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SAFE COCKING HANDLE**Subject of the invention**

[0001] The present invention relates to the making-safe of an open-bolt firearm using
10 a cocking handle.

State of the art

[0002] A machine gun operates with an open bolt, to avoid the risk of cook-off (self-
ignition). This means that before a shot is fired, while awaiting firing, the moving parts (usually
15 comprising a slide, a breech bolt and a firing pin, the whole being sometimes referred to
collectively as the bolt slide) are in the rear position in the weapon and the cartridge is in a leader
waiting to be fired. The cartridge is therefore not chambered while awaiting firing.

[0003] The command to fire causes the moving parts to be released from the rear
position. The energy to move the moving parts is stored in a spring, called a recoil spring. Once
20 these moving parts have been released, after they have completed their forward movement,
the shot is fired as a result of the primer being struck by a firing pin which may or may not be
attached to the moving parts.

[0004] The percussive firing energy is obtained during the rearward recoil of the
moving parts, either by manual rearming by the shooter or automatically by recovering the
25 energy supplied by the round. The percussive firing energy can therefore be stored in a recoil
spring or in another spring (example: in a hammer spring where firing is performed by a
hammer).

[0005] During a misfire with an unfired cartridge present in the chamber, the shooter
performs the instinctive problem-solving operation known as "immediate action", which
30 involves taking hold of the cocking handle and moving the moving parts back until they are
latched by the sear, awaiting an action on the trigger to resume firing.

[0006] During this re-cocking action, if the shooter does not fully retract the moving parts as far as the sear, and an unfired round remains chamberable, and this shooter deliberately or unintentionally releases the moving parts, and the moving parts return completely forward, there is potentially enough percussive firing energy so that there is a risk of a shot being let off
5 unintentionally; all without any action on the trigger!

[0007] In order to address this problem, the complete forward movement of the moving parts must therefore be prevented.

[0008] In the case of the Uzi submachine gun or NEGEV machine gun, the forward movement is prevented by the handle being blocked by the receiver frame.

10 **[0009]** Another option is described in patent application US2003/192222A1. This also prevents forward movement of the moving parts by the blocking of the handle by the receiver frame, but a deliberate movement on the part of the user is required to rotate the handle and lock it. This system therefore does not work in the case of unintentional release.

15 **Summary of the invention**

[0010] The present invention relates to an open-bolt firearm comprising a bolt slide slidably guided in a receiver frame between a forward position against a barrel, a barrel extension or the receiver frame, and a rearward reloading and awaiting-firing standby position, a cocking handle which is also slidably guided in the receiver frame on which the bolt slide rests,
20 a firing pin arranged in the bolt slide, or attached thereto, and a handle safety arranged on the cocking handle or on the bolt slide and which can occupy a safety position in which a distance-piece of the handle safety is interposed between the bolt slide and the barrel, the barrel extension or the receiver frame so as to prevent contact between the firing pin and a round chambered in the barrel, or a firing position in which the distance-piece is not interposed
25 between the bolt slide and the barrel.

[0011] In the present invention, moving parts are understood to mean all the parts set in motion by the weapon reloading cycle (bolt slide, slide, breech bolt, etc., depending on the type of weapon).

30 **[0012]** In preferred embodiments, the device of the invention includes a suitable combination of at least one of the following features:

- the handle safety is disposed on the cocking handle;

- the weapon includes a handle catch pivotable from a first position in which said handle catch locks the handle safety in the firing position, to a second position in which the handle safety is able to move into its safety position;
- the handle catch is arranged to swing into its second position when the cocking handle is pushed forward to a stop;
- the handle safety is disposed on a pivot pin fixed to the re-cocking handle and comprises a bearing surface which can bear against a corresponding surface on the handle catch to lock the handle safety in the firing position;
- the receiver frame includes a deflector on which, in use, a surface of the handle safety bears during the rearward movement thereof, causing said handle safety to swing into the firing position when the cocking handle reaches the rear reloading and awaiting-firing standby position, or when the bolt slide has reached an intermediate (anti-runaway) retaining notch;
- the handle catch is arranged to swing into its first position when the handle safety is in the firing position and the bolt slide is in the rear reloading and awaiting-firing standby position;
- the cocking handle comprises a handle handgrip which can be locked in the forward position by controllable locking means.

20 **Description of the figures**

- [0013]** Figure 1 shows a partial section of the various parts of one example of a weapon according to the invention, with the moving parts in the forward position, after a complete reloading: the breech is completely closed, the base of the cartridge against the breech face, the firing pin ready to fire.
- [0014]** Figure 2 shows a partial section of the various parts of the example of figure 1, with the moving parts in the forward position, after incomplete reloading: the base of the cartridge is not against the breech face, the firing pin cannot emerge sufficiently from the breech bolt to strike the cartridge, a handle safety is interposed between the slide and the barrel extension.
- [0015]** Figure 3 shows a partial section of the various parts of the example of figure 1, with the moving parts in an intermediate reloading position: the handle safety has been released from under the barrel extension.

[0016] Figure 4 shows a partial section of the various parts of the example of figure 1, with the moving parts in an intermediate reloading position: the handle safety has been pushed into its down position by a deflector on the receiver frame.

[0017] Figure 5 shows a partial section of the various parts of the example of figure 1, with the moving parts in the rearward reloading position, after the moving parts have been latched in the awaiting-firing standby position: the handle safety is in the down position through the action of the deflector and is retained in this position by the swinging of the handle catch.

[0018] Figure 6 shows a partial section of the various parts of the example of figure 1, with the moving parts in the course of the forward return movement. The handle safety is kept in the down position by the handle catch, held in this position by a spring.

[0019] Figure 7 shows a section of an example of a handle retention device that keeps the handle in the forward position by means of a leaf spring.

[0020] Figure 8 shows an overview of an example of a firearm according to the invention.

Key to figures

1. Barrel extension
2. Primer
3. Round
4. Cocking lever front stop
5. Handle handgrip
6. Handle catch
7. Handle safety
8. Handle body
9. Slide
10. Firing pin
11. Breech bolt
12. Handle safety distance-piece
13. Handle safety bearing surface that bears against the handle catch
14. Handle catch release feature
15. Handle catch bearing surface that bears against the handle safety
16. Receiver frame
17. Handle safety pivot pin
18. Handle catch pivot pin

- 19. Handle safety spring
- 20. Handle safety deflector
- 21. Leaf spring
- 22. Leaf spring lug
- 5 23. Handle clip-in groove
- 24. Handle body sliding surface
- 25. Machine gun
- 26. Handle catch spring

10 **Description**

[0021] Modern lightweight machine guns are, at present, often formed from a lightweight material (aluminum rather than the steel traditionally used for machine guns), with the exception of the barrel. It is therefore important to avoid passing significant forces through the receiver frame and the cocking handle when preventing firing in the event of incomplete rearming, and therefore to prevent these parts from breaking (or to prevent oversizing them and thus increasing their mass in order to prevent them from breaking).

[0022] In order to prevent firing, the moving parts, according to the invention, will not be able to move completely forward because of a part 7 (which will be referred to hereinafter as the handle safety) which adds a thickness between the moving parts and the usual forward stop of the weapon, the barrel or the barrel extension 1 into which the breech bolt 11 is locked in the case of a bolt-action breech. In this case, there is therefore no force applied directly to the receiver frame and the part that absorbs the forward impact is the one that is rated for this during intentional firing with the weapon.

[0023] Alternatively, the distance piece can be interposed between the bolt slide and a projection provided for this purpose on the receiver frame.

[0024] This handle catch 7 has a thickness just sufficient to prevent the firing pin 10 from protruding, so it is therefore not possible for the primer 2 to be struck. Moreover, advantageously, the moving parts 9, 10, 11 are dimensioned (particularly the breech bolt 11 and the locking slot controlling the movement of the breech bolt in the slide 9) in such a way that when the moving parts (bolt slide) are in abutment against the handle catch 7, the bolt slide is far enough forward for the weapon to be locked, so the shooter is also safe from cook-off of

the chambered cartridge: even if a shot is fired as a result of cook-off, the system will not explode (the pressure is contained by the locked weapon).

[0025] One objective of the invention is therefore to prevent a shot from being let off unintentionally as the result of percussion:

- 5 - if an unfired cartridge is in the chamber;
- and in the event of action on the cocking handle followed by incomplete recoil of the moving parts.

[0026] Figure 1 shows the situation of the various parts brought into play in a normal situation just before the shot is fired. It may be seen that the breech bolt 11 is locked to the barrel extension and adjoins the base of the barrel. The base of the chambered round is resting on a breech face and the firing pin 10 is in contact with the primer 2. The handle safety 7 is locked under the barrel extension 1 and the handle catch 6 is bearing on a housing of the front stop 4 which allows the handle safety 7 to be released when the re-cocking handle 8 is brought into the forward position. In this position, the shot can be fired in the normal way. During a normal (i.e. automatic) cycle, the bolt slide is returned backward by the automatic mechanism without the re-cocking handle accompanying this movement, the handle safety 7 therefore remains under the barrel extension, and the moving parts (or bolt slide) are either latched by the firing mechanism at the end of a burst of fire or between shots fired individually, or move forward again to fire the next shot of a burst of fire.

20 **[0027]** Figure 2 shows a situation similar to figure 1, but resulting from a partial manual re-cocking. It can be seen that the handle safety has turned through 90°, a distance piece 12 becoming interposed between the slide 9 and the barrel extension 1. The extra thickness of this distance piece 12 then prevents the firing pin 10 from striking the primer 2. It should be noted that advantageously, in the example of the figures, the distance piece 12 does not bear directly on the slide 9, but bears on a lug of the handle body 8, which itself bears on the slide 9. This advantageous arrangement makes it possible to define a limited travel for the handle safety. This lug also serves as a something for the re-cocking handle 8 to bear against when the moving parts are being brought rearward; it is hereinafter referred to as the control lug of the re-cocking handle 8.

30 **[0028]** Figure 3 shows the moving parts in an intermediate manual reloading position: the handle safety 7 has been released from under the barrel extension 1 and now bears against

the control lug of the re-cocking handle 8. In this position, if the re-cocking handle 8 is released unintentionally, the situation of figure 2 will be returned to and firing is prevented.

[0029] Figure 4 shows the moving parts in an intermediate reloading position. Here, the handle safety 7 has been pushed towards its down position by a deflector 20 disposed on the receiver frame.

[0030] Figure 5 shows the moving parts in the rearward reloading position, after the moving parts have been latched in the awaiting-firing standby position. This time, the handle safety 7 is in the down position as a result of the action of the deflector 20 and is kept in this position by the swinging of the handle catch 6. Specifically, the surface 15 at the rear end of the handle catch 6 then bears on the corresponding bearing surface 13 on the handle safety 7. From this position, the user can push the re-cocking handle 8 forward without the handle safety 7 popping up.

[0031] When the user pushes the re-cocking handle forward to the stop, a cavity in this stop allows the forward end of the handle catch to be raised, causing the rear end to swing in the opposite direction, releasing the handle safety 7 and thus returning to the position of the re-cocking handle 8 that is illustrated in figure 1 (but with the moving parts in the rearward position).

[0032] Advantageously, the re-cocking handle 8 comprises means reducing the risk of uncontrolled movement of the latter which could result in unintentional release of the handle safety 7. They may, for example, be simple male/female reliefs perpendicular to the movement that are overcome "by force", or may be more complex mechanisms such as, for example, a handgrip base comprising a lug or a hole cooperating with a corresponding hole or lug in the receiver frame, the handgrip being disengaged from this hole or this lug by a lateral movement of the handgrip prior to the re-cocking movement proper.

[0033] As a preference, as shown in figure 7, the weapon according to the invention comprises a leaf spring 21 comprising at least one lug 22 inserted into a corresponding groove 23 on the handle body 8 when the handle is in the forward position. This leaf spring 21 comprises a rear flank (i.e. flank toward the rear of the weapon) having a small angle (less than 45°, preferably less than or equal to 30°) relative to the axis of movement of the handle so as to offer low resistance to the forward movement of the handle. This low resistance can also advantageously be obtained by a sliding surface 24 at the front of the handle body, on which surface the lug 22 of the leaf spring bears during the forward movement of the handle. Conversely, the front flank of the lug 22 of the leaf spring 21 has a high angle with respect to the

axis of the moving parts (i.e. an angle greater than the angle of the rear flank, preferably greater than or equal to 45°).

Claims

1. An open-bolt firearm (25) comprising a bolt slide (9) slidably guided in a receiver frame (16) between a forward position against a barrel, a barrel extension (1) or the receiver frame, and a rearward reloading and awaiting-firing standby position, a cocking handle (8) which is also slidably guided in the receiver frame (16) on which the bolt slide (9) rests, a firing pin (10) arranged in the bolt slide, or attached thereto, and a handle safety (7) arranged on the cocking handle (8) or on the bolt slide and which can occupy a safety position in which a distance-piece (12) of the handle safety (7) is interposed between the bolt slide and the barrel, the barrel extension (1) or the receiver frame so as to prevent contact between the firing pin (10) and a round (3) chambered in the barrel, or a firing position in which the distance-piece (12) is not interposed between the bolt slide and the barrel.

2. The firearm as claimed in claim 1 wherein said handle safety (7) is disposed on the cocking handle (8).

3. The firearm as claimed in claim 2 including a handle catch (6) pivotable from a first position in which said handle catch (6) locks the handle safety (7) in the firing position, to a second position in which the handle safety (7) is able to move into its safety position.

4. The firearm as claimed in claim 3 wherein the handle catch (6) is arranged to swing into its second position when the cocking handle (8) is pushed forward to a stop.

5. The firearm as claimed in one of claims 3 to 5 wherein the handle safety (7) is disposed on a pivot pin (17) fixed to the cocking handle (8) and comprises a bearing surface (13) which can bear against a corresponding surface (15) on the handle catch (6) to lock the handle safety (7) in the firing position.

6. The firearm as claimed in one of claims 3 to 5 wherein the receiver frame includes a deflector (18) on which, in use, a surface of the handle safety (7) bears during the rearward movement thereof, causing said handle safety (7) to swing into the firing position when the cocking handle reaches the rear reloading and awaiting-firing standby position.

7. The firearm as claimed in claim 6 wherein the handle catch (6) is arranged to swing into its first position when the handle safety (7) is in the firing position and the bolt slide is in the rear reloading and awaiting-firing standby position.

5 8. The firearm as claimed in one of the preceding claims wherein the cocking handle comprises a handle handgrip (5) which can be locked in the forward position by controllable locking means.

9. The firearm as claimed in one of the preceding claims wherein the bolt slide includes a breech bolt (11) and the thickness of the distance-piece (12) is determined so as to prevent percussion but permit locking.