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SEAR CONTROL MECHANISM FOR AUTOMATIC FIREARMS

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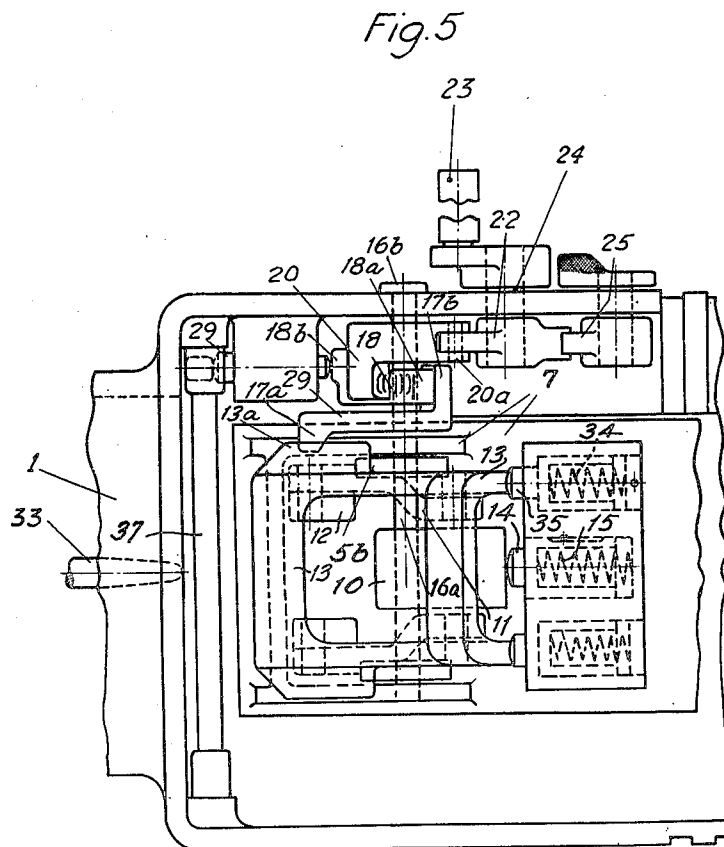
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## UNITED STATES PATENT OFFICE

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SEAR CONTROL MECHANISM FOR  
AUTOMATIC FIREARMS

Hanns Lippert, Zurich, Switzerland

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7 Claims. (Cl. 89—27)

My invention relates to a modification of or improvements in the trigger and sear control mechanisms for automatic firearms firing on advance movements of the breech block, and controlled either locally or remotely.

My invention relates particularly to the remote control of the trigger and sear mechanism by means of Bowden cables, in which by the arrangement of a device which becomes operative after the release of the remote control, a locking member is positively carried back into the locking position.

My invention consists in complementing the locking means, whereby it is possible to make the weapons for remote or direct control. The improved device has four levers hingedly connected together and arranged in the manner of a four-sided linkage system, of which one at the same time forms the locking member released on uncocking, another one is in operative connection with the service members, and a third cooperates with the breech closure body.

The spring buffer can be fitted in the closure body, so that all the parts of the sear control can be carried unsprung directly in the sear control housing. Since, however, for reasons due to the mass locked closure system itself the spring buffer in the closure body must not excessively load the moving masses, it is in the scope of a further improvement of the weapon to shift the spring buffer into the sear control arrangement.

The accompanying drawings show a construction for carrying out the invention, by way of example.

In said drawings,

Figure 1 is a sectional elevation of a portion of a machine gun including the sear mechanism;

Figure 2 is a similar view with the sear device in the cocked position;

Figures 3 and 4 are vertical sections showing a portion of the part of the sear device not located in the sectional plane of Figures 1 and 2;

Figure 5 is a plan view of the structure shown in Fig. 3, the cover being removed.

In Figure 1, 1 indicates the breech closure housing of a machine gun, which merges into a control mechanism casing 2. The covers 3 and 4 enclose the latter at the top and to the rear. The breech closure body or block 5 projects into the control mechanism casing 2 by an extension 5a carrying a sprung pawl 6. The sear hook 9 is carried in a slidable buffer casing 7. The buffer springs 8 are arranged in a row around the circumference of the casing 7, and are supported on the front of the control mechanism casing 2 and press the

casing 7 backward, where it abuts against the cover 4.

The sear hook 9 is adapted to lock the pawl 6, by means of a downwardly directed nose piece 9a, the pawl 6 and the sear hook 9 cooperating with automatically releasing surfaces. A nose piece 9b on the upper side of the sear hook 9 permits the latter to be pressed downwards in the position of rest by means of a locking lever 10, see Figure 1. Two clutch forks or links 11, arranged symmetrically to the vertical central longitudinal plane of the weapon, and with stops 11a, are each hinged at one end to the locking lever 10 and at the other end to the guide links 12 which on their part are connected hingedly to the limb, located symmetrically to the vertical central longitudinal plane of the weapon, of a release lever 13 surrounding the locking lever 10 in loop form. The locking lever 10, the clutch forks or links 11, the guide links 12, and the release lever 13 form with each other a kind of four-sided closed linkage system as the axes of their connecting bolts intersect the sectional plane of Figures 1 and 2 at the four corner points of a quadrilateral. Two sprung control pawls 5b rotatably carried on the extension 5a of the breech closure body 5 bear against the two stops 11a. A bolt 14 carried in the casing 7 is pressed by a spring 15 against an upper arm of the locking lever 10, which is rotatably carried on a pivot 16a, together with the release lever 13. The pivot 16a is supported at both sides in the casing 7.

The pivot 16a and a spindle 16b firmly inserted in the wall of the control mechanism casing 2 lies coaxially in the position of rest, see Figure 3. A driver 17 carried on the inner ends of the spindle 16b is in operative connection with the release lever 13 and this by means of lateral nose pieces 17a which engages under a projection 13a of the release lever 13. The driver 17 has a nose piece 17b against which the nose piece 18a of release pawl 18 provided with an arm 18b is adapted to rest.

The release pawl 18 is rotatably mounted on a pin 21, which is fixed in a pawl carrier 20 and accompanies the rotations thereof about the spindle 16b. By means of a spring 19 the nose piece 18a of the release pawl 18 is pressed against the cooperating nose piece 17b. A further pin 20a (Figures 3, 4) fixed on the pawl carrier 20 is in constant engagement with an intermediate lever 22 in the notch 22a of which it is adapted to move. The intermediate lever 22 is fitted together with a trigger lever 23 on a spindle 24 carried in the casing 2. Both levers 22, 23 are held in the normal

position by a spring 28 which presses by means a spring bush 27, against a rib 22b of the intermediate lever 22. A safety nose piece 25 on a spindle 26 carried in the casing 2 is adapted to be rotated so that it locks a finger 22c of the intermediate lever 22 and so secures the sear mechanism.

A release fork 31, oscillatably carried on shaft 32 in the front part of the casing 2, is adapted to release the pawl 18 through its arm 18b from the front side, by means of a pin 28. The release fork 31 here transmits the movement of a release rod 33, released after the last shot by the magazine supply member, on to the release pawl 18. 34 (Fig. 5) are the springs of two resetting pins 35 acting on the release lever 13 and which are disposed in series with and symmetrically to the spring bolt 14 arranged in the vertical longitudinal central plane of the weapon, in front of the quadrilateral structure 10, 11, 12, 13 in the casing 7.

The device operates as follows:

In the position of rest, the sear mechanism takes up the position according to Figures 1 and 3. In order to place the safety device of the weapon out of operation the marksman rotates the safety nose piece 25 and thereby releases the trigger lever 23. If now the marksman pulls lever 23, the spindle 24 rotates in the direction of the arrow (Fig. 3) and with it the intermediate lever 22. The notch 22a on the latter transmits this rotation through the pin 20a on to the pawl carrier 20 which carries with it the pin 21, the spring 19 and the pawl 18. The nose piece 18a of the latter, in consequence of the action of the spring 19, remains pressed against the nose piece 17b and transmits the rotation of the pawl carrier 20 to the driver 17.

Between the driver 17 carried in the stationary casing 2 and the release lever 13 carried in the axially movable casing 7, there is a working connection at the point of contact of the release lever projection 13a with the driver nose piece 17a, which lifts the release lever 13 and oscillates it against the pressure of the two resetting springs 34. The release lever raises the links or forks 11, until their stops 11a slide off the control pawls 5b of the extension 5a of the closing device body 5. At this instant, the spring bolt 14 oscillates the locking lever 10 counterclockwise, as viewed in Figs. 1 and 2 about the spindle 16a. The nose piece 9b of the sear hook 9 is thereby unlocked and this moves upward and releases the closure body 5. The separate parts and in particular the four-sided linkage 10, 11, 12, 13 now take up the position shown in Figure 2.

Under the pressure of the forward drawing spring, not shown, the closure body 5 springs forward and fires a cartridge. As the weapon continues to fire automatically, the firing can only be interrupted by releasing the lever 23 or by releasing the trigger mechanism after the last cartridge has left the magazine. In the first case, that is, after the firing of one or more cartridges, the turning back of the lever 23 effects the backward rotation of the parts 22, 20, 18 and 17. Under the pressure of the resetting pins 35, the release lever 13 now rotates back to its normal position and lowers the links 11 with their stops 11a until these come into the path of the control pawls 5b. On the next forward movement of the breech body 5 from the rear reversal, the control pawls 5b drag the catch forks 11 forward and thereby oscillate the locking lever 10 which presses the sear hook 9 downward. This then catches the breech closing body 5 by means of

the pawl 6. The blow produced thereby is taken up and dampened by the recoil springs 8. The jerky movement of the body 7 with the sear mechanism carried therein does not in any way affect its efficiency.

In the same way, the interruption of the return of the breech body 5 to firing position takes place when the magazine is emptied. When the last cartridge has left the magazine, the delivering device in the magazine presses the release rod 33 backward, as shown by Figure 4. The release fork 31 rotates with the shaft 32 and transmit the movement of the release rod 33 to the pin 29 which forces the arm 18b of the release pawl 18 backward. The latter is thereby rotated about the pin 21, whereby the nose piece 18a is brought out of engagement with the nose piece 17b of the driver 17. Now, even with the trigger lever 23 pulled the driver 17 can be rotated back into the position of rest. Under the load of the spring-pressed pins 35, the parts 13, 12, 11 and 10 initiate the locking of the breech closure body 5, which is completed in the above-described manner. On the subsequent release of the lever 23 the nose piece 18a of the release pawl 18 again comes in front of the nose piece 17b after the release rod 33 has also moved back into its normal position. As the release parts 33, 31, 29, 18 and 17 are located in the stationary sear mechanism housing 2, they do not accompany the movement of the buffer body 7 in seizing the breech closing body 5.

I claim:

1. In an automatic firearm, firing on the breech block advance movement, the combination of a housing, a breech block slidable in the housing, a releasable sear hook arranged to hold the breech block against forward movement, a sear mechanism pivotally supported in the housing and comprising an articulated, quadrilateral structure, one of whose elements constitutes a locking member for the sear hook adapted to engage and lock the latter in breech block arresting position, a second element of said quadrilateral structure being arranged to be engaged and driven by the breech block during its passage through its rear portion of travel to carry the locking member back into the locking position after a period of release of said member, a third element of said quadrilateral structure acting as a release lever for the locking member, the fourth element of said structure operating as a connecting link, a trigger member operable to cause tripping of the release lever with resulting disengagement of the said second element from the breech block, whereupon the locking member becomes movable to non-locking position, and means for urging said locking member towards unlocking position.

2. The combination according to claim 1, including a buffer casing disposed within the housing, the sear hook and quadrilateral structure being mounted in such casing, the trigger member being carried by the housing, and connecting means including a force-transmitting sliding coupling between the trigger member and the release lever.

3. The combination according to claim 1, including a buffer casing surrounding the breech block and a plurality of springs arranged within the wall of the casing parallel to the axis of the breech block and acting against the housing.

4. The combination according to claim 1, including a driver arranged to actuate the release lever, means for transmitting movement from the trigger member to the driver, said third ele-

ment surrounding the locking member in strap fashion, the second element of the quadrilateral structure being connected with the locking member and being connected to the release lever by the fourth element, said second element having a stop thereon, and two control pawls on the breech block body, one of said pawls being engageable with the said stop to bring the locking member into sear hook locking position, and the second of said pawls being engageable with the sear hook in the locked position.

5. The combination according to claim 1, including three spring-pressed buffer pins arranged in series at the rear of the quadrilateral structure, the center pin lying in the central longitudinal plane of the firearm and acting on the locking member to urge the same into sear hook releasing position upon tripping of the release lever, the release lever straddling the locking member, and the two other pins acting upon the release lever, and urging the same toward its reset position.

6. The combination according to claim 1, including a driver arranged to operate the release lever, the release lever being pivoted intermediate its ends, a pawl carrier coupled with the trigger member and rotatably carried in com-

mon with the driver on a pivot pin coaxial with the axis of rotation of the release lever in the position of rest, a pawl on the carrier biased to the coupling position and adapted to be coupled with the driver, and a release rod adapted to be controlled by the magazine charger and movable into the housing, said release rod being operable to cause uncoupling of said pawl.

7. The combination according to claim 1, including a driver arranged to operate the release lever, the release lever being pivoted intermediate its ends, a pawl carrier coupled with the trigger member and rotatably carried in common with the driver on a pivot pin coaxial with the axis of rotation of the release lever in the position of rest, a pawl on the carrier biased to the coupling position and adapted to be coupled with the driver, a release rod adapted to be controlled by the magazine charger and movable into the housing, said release rod being axially movable in the perpendicular longitudinal central plane of the weapon, a release fork adapted to oscillate in the housing and engageable by said release rod, and spring-pressed pins between the fork and pawl and loading the fork in the return direction.

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