

Device For Locking A Closure In A Repeating Weapon

The invention relates to a repeater rifle with an action that can move in the shooting direction, i.e., in the longitudinal direction, with an interlocking block that can move in the direction transversally to the action and that serves to lock the action by being introduced into recesses in the action and in the rifle's body, and a manipulation device to move the action forward and backward and to introduce and release the interlocking block (pre-characterizing clause of claim 1).

Any indication of position or direction such as "at the top" or "forward" in this documentation relates to a rifle in a normal shooting position, i.e., one that shoots horizontally "forward".

Soon after the invention of repeaters with bolt action, attempts were being made to simplify the procedure and movements required to charge the rifle. Until then, in order to charge the rifle, the rifleman had to perform a transversal movement, a backward movement, a forward movement, and a further transversal movement. Therefore, manufacturers introduced a kind of screw drive, which transformed the previously complicated sequence of movements into a simple backward and forward movement. However, due to their complicated mechanism, these so-called "straight-pull" systems either did not prove to be reliable or were too costly. In these known systems, the actual action is assigned a slider, which can be considered to be the action carrier.

There are also other systems that simplify the procedure and movements used to charge the rifle. One such system is briefly indicated in the pre-characterizing clause of claim 1, and it was even designed before the above-mentioned straight-pull systems: the action can move straight forward until it reaches the cartridge bottom in the cartridge magazine. When it reaches this action position, a transversal slider or an interlocking block is moved in the recesses in the action and in the rifle body and thus locks the action. A lever is swivelled downwards in an arch-like movement and thus releases the interlocking block on an initial path. After traveling along an end path, the unlocked action is then pulled back. The action is closed and locked only when the lever swivels upward. Since 1895, a box magazine has also been known for this system.

Rather than using a lever, similar systems are actuated by a straight moving slider, which is connected to the front shaft. However, in this case, the interlocking block performs a swiveling motion.

All the systems described above are quite complex and, therefore, costly and sensitive.

In the case of interlocking blocks operated by a lever or front-shaft gliders, and particularly when powerful cartridges are involved, there occur high surface pressures. Such high pressures require either a robust design or an extreme degree of precision in manufacturing.

In the case of firearms to be used in emergencies it is particularly important that they should combine a robust design with small dimensions and reliability at a low price.

After all, such firearms should be used only in the rare event of an emergency, but must then work safely under adverse conditions.

The technical task of the invention is to further develop the above-mentioned repeater in such a fashion that at least a part of the aforementioned difficulties are at least partially eliminated.

Preferably, the invention should provide a straight-pull repeater rifle that is especially suitable for emergency use, but also for military use, use by police, and similar applications.

This technical task is fulfilled in that an action carrier is provided in the initially indicated rifle, which can move parallel to the action over an initial path and an end path, and that the action carrier is fitted with at least one angular surface which engages in a counter-surface on the interlocking block in such a fashion that as it travels over the initial path, the interlocking block is released or introduced (Claim 1).

To a certain degree, the invention uses the longitudinal slider of the above-described straight-pull action to actuate an interlocking block that is known from a lever-action rifle. The action can be very brief, which reduces the total length of the rifle. Since the longitudinally movable action-carrier need not be adjacent to the action in the longitudinal direction, the motion path of the action-carrier need not be precisely defined; it must simply be long enough.

It is suitable that, before it travels along the initial path, the action carrier moves over a lost-motion path, during which the action remains interlocked (Claim 2). This lost-motion path not only compensates for any design inaccuracy, but also allows the rifleman to achieve momentum. Thus the interlocking block is unlocked by the action carrier only after the action carrier has gained some speed. This allows one to entrain even a lightly stuck action, without the rifleman even noticing this minor failure, for the most part.

A preferred further development of the invention consists in the rifle body being formed by the rear end of the barrel or a barrel-retaining shell and a housing made of plastic material, and recesses designed in the rifle body at the rear end of the barrel and/or in the barrel-retaining housing (Claim 3). During the course of a shot, the main arising forces are conducted by the action through the interlocking block directly into the barrel. The actual rifle housing, which is made of plastic material, receives only parasitic forces, conducts movable components, and protects all components from being soiled.

Due to the high degree of design freedom, the rifle according to the invention can assume almost any practical form. The manipulation device for the action carrier can be a handle, a front shaft, or a lever or simply a grip that protrudes from the (plastic-material) housing to the side, forward or backward.

Furthermore, the invention proposes that the firing pin be mounted directly on the action, and especially traversing it (Claim 4).

However, when the action leans on it the cartridge can be ignited irrespective of whether the breech is interlocked or released.

In order to prevent this problem, a further development of the invention proposes that an interlocking block be assigned to the action, which in the locked position is freely penetrated by the firing pin while, in the unlocked position, it locks the firing pin in a withdrawn, ineffective position (Claim 5). Thus, in a way, the interlocking block acts as the safety bolt because the trigger can ignite the cartridge only if the action is locked in.

This embodiment of the invention is further improved in that the interlocking block comprises beveling, by which the firing pin is pushed into its ineffective position during the interlocking block's transition from the locked to the unlocked position (Claim 6). If, for example, due to a defective cartridge, during a shot the firing pin gets stuck in the ignition primer, it is again loosened, released and transferred to its ineffective position by the motion of the interlocking block being unlocked.

According to another preferred embodiment of this invention, this interlocking block can move, transversally to the centerline of the bore, into the locked-in position and from the locked-in position in the action. In addition, it penetrates the action and, in its locked-in position, engages in a recess in a component that is designed as one piece with the barrel, or is firmly connected to it (Claim 7). This engagement preferably occurs in three spots regularly distributed along the circumference. This is particularly true in the case of a shotgun, where a generous over-dimensioning of the recess and the locking pin is possible due to the size of the cartridge. In its section that engages in the recess, the locking pin is preferably slightly beveled so that it can always lock and unlock smoothly (especially with large housing tolerances).

On the action's side opposite to the recess, the action carrier can be designed as a movable part along the action. The interlocking block is fitted with front and rear base plates and the action carrier is fitted with front and rear driving plates in such a way that

- the receding action carrier, upon continuing its reversal, hits with its front driving plate against the front base plate of the interlocking block in order to pull it out of the recess, and
- the action carrier, during its closing motion, hits with its rear driving plate against the rear base plate of the interlocking block in order to press it into the recess,
- wherein at least one of the front or rear base or driving plates is beveled (Claim 8).

When the action is locked-in, the action carrier can move freely forward beyond the position that it assumes after the locking is completed. By contrast, if the action carrier moves backward from this position, then, after having traveled a certain lost-motion path, it pulls the interlocking block from the recesses and, subsequently, also carries along the action. It is not important how great is the level of free play between the base plates of the interlocking block and the driving plates of the action. The only issue of importance is

that the base plates fit into the opening in the action carrier formed between the driving plates.

This allows for a simple and less precise manufacturing process; imprecise parts or spare parts can be built in without any further adjustment.

The rifle, as designed by the invention, can be used, for example, for a small-caliber repeater. The system as designed by the invention is particularly suitable for a repeater shotgun (Claim 9), and preferably a front-shaft repeater.

In general, the system of the present invention has proved to be especially suitable for a multiple-barrel rifle using large cartridges, especially cartridges of a caliber greater than 15 mm, as the two or more retractor claws reliably hold and conduct the very large cartridges.

The repeater action can also be used for an auto-loading (semi-automatic) weapon in that an auto-loading mechanism (for example, a gas-piston gear) is connected to the grip or to an articulated rod instead.

We will now explain the subject of the invention using an example design and the attached schematic drawings.

- Figure 1 shows a longitudinal view of the rear part of the barrel and the action of a shotgun designed according to this invention, with the action in closed and locked positions
- Figure 2 As in Figure 1, but with an unlocked action and immediately after the firing of a shot;
- Figure 3.1 shows a longitudinal view of the action carrier in a slightly larger scale than in Figures 1 and 2;
- Figure 3.2 shows a perspective projection of the action carrier shown in Figure 3.1, seen obliquely from the top;
- Figure 4 shows a cross-section of the rearmost part (end section) of the barrel along the middle axis of a locking recess;
- Figure 5.1 shows a view of the interlocking block from the back;
- Figure 5.2 shows a side view of the interlocking block;
- Figure 6 shows a view of the action in the state shown in Figure, seen obliquely from the top;
- Figure 7 shows a strongly enlarged extracting claw;

Figure 8 shows a side view of the dismantling block; and

Figure 9 shows a cross-section along the line IX - IX through the dismantling block in Figure 8.

Overall, the drawings show an example design of the invention. Therefore, in the subsequent text we will refer to individual figures of the drawing only if this facilitates to locate and explain a certain element/feature.

The only partially shown rifle is a repeater shotgun that can be equipped with a box magazine (Figures 1,2). The shotgun comprises a barrel 1 with a middle axis or an axis of bore 37. At the rear end of the barrel is provided a cartridge magazine 3, to which connects an end section 4 of barrel 1. The end section 4 has an approximately U-shaped cross-section that is open towards the bottom (Figure 4), and comprises, in the middle, an upper locking recess 5 and 2 interlocking notches 6 at the bottom. The notches sit in the free ends of the two branches of the U cross-section. At about half the height of each U branch is provided a groove 10 that extends parallel to the axis of bore 37 and in which can run a cartridge extractor 61 (Figure 6).

In a weapon ready to shoot, the cartridge magazine 3 is closed by an action that extends toward the back. The action is penetrated by a front vertical borehole that retains an interlocking block 25. This interlocking block comprises, transversal to the axis of bore, a inverted-T-shaped cross-section (Figures 5.1. and 5.2) with a conical interlocking extension 7 at the free (upper) end of the middle shaft and an interlocking finger 8 on each of the two ends of the (lower) transversal shaft.

In the interlocked position, the interlocking extension 7 engages in the interlocking recess 5 and, at the same time, the interlocking fingers 8 engage in the interlocking notches 6.

All engagement surfaces are positioned obliquely to the perpendicular in order to facilitate a smooth engagement and disengagement of the interlocking block 25 in the end section 4 of the barrel 1. However, the oblique angle of the surfaces is so small that the engagement is self-locking; that is, it cannot open towards the back under a force exerted on the action 11 along the axis of bore 37.

Thus, during a shot, barrel 1 and action 11 are directly connected to each and transfer the initial high forces directly to each other. No other element is affected by the force transmission. Therefore, the barrel 1 can be embedded, with its rear end, in a plastic material body 2. The fact is that the greatest forces are not transmitted to the body 2.

The action 11 sits on an action carrier 13 (Figures 3.1 and 3.2). This action carrier is longitudinally movable, in relation to the action 11, along a certain path. The action carrier 13 comprises: a longitudinal recess 54, a transversal recess 53 in the area underneath the interlocking block 25, and a flat surface 59 behind the transversal recess.

In the forward direction, the transversal recess 53 is limited by lugs 55 on both sides of the longitudinal recess 54; these lugs protrude towards the top and backward and exceed the flat surface 59.

The interlocking block 25 is designed in such a manner that in its upper interlocked position the lower surface of its transversal shaft is flush with the lower surface of the action 11 (Figure 1). In this position, the action carrier 13 can move forward and backward underneath the interlocking block 25, and the action 11 and the interlocking block 25 can slide on the flat surface of the action carrier 13.

However, if the action carrier 13 moves backward beyond the rest position shown in Figure 1, its two lugs 55 will grab, with their rear edges, both sides of the transversal shaft of the interlocking block 25 and pull it to the bottom into the transversal recess 53. This position is shown in Figure 2. In this position, the interlocking block 25 is being released from the end section 4 of the barrel 1. The action 11 can now move backward in relation to the barrel 1.

Thus, the unlocked action 11 during its further backward movement runs in a guide (not shown) in the body 2 so that the interlocking block 25 cannot move upward.

During the closing of the action 11, the action hits the rear end of the cartridge magazine 3, that is, the bottom of a cartridge. The action carrier 13 is then pulled or pressed further forward by a spring 9 (only schematically indicated as the direction of a force). A bevel 57, which forms the rear wall of the transversal recess 53, presses the interlocking block 25 in the upward direction, that is, pushes it upward during its forward movement until the flat surface 59 is underneath the interlocking block 25 and the position shown in Figure 1 is reached.

The action 11 comprises, behind the interlocking block 25 and roughly parallel to its middle shaft, a rotating dismantling block 27, which is held in its usual position by a latch 28 (Figures 1, 2, 6, 8, and 9). The dismantling block 27 is retained in a rear, vertical transversal borehole 23 in the action 11.

The interlocking block 25 and the dismantling block 27 are penetrated by a firing pin 19 and, for this purpose, are fitted with boreholes 31 and 34, accordingly.

The lower end of the dismantling block 27 is designed as a T-pod 5 that runs in the longitudinal recess 54 with a reverse-T cross-section in the action carrier 13. In the operational state, i.e., in a position where the T-pod 51 is positioned underneath the flanks of the groove 54, and the dismantling block 27 is held by its latch, a shoulder 35 of the firing pin 19 hits a protrusion 36 placed behind it in the borehole of the dismantling block 27. This prevents the firing pin 19 in its position of use from falling backward out of the action 11. If, after overcoming the latch 28, the dismantling block 27 is turned by approximately by one eighth of a turn, the firing pin 19 can be moved backward. Since in this state, the T-pod 51 is still positioned underneath the upper flanks of the groove 54, the action 11 and the action carrier 13 still remain built together, while the firing pin 19

can be exchanged. Only a full one-quarter turn of the dismantling block 27 (which is possible only after the firing pin 19 has been removed), will release the T-pod 51 from the groove 54, and the action 11 can be removed from the action carrier 13.

The borehole 31 in the interlocking block 25, which is penetrated by the firing pin 19, is designed as a deep hole that allows the interlocking block 25 to assume the positions shown in Figures 1 and 2 (locked and unlocked) in spite of the presence of the firing pin 19.

Behind the deep hole 31, the firing pin 19 comprises a slub 29, while a beveled recess 33 – complementary to the slub 29 – is designed in the rear side of the deep hole 31. The recess 33 and the firing pin slub 29 are designed in such a way that the firing pin 19 can plunge into the deep hole 31 only when the interlocking block 25 is in its uppermost position (interlocking position in Figure 1). In this position the firing pin 19 can plunge so deeply into the deep hole 31 that its tip can emerge from the front surface of the action 11 and ignite the cartridge.

When the interlocking block 25 is lowered, then – due to its special shape – the recess 33 presses the firing pin slub 29 so far backward that the firing pin tip can no longer reach the cartridge. This design ensures that a cartridge can be fired only when the action 11 is sufficiently interlocked.

As we have described, the slub 29 and the shoulder 35 hold the firing pin loosely between two end positions; upon being unlocked, the beveled recess 33 of the interlocking block forces the firing pin to withdraw. Thus, a firing pin spring is usually superfluous and, therefore, need not be provided.

The action carrier 13 comprises a handling device 65, which is connected to the sliding front shaft. A disconnectable lock could hold this handling device in its front-most position. The handling device – and thus the action carrier – are moved backward and forward again to re-load the weapon.

When the handling device 65 is pulled backward, the action carrier 13 is carried along, wherein the action carrier, with its lugs 55, pulls the interlocking block 25 downward, and then, during its continuing backward movement, pulls the action 11 over it. In this process, the rear end of the action carrier 13 re-loads the hammer of a knocking mechanism of a known design that is not illustrated here, and performs a recharging movement. When the handling device 65 is pushed forward, the interlocking block 25 is again pressed upward in the above-described manner, and is supported from the bottom by the flat, upper surface 59 of the action carrier 13. It is unimportant whether the action carrier 13 is placed one millimeter further in the front or not. Thus, subsequent free plays have no influence.

An advantage of the shown action 11, 13 consists in that in its unlocked state (Figure 2) the front surface of its action carrier 13 protrudes slightly over the front surface of the action 11. Thus, a cartridge can be transported upward without getting stuck, with its

bottom, in a cartridge extractor or any protrusion of the front surface of the action 11. Thus, the action 11, which is not burdened by this process, does not have a tendency to interlock when "underway".

As Figure 6 illustrates, in this design example the action 11 comprises – in a somewhat unusual manner – two cartridge extractors 61 located opposite to each other. Such a cartridge extractor 61 is further shown enlarged in Figure 7. As can clearly be seen, it comprises a hook-like formation with a hook surface 63 facing the rear, which is designed to lean against the edge of a shot cartridge. This edge is vaulted forward so that the hook surface 63 fits against an arched formation. Depending on whether the cartridge extractor (not shown here) is arranged on the right-hand side or on the left-hand side, the cartridge casing is thrown out to the left or to the right. However, it is essential that no eccentric, longitudinal or transversal force be exerted upon the cartridge casing when it is being pulled out, especially not one that could come from a single cartridge extractor 61. This ensures a smooth pullout of even very long cartridge casings. It is only close to the end of the backward path of the action that an eccentric force acts upon the cartridge casing, which causes the cartridge casing to actually be released from one or the other cartridge extractor.

In general, when one wants to switch from the right-side to the left-side ejection, one only needs to switch the ejector. The two cartridge extractors 61 stay where they are.

Claims

1. A repeater rifle with an action (11) that can move in the shooting direction, i.e., in the longitudinal direction, an interlocking block (25) that can move in the direction transversally to the action, and that serves to lock the action (11) by being introduced into recesses (5, 6, 21) in the action and in the rifle's body (1, 2), and a manipulation device (65) to move the action (11) forward and backward and to introduce and release the interlocking block (25), characterized in that an action carrier (13) is provided that can move parallel to the action (11) over an initial path and an end path, and carries the action in the end path, and that the action carrier (13) is fitted with at least one angular surface (57), which engages in a counter-surface on the interlocking block (25) in such a fashion that as it travels over the initial path, the interlocking block is released or introduced.
2. The repeater rifle according to claim 1, characterized in that, before it travels along the initial path, the action carrier (13) moves over a lost-motion path, during which the action (11) remains interlocked.
3. The repeater rifle according to one of claims 1 or 2, characterized in that the rifle body (1, 2) is formed by the rear end of the barrel (1) or a barrel-retaining shell and a housing made of plastic material (2), and that recesses (5, 6) are designed in the rifle body (1, 2) at the rear end of the barrel (1) and/or in the barrel-retaining housing.
4. The repeater rifle according to one of the preceding claims, characterized in that the action (11) is penetrated by a firing pin (19).
5. The repeater rifle according to claim 4, characterized in that the action (11) is penetrated by an interlocking block (25) which in the locked position is freely penetrated by the firing pin (19) while, in the unlocked position, it locks the firing pin (19) in a withdrawn, ineffective position.
6. The repeater rifle according to claim 5, characterized in that the interlocking block (25) comprises beveling (33), by which the firing pin (19) is pushed into its ineffective position during the interlocking block's transition from the locked to the unlocked position.
7. The repeater rifle according to one of the preceding claims, characterized in that the interlocking block (25) can move, transversally to the action (11), into the locked-in position and from the locked-in position, and, in its locked-in position, engages in a recess (5) in a component (4) that is designed as one piece with the barrel (1), or is firmly connected to it.
8. The repeater rifle according to claim 7, characterized in that

- the interlocking block (25) is fitted with a base plate (8) with a front and a rear guide surface and
 - the action carrier (13) is arranged on the side of the action (11) that is facing the base plate (8),
 - is fitted with a front and a rear driving plates (55, 57), in such a way that
 - the receding action carrier (13), upon continuing its reversal, hits with its front driving plate (55) against the front guide surface of the base plate (8) of the interlocking block (25) in order to pull it out of the recess (5) and/or from the interlocking notch (6), and
 - the action carrier (13), during its closing motion, hits with its rear driving plate (57) against the rear base plate (8) of the interlocking block (25) in order to press it into the recess (5) and/or into the interlocking notch (6),
wherein at least one of the front or rear base or driving plates (53, 55, 57, 59) is beveled.
9. The repeater rifle according to one of the preceding claims, characterized in that it is designed for shot cartridges or other cartridges with a caliber of more than 15 mm.
10. The repeater rifle according to one of the preceding claims, characterized in that, instead of the handling device (65), a point of action for an automatic charging mechanism is provided.