

PATENT SPECIFICATION

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DRAWINGS ATTACHED



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(54) IMPROVEMENTS IN OR RELATING TO GUNS HAVING A BREECH MECHANISM INCLUDING A WEDGE BREECH BLOCK

(71) We, OY TAMPELLA AB, a Finnish Company, of Tampere, Finland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to guns having a breech mechanism including a wedge breech block.

The wedge breech block of a breech mechanism for guns is disposed, as known, transversely slidable in the bottom part or breech piece of the barrel. In such known guns the firing mechanism and all the parts associated with it, such as the striking pin assembly and the trigger arrangement are disposed in the slidable breech block. The bore for the reception of the detonator cartridge and the ignition channel merging therewith and leading to the barrel are arranged along a central axis, parallel to the barrel axis. When a cased shell is used, the striking pin is normally arranged close to the side of the breech block facing the barrel. When an uncased shell is used, the detonator cartridge can be arranged in the breech block. Owing to this the breech block is statically weakened in several aspects and the safety mechanism for the trigger arrangement is subjected to vibrations and shock through the sliding back and forth of the breech block. Such vibrations and shock influence the effectiveness of the safety mechanism.

It is further known to provide such guns with a magazine for cased detonator cartridges and to mount this magazine in the wedge breech block so that the magazine is advanced through the opening movement of the breech block. The associated firing arrangement is in this case housed separately and is mounted on a slide in the breech piece. This slide is slidably disposed in the breech piece and is held in its position by means of a catch bolt. By means of stops provided on the breech block and in the

breech piece, a limitation of the stroke of the slide containing the firing arrangement is effected with the open and locked breech block. The firing mechanism and the trigger arrangement are herein provided in different movable parts of the breech block.

It is the object of the invention to provide a gun having a breech mechanism in which the parts necessary for the firing mechanism are arranged in a safer and more easily accessible manner.

According to the present invention there is provided a gun comprising a barrel and a breech mechanism including a breech piece of the barrel and a wedge breech block transversely slidably mounted in the breech piece, the breech piece having therein a firing mechanism including a trigger arrangement and a striking pin mechanism, and the breech block having therein a housing for a detonator cartridge, and a firing channel coaxial with the housing, the axis of the housing and the channel being inclined to the longitudinal axis of the barrel.

It is possible owing to the arrangement according to the invention for the breech block to remain free of the trigger arrangement and the associated striking pin mounting. Thus, the breech block itself may be simpler in construction and form. Relatively large bores necessary for housing the trigger pin mechanism and also comparatively large cut-outs and recesses in the breech block for accommodating and housing the trigger arrangement with its associated safety device are thereby unnecessary. Thus, the breech block can be made more solid and shock-resistant. The relevant trigger arrangement and safety device parts, are, according to the invention, mounted on the breech piece of the barrel and are no longer under the influence of the back-and-forth sliding and the acceleration and retardation forces associated with the breech block. Furthermore, the housing for the detonator cartridge is more easily accessible than before and the parts of the trigger mechanism can

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be more easily supervised. On the whole, one is not dependent on the use of a cartridge case and the handling during insertion of the detonator cartridge can be effected substantially more simply and quickly.

5 Preferably, the firing mechanism is arranged on the right side of the breech piece—when viewed from the back of the latter. An intermediate piece in the form of a rotatable wedge may be expediently arranged in the breech block between the housing for the detonator cartridge and the striking pin mechanism, with which intermediate piece the housing for the cartridge may be closed. 10 When the breech block is slid to the side, the intermediate piece is moved away from the cartridge housing so that the case of the detonator cartridge may be ejected. A new cartridge can then be inserted. The closing of the cartridge housing is effected through the movement of the intermediate piece towards it. Only thereafter can the breech block slide into a breeching position and the striking pin mechanism can only perform its function when the breech block has reached its proper end position. 25

Rotation of the intermediate piece is expediently derived from the sliding movement of the breech block. Furthermore, the operation of the ejector arrangement for the cartridge can be derived from the rotation of the intermediate piece. 30

Embodiments of the invention will now be described by way of example, with reference to the accompanying drawings, in which:— 35

Figure 1 is a part sectional side view of a breech mechanism of a gun according to the invention;

40 Figure 2 is a part sectional plan view of the mechanism shown in Figure 1;

Figure 3 is a part section front view of the mechanism shown in Figure 1;

45 Figure 4 is a sectional view on the line IV of Figure 2 and shows the trigger arrangement;

Figure 5 is a sectional view on the line V—V of Figure 1;

50 Figure 6 is a sectional view on the line VI—VI of Figure 1 and shows the ejector arrangement for the detonator cartridge;

Figure 7 is a sectional view on the line VII—VII of Figure 6; and

55 Figure 8 is a detail view showing a variation for holding the intermediate piece in its extreme open and closed positions.

In the end 1 of a gun barrel a breech mechanism includes a wedge breech block 2 slidably mounted for movement in a direction transversely to the axis of the barrel. A crank arm 3 swingably rotatable by a shaft 4 is mounted in the barrel end 1. The crank arm 3 moves a roller 5 in a groove 6 in the breech block 2 whereby, by means of 60 the crank arm 3, the locking and sliding of

the breech block is effected in a known manner.

A striking pin mechanism 7 and a trigger arrangement 8 are accommodated in a bottom or breech piece 9 of the gun barrel 1, while in the breech block 2 itself a housing 10 for a detonator cartridge, and a firing channel 11 are arranged. The axes of the cartridge housing 10 and the firing channel 11 are inclined to the central axis of the gun barrel in such a manner that the axis of the firing channel 11 and the cartridge housing 10 run from the front to the right hand end of the back of the breech block as viewed from the rear, as in Figure 2. Correspondingly, the striking pin mechanism is also located at the right side of the breech piece as viewed from the rear, as in Figure 2. The breech block 2 is sloped at 12 on the right back side. The free wedge-shaped space so formed between the breech block 2 and the breech piece 9 is taken up by an intermediate piece 13 in which a cover 14 for the cartridge housing 10 is accommodated. The cover 14 is constructed to receive the front tip of a striking pin 15 (Figure 4). The barrel end 1 is sealed off by a packing ring 16 which has a right-angled cross-section so that, when the breech block 2 is in the locked or breeching position, the ring 16 bears against an annular collar 17 disposed in a groove in the breech block. Between the collar 17 and the breech block 2 an exchangeable intermediate plate 18 is provided by means of which the pressure with respect to the packing ring 16 can be regulated. 70 75 80 85 90 95 100

In the striking pin mechanism 7 the striking pin 15, which is under the action of a spring 19, is accommodated in a sleeve 20 against which a spring 21 acts. The back end 15a of the striking pin is bifurcated and is surrounded by a trigger lever 22 in which a pawl 23 is mounted for rotation about a pivot 24, the pawl 23 being in engagement with a cam 25 of the striking pin 15 and being under the action of a spring 26. 105 110

The trigger lever 22 is mounted for rotation about an axis 27 and has on its inner arm a roller 28 which bears against an extension of the sleeve 20 and can roll off a corresponding slanted surface 20a. 115

The intermediate piece 13 constructed as a wedge is rotatably mounted on a shaft 29. At the bottom end of the shaft 29 a gear 30 is provided, the teeth of which engage the teeth 31 of a rack 32 slidably mounted in the breech block 2. The rack 32 is provided with a longitudinal groove 33 which is engaged by a spring-loaded stop 34 mounted in the breech piece 9. 120 125

The intermediate piece 13 is provided with a cam 35 which co-operates with a counter cam 36 provided on a bolt 37. The bolt 37 is under the action of spring 38 and has at one end a wedge piece 39 which is 130

guided through a slot 40 of a further bolt 41, on whose end a detonator cartridge ejector 42 is provided. The spring 38 is disposed in a cap-shaped sleeve 43 set into the breech block 2. By means of a bush 44 the outer bearing surface of the spring 38 can be adjusted.

When the breech block 2 is slid transversely to the barrel axis after firing the gun, the wedge-shaped intermediate piece 13 will be outside the breech piece 9. When the sliding of the breech block 2 has reached a predetermined point, the end 33a of the groove 33 hits against the stop 34 so that the rack 32 is held fast. Since the breech block 2 slides still further in the transverse direction the rack 32 moves relative to the breech block 2. Owing to the teeth 31 rotation of the gear 30 is effected and correspondingly of the shaft 29 and the intermediate piece 13. Rotation of the now free intermediate piece 13 with the shaft 29 towards the outside results in the cartridge housing 10 being opened. As soon as the intermediate piece 13 has swung outwardly through a sufficient angle, the cam 35 of the intermediate piece 13 hits against the cam 36 of the bolt 37. Thereby the wedge piece 39 is pushed through the bolt 41 against the action of the spring 38 so that the ejector 42 is pressed outwardly. The ejector engages the protruding edge of the cartridge case disposed in the housing 10 and throws the case out of the housing 10. During loading of the barrel 1 a new cartridge can be inserted smoothly into the housing 10. Before this, the cam 35 has skipped over the counter cam 36, so that the bolt 37 can be returned into its position of rest under the action of spring 38 and therewith also the ejector 42. As soon as the loading operation has been finished and the breech block 2 has been slid again in front of the barrel end, the rack 32 moves relative to the breech block 2 in the opposite direction, whereby the transfer of the swingable intermediate piece 13 into engagement with the slanted surface 12 results, before the breech block 2 together with the adjacent intermediate piece 13 rides into the breech piece 9. During the return rotation of the intermediate piece 13, the cam 35 comes from the other side against the counter cam 36 and snaps past it by pressing the bolt 37 back against the spring 38 in order to return to the starting position. Thus there is obtained an automatic opening of the intermediate piece 13 in timed relationship with the transverse sliding of the breech block 2 only after the breech block has moved sufficiently outwardly from the breech piece 9 in the transverse direction. The intermediate piece 13 is held in its extreme closed and open positions by a catch or detent device 45 which consists of a ram 47 under

the action of a spring 46 and along which can roll a roller 48 connected to the intermediate piece 13. The catch or detent positions are given by surfaces 49 and 50.

In Figure 8 a further embodiment of a catch or detent device 51 for the extreme positions of the swingable intermediate piece 13 in connection with the ejector 42a, is illustrated. On the intermediate piece 13 a recess 52 is provided in which there is located a boss 53 mounted on a bolt 54. A spring 55 acts on the bolt 54 and is rotatably mounted with its bearing end 56 in a recess 57. Further, in the intermediate piece 13 an ejector 42a is under the action of a spring 58 whose rear bearing end 59 is safeguarded in its position by a bolt 60. During the opening movement of the intermediate piece 13 the bolt 54 is lodged with the stud 53 in the recess 52 and is pressed back against the action of the spring 55 until the bolt 54 swings over centre in the recess 57 and the spring 55 is released to complete the opening movement of the intermediate piece 13. Thus, the intermediate piece is catchingly held by stops in the end positions. During the opening movement of the intermediate piece 13, the ejector 42a engages with its elongated portion 42b the back edge of the cartridge case which is disposed in the cartridge housing 10 and throws out the case.

In the appended claims it has been assumed for convenience, that the breech assembly is in the position shown in Figure 2 of the drawings.

WHAT WE CLAIM IS:—

1. A gun comprising a barrel and a breech mechanism including a breech piece of the barrel and a wedge breech block transversely slidably mounted in the breech piece, the breech piece having therein a firing mechanism including a trigger arrangement and a striking pin mechanism, and the breech block having therein a housing for a detonator cartridge, and a firing channel coaxial with the housing, the axis of the housing and the channel being inclined to the longitudinal axis of the barrel.

2. A gun according to claim 1, in which the firing mechanism is arranged at the right hand side of the breech piece when viewed from the back of the latter and in which an intermediate piece in the form of a rotatable wedge is provided between said housing and said striking pin mechanism.

3. A gun according to claim 1 or 2, in which rotation of the intermediate piece is derived from the sliding movement of the breech block.

4. A gun according to claim 2 or 3, including an ejector for ejecting cartridges from said housing and in which operation of the ejector is derived from the rotating movement of the intermediate piece.

5. A gun according to any one of claims 130

guided through a slot 40 of a further bolt 41, on whose end a detonator cartridge ejector 42 is provided. The spring 38 is disposed in a cap-shaped sleeve 43 set into the breech block 2. By means of a bush 44 the outer bearing surface of the spring 38 can be adjusted.

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the action of a spring 46 and along which can roll a roller 48 connected to the intermediate piece 13. The catch or detent positions are given by surfaces 49 and 50.

In Figure 8 a further embodiment of a catch or detent device 51 for the extreme positions of the swingable intermediate piece 13 in connection with the ejector 42a, is illustrated. On the intermediate piece 13 a recess 52 is provided in which there is located a boss 53 mounted on a bolt 54. A spring 55 acts on the bolt 54 and is rotatably mounted with its bearing end 56 in a recess 57. Further, in the intermediate piece 13 an ejector 42a is under the action of a spring 58 whose rear bearing end 59 is safeguarded in its position by a bolt 60. During the opening movement of the intermediate piece 13 the bolt 54 is lodged with the stud 53 in the recess 52 and is pressed back against the action of the spring 55 until the bolt 54 swings over centre in the recess 57 and the spring 55 is released to complete the opening movement of the intermediate piece 13. Thus, the intermediate piece is catchingly held by stops in the end positions. During the opening movement of the intermediate piece 13, the ejector 42a engages with its elongated portion 42b the back edge of the cartridge case which is disposed in the cartridge housing 10 and throws out the case.

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2. A gun according to claim 1, in which the firing mechanism is arranged at the right hand side of the breech piece when viewed from the back of the latter and in which an intermediate piece in the form of a rotatable wedge is provided between said housing and said striking pin mechanism.
3. A gun according to claim 1 or 2, in which rotation of the intermediate piece is derived from the sliding movement of the breech block.
4. A gun according to claim 2 or 3, including an ejector for ejecting cartridges from said housing and in which operation of the ejector is derived from the rotating movement of the intermediate piece.
5. A gun according to any one of claims



- 2 to 4, in which the intermediate piece is mounted on a shaft including a gear, the teeth of which are co-operable with a rack longitudinally slidably in the breech block and in which a stop on the breech piece engages in a groove in the rack.
- 5 6. A gun according to claim 2 or 3, in which a cam is arranged on the intermediate piece which cam is co-operable with a counter cam on a bolt, the latter being spring biased and being co-operable with a flat wedge to form a cartridge ejector.
- 10 7. A gun according to claim 2 or 3, in which a spring biased ejector is arranged in the intermediate piece at an oblique angle to the cartridge housing.
- 15 8. A gun according to any one of claims 2 to 7, in which the intermediate piece is held in its extreme open and closed positions by means of a detent device.
- 20 9. A gun substantially as hereinbefore described with reference to Figures 1 to 7 of the accompanying drawings.
- 25 10. A gun substantially as hereinbefore described with reference to Figure 8 of the accompanying drawings.

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