

Dec. 9, 1924.

1,518,498

A. FURRER

AUTOMATIC FIREARM

Filed April 14, 1924

2 Sheets-Sheet 1

Fig. 1.

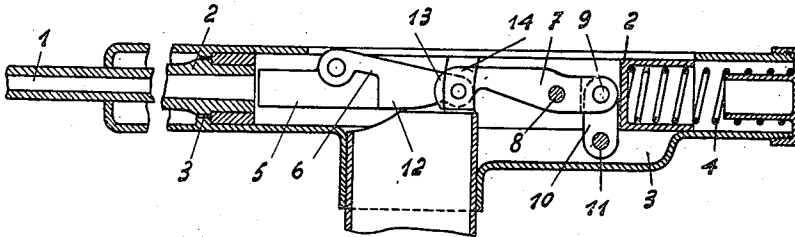


Fig. 2.

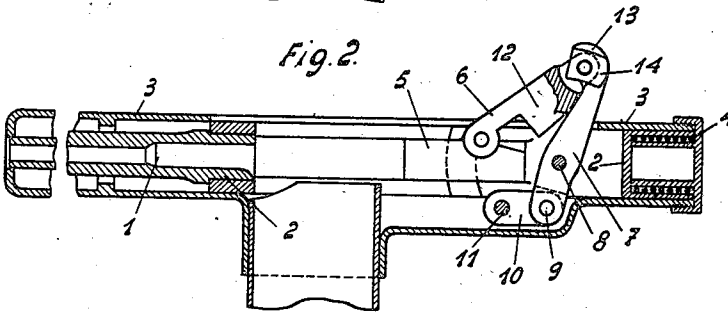


Fig. 3.

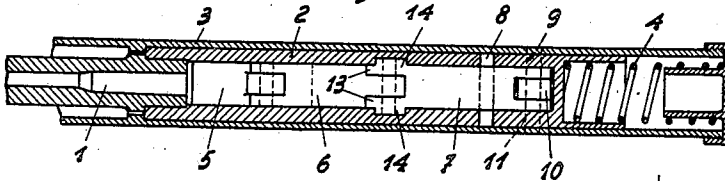
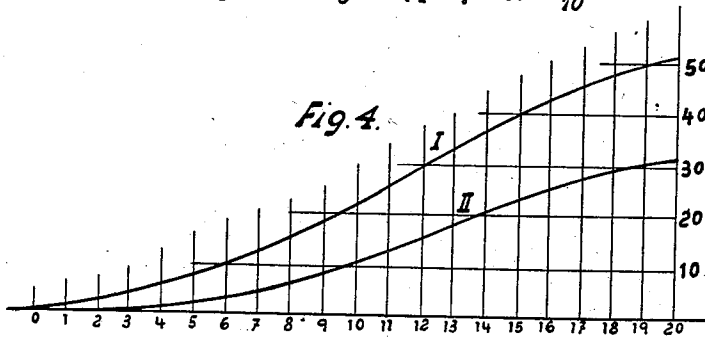


Fig. 4.



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Fig. 5.

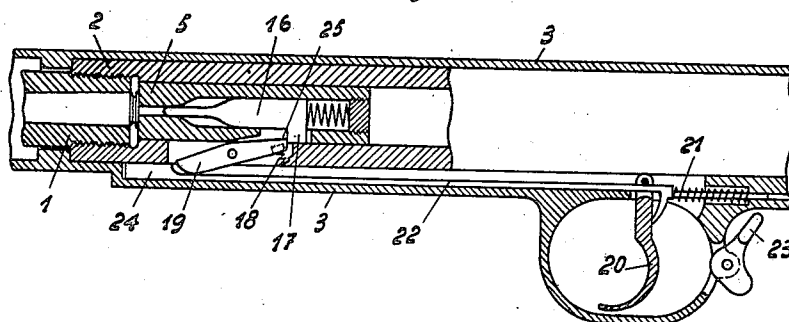


Fig. 6.

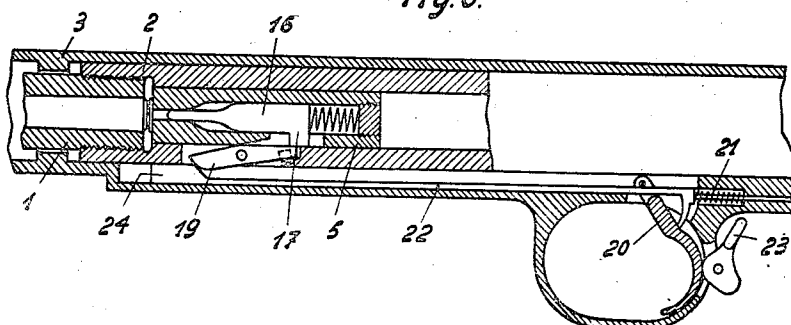
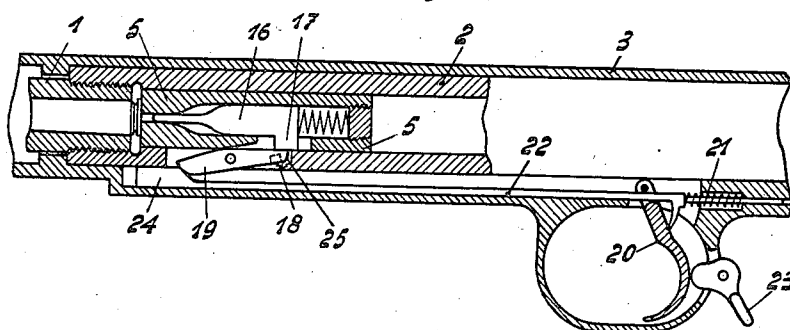


Fig. 7.



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## UNITED STATES PATENT OFFICE.

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## AUTOMATIC FIREARM.

Application filed April 14, 1924. Serial No. 706,504.

*To all whom it may concern:*

Be it known that ADOLF FURRER, a citizen of the Swiss Confederation, residing at Muri-strasse 8<sup>p</sup>, Berne, Switzerland, has invented certain new and useful Improvements in Automatic Firearms, of which the following is a specification.

The present invention has reference to automatic firearms or machine guns and has for its purpose to provide a weapon of very greatly simplified construction, in which the number of working parts is very small, the gun being thoroughly efficient in operation, capable of great rapidity of firing and being of very light weight.

With these objects in view the present invention provides in an automatic fire arm an articulated breech mechanism actuated by the recoil, which mechanism comprises a breech bolt frame movable in stationary guides of the stock and a breech bolt proper movable in this breech bolt frame which bolt closes the rear end of the barrel. The new weapon comprises a pivoted link, moving the breech bolt in the movable breech bolt frame which link is not only rotatably mounted in the said movable breech bolt frame but is pivotally connected at its rear end to a supporting link which rotates on a pin in the stock of the weapon. During the recoil movement of the breech bolt frame in its stationary guides a movement of the supporting link takes place whereby the pivoted link is also moved and in turn produces the movement of the breech bolt in the breech bolt frame which is itself moving, and effects the opening of the rear end of the barrel. The distance through which the breech bolt moves in the breech bolt frame, the period at which the relative movement of the breech bolt in relation to the breech bolt frame begins and again ends, can be determined by the correct dimensioning of the parts. A further feature resides therein that of the members serving to move the breech bolt in the breech bolt frame some simultaneously serve to lock the breech bolt in the breech bolt frame during the shot delivery in such a manner that the force of the recoil is transmitted directly to the breech bolt frame without acting upon sensitive pivot pins of the mechanism.

With these and other objects in view the invention consists in the novel parts more fully hereinafter disclosed and particularly

pointed out in the claims. Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views:

Fig. 1 is a longitudinal section with the breech mechanism in the closed position,

Fig. 2 is a longitudinal section with the breech open,

Fig. 3 is a longitudinal section in a plane at right angles to the sections shown in Figs. 1 and 2. The link members are shown in elevation.

Fig. 4 shows by means of two curves the dependency of the recoil movement of the breech bolt on that of the breech bolt frame. The abscissæ are the paths of the breech frame, the ordinates the corresponding paths of the breech bolt. Curve I indicates the path of the breech bolt relatively to the stationary parts of the weapon and curve II the path of the breech bolt relatively to the breech-bolt frame. Whilst in Figs. 1, 2 and 3 the trigger and sear mechanism has been omitted for the sake of clearness.

Figs. 5, 6 and 7 show the relative position of the movable parts of the breech mechanism and the trigger parts. Fig. 5 shows the position of these parts in the position of rest, with closed breech the firing pin in a position ready for firing. In Fig. 6 is illustrated the position of these parts for automatic repeat firing with the trigger pulled fully back and this at the moment, as the movable parts of the breech mechanism is still moving forwards, when the breech bolt has been released and moves forwards for firing. Fig. 7 shows the position of the parts, by closed breech when the trigger movement is reduced by turning a control lever so that the striker can only be released, even in repeat firing, when the movable parts of the breech mechanism are wholly in the forward position. The position of the parts shown in Fig. 7 corresponds with the moment of firing; the movable parts have passed wholly into the front position, the striker has been released and slides forwards for firing.

The barrel 1 is rigidly connected with the casing or breech bolt frame 2 and during firing slides backwards under the action of the recoil in guides of the stationary part 3 in the direction of the barrel axis. In this manner the spring 4 is tensioned, this spring returning the movable parts of the breech

mechanism after the completion of the recoil into the firing position. In the breech bolt frame 2 there is mounted the breech bolt or breech block 5 which is also movable in guides in the direction of the barrel axis. This breech bolt is connected by an intermediate link 6 with the front end of the pivoted link member 7. The latter is rotatably mounted in the breech bolt frame 2 on a pivot 8. The rear end of the link member 7 is connected by means of the pivot pin 9 with one end of the supporting link 10, of which the other end is rotatably mounted on the pivot 11 in the stock of the gun.

To relieve the link pivots from the action of the recoil force during firing the intermediate link 6 is provided with a projection 12, which, when the breech is closed, presses at the front against the hind face of the breech bolt and at the back against shoulders 13 at the front end of the pivoted link 7. The front end of the pivoted link 7 is provided with lateral studs or bosses 14 which, when the breech is closed, engage with corresponding recesses in the breech bolt frame 2. The bosses 14 and the recesses in the breech bolt frame, are of semi-circular shape and extend circumferentially around the shaft 8 of the pivoted link 7.

As shown by curve II in Fig. 4 the breech bolt only starts to move away from the rear end of the barrel after the barrel and the breech bolt frame have passed through a certain distance which in magnitude depends upon the dimensions of the links, particularly the supporting link 10. The speed of the breech bolt relatively to the breech bolt frame is zero at the beginning of the return movement, it then gradually increases and is again reduced towards the end of the return movement. The breech at the beginning of the return movement thus remains closed for a time and it is again closed before the movement has been completed. Consequently it is possible in the case of automatic repeat firing to deliver the shot before the return movement has been completed for the purpose of reducing the recoil. Figs. 5, 6 and 7 illustrate how the shot delivery can be controlled.

The firing pin or striker 16 is provided with a projection 17 and is movably mounted in the breech bolt 5. The sear 19 is rotatable in the breech bolt frame and its end 18 is pressed by a spring towards the firing pin 16. During the forward movement of the breech bolt 5 the projection 17 catches on the end 18 whereby the striker spring is tensioned. By means of the trigger 20, the trigger rod 22, which is under the action of the spring 21, is pulled back until the trigger 20 comes against the short cam of the controlling lever 23. The projection 24 at

the front end of the trigger rod 22 thereby slides on the inclined surface at the front end of the sear 19 and when the trigger rod 22 is pulled fully back presses the end 18 of the sear 19 outwards to such an extent that the projection 17 of the striker is released and the firing pin can move rapidly forwards under the action of the striker spring. The movement of the trigger and thus of the rod 22 can be so adjusted that when the trigger bears fully against the control lever that in repeat firing the striker is released at the second and following shots before the movable parts of the breech mechanism have returned fully into the forward position. The release of the first shot in repeat firing and all the shots in single firing is effected in the forward or closed position of the breech mechanism before the trigger 20 comes to bear against the short cam on the controlling lever 23. The control of the delivery of the shots in repeat firing can be disengaged by moving the control lever 23 into the position illustrated in Fig. 7. The longer cam of the control lever then prevents a further backward movement of the trigger rod 22 and the release of the shots can only be effected after the movable system has moved fully forwards.

What I wish to secure by Letters Patent is:

1. Automatic fire arm with articulated breech mechanism actuated by the recoil, which mechanism comprises a breech bolt and a breech frame movable in stationary guides the breech bolt being movable in the breech frame, characterized by the fact that a pivoted link, moving the breech bolt and rotatably mounted on a pivot in the breech frame is at its rear end pivoted to one end of a supporting link which rotates on a shaft in the stationary part of the weapon.

2. Automatic fire arm with link bolt according to claim 1, characterized by the fact that the intermediate link connecting the breech bolt to the pivoted link is provided with a projection which when the breech bolt is closed engages between the breech bolt and the pivoted link.

3. Automatic fire arm with link bolt according to claim 1, characterized by the fact that the pivoted link is provided with bosses arranged concentrically to the pivot which, when the breech is closed, engage with corresponding recesses in the breech frame.

4. Automatic fire arm with link bolt according to claim 1, characterized by the fact that the delivery of shots in automatic repeat firing can be controlled by drawing the trigger further back and the shot release can be effected before the forward movement has been completed.

In testimony whereof I affix my signature.

ADOLF FURRER.