of the key 31 when the same is in its inserted position. A small pin 41 is inserted in the apertures 40 and eye 33.

25 A first ring 42 is secured to the end of the pin 38 for connection to a trip wire 43. A second ring 44 is

secured to the pin 41 to facilitate the operation thereof.

5 The operation of the triggering device hereinbefore described will now be explained.

The device is first secured to the detonator of an already installed mine (not shown) in completely conventional manner, then connected by way of the ring 10 42 to the trip wire 43. At this juncture the tension of the wire 43 must be adjusted against the force of the spring 20 so that the arm 19 is accurately balanced in the inoperative position with the tooth 24 in the middle of the recessed part 25; fine adjustment 15 of wire tension is by means of the nut 39 which is turned to move the pin 38 in the apertures.

After the arm has been balanced in the inoperative position the safety devices can be removed, the pin 41 20 first being removed from the apertures 40 to release the eye 33, whereafter the safety key 31 is withdrawn from the aperture 29.

The triggering device is now in the activated 25 state and pulling or cutting of the trip wire

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43 will operate the device and therefore
explode the mine; for when the wire 43 is pulled,
the arm 19 turns and the tooth 24 moves in
the part 25, its movement first being horizontal
between the edges 26 and 28 until it strikes
5 one of the two inclined edges 27 and thus raises
the closure member 13.

As it rises the member 13 clears the aperture
12, so that the ball 15 can be pushed out by
the rounded walls of the throat 16 of the striker
10 6, the same therefore being forced downwards
abruptly by the spring 7 and striking the detonator
to explode the mine.

Operation is of course very similar if
15 the wire 43 is cut; in this case the spring
20, which is no longer opposed by the tension
of the wire, turns the arm 19 at the opposite
end.

As can be gathered from Figs. 5 and 6,
the safety pin 31 can be withdrawn only if
20 the arm 19 is properly balanced in its inoperative
position, as shown in Fig. 6. If the arm
19 is unbalanced due to the tension of the
trip wire 43 being too high or too low, the
key 31 takes up a position as shown in Fig.
25 5; the shoulder 35 closes the end of the aperture

- 29 to prevent withdrawal of the key 31.

Consequently, the special shape of the key 31, in co-operation with the projecting head 34 and the shoulder 35, makes it absolutely impossible to withdraw the key 31 if trip wire
5 tension is misadjusted; this makes absolutely sure that the triggering device cannot operate immediately after removal of the key and thus cause an explosion harming the operator.

Also, the fact that operator risk is very
10 low does not in the least reduce the reliability of operation of the readied installation, for the triggering device can be set off just by rotating the arm 19 through a few degrees.

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- 11 -

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1. A mechanical mine-triggering device comprising: a
5 casing receiving a striker movable from an armed
position to a released position; an arm mounted on the
casing and movable from a first position, in which it
retains the striker in the armed position, to at least
one second position, in which the striker is released
10 towards the released position; and a safety key
releasably introduced through a seat in the arm and
engaging with a seat in the casing to secure the arm
in its first position, the casing with its seat being
located below the arm, characterized in that the
15 safety key has a shank associated with a head larger
than the shank, a plane annular shoulder or step which
is perpendicular to the key axis being provided between
the head and the shank, the head projecting in its
entirety below the arm when the key is introduced and
20 the shank of the key in the introduced position being
above the head and passing through the seat in the
arm.



-12 -

2. A device according to claim 1, characterized in that the head is disposed at the end of the shank.

5 3. A device according to claim 2, characterized in that the arm has a cylindrical aperture and the casing has a radical groove, the diameter of the cylindrical aperture in the arm and the width of the radical groove in the casing are substantially equal to the diameter of the key head.

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4. A device as claimed in Claim 1 and substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
