

UNITED STATES PATENT OFFICE.

ANDREAS WILHELM SCHWARZLOSE, OF CHARLOTTENBURG, GERMANY.

AUTOMATIC FIREARM WITH FIXED BARREL AND LOCKED BREECH.

1,026,609.

Specification of Letters Patent.

Patented May 14, 1912.

Application filed January 3, 1912. Serial No. 669,231.

To all whom it may concern:

Be it known that I, ANDREAS WILHELM SCHWARZLOSE, a subject of the German Emperor, and resident of Charlottenburg, Germany, have invented certain new and useful Improvements in Automatic Firearms with Fixed Barrel and Locked Breech, of which the following is a specification.

The invention relates to an automatic fire arm with fixed barrel and locked breech, said breech being unlocked by a locking part which is not influenced by the recoil and consequently does not participate in the backward motion of the weapon. In contradistinction to the devices of this class known heretofore, a force accumulating spring is put under tension through the forward motion of said locking part on firing the shot, said spring being constructed in such a manner that it immediately unlocks the breech bolt whereas in the devices known heretofore the unlocking was only effected indirectly during the rearward motion of the part which is not influenced by the recoil. The advantage of this arrangement consists in that breech bolts with a long unlocking stroke such as cylindrical bolts, may be unlocked early enough to enable the bolt to separate from the barrel and jump back automatically to its wholly open position, by reason of the velocity which is transmitted to said breech bolt by the recoil or to the pressure of the gases on the bottom of the cartridge. Indeed, in this arrangement part moving forward puts the force accumulating spring under a certain tension when, owing to the high pressure of the gases in the barrel, a motion of the breech block is not yet possible, and when said part would be obliged, in case of its acting directly on the breech block, as it happened heretofore, to run empty. But as soon as the pressure of the gases has fallen so far that the tension of the force accumulating spring becomes stronger than the pressure on the bottom of the cartridge and the frictional resistance of the breech bolt, the unlocking is done with extreme quickness. This object is attained not only by means of the strong accumulating spring tension, but also because the force-accumulating spring acts upon the breech block so that said accumulating spring does not undergo any loss of energy or time by friction. With this object in view, the accumulating spring is not formed in shape of a coil spring, but in

shape of a cranked lever. When applying said cranked spring, the relative forward stroke of that part which remains in a fixed position while the shot is fired may become shorter than the unlocking stroke of the breech piece, while in the beginning of the unlocking action it acts on a longer lever arm, consequently with greater force for securing the required opening of the breech. The accumulating spring thus directly unlocks the breech and still works while the part which is not influenced by the recoil is moving forward, or at least in immediate connection therewith, that is to say not merely when said part is thrown backward as is the case in the arrangements heretofore. The breech cover constitutes here the unlocking device, said cover closing at the same time the upper part of the barrel extension and completely covers the loading way of the breech parts. In order to increase the sliding mass, several auxiliary parts of the breech may be used simultaneously as unlocking means. For instance the safety device, rigidly secured on said cover, acts upon the accumulating spring to which may be imparted thus a degree of tension, which was not to be secured heretofore.

By this invention the well known process which consists in unlocking the breech by a part which is not influenced by the recoil, is improved to such an extent that the rotating cylindrical breech bolt may also be used in the simplest way as an automatic loader without any drawback which could result from the uncovered breech being thrown back while firing. Furthermore the length of the breech is considerably shortened in this improved lock arrangement and the sear arrangement is considerably simplified. The safety device of the firing pin is also improved, said device connecting at the same time the breech cover with the barrel extension and serves when firing single shots, for fixing automatically the breech in its opened position.

The invention is shown in the accompanying drawings, in which:

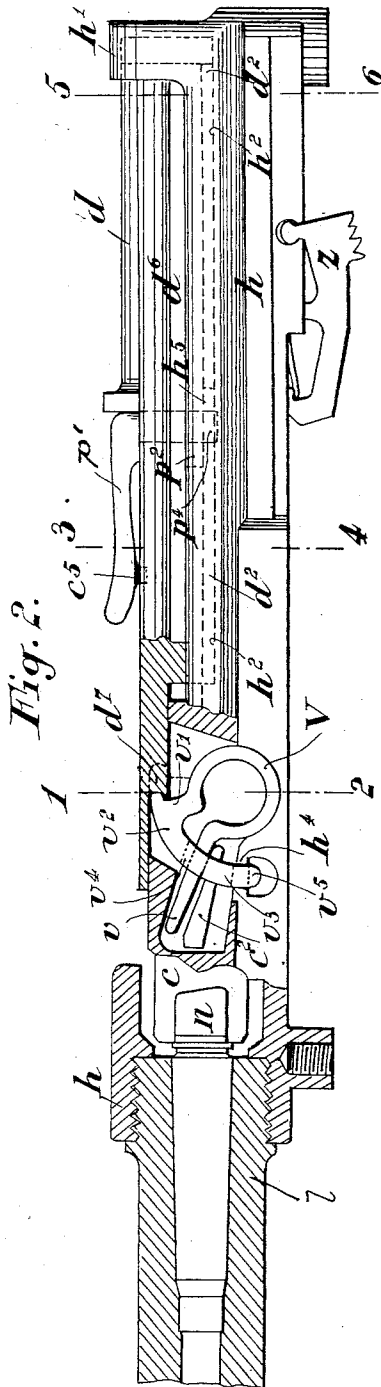
Figure 1 is a vertical longitudinal section through the barrel extension of a gun with cylindrical breech bolt, in the open position and under tension. Fig. 2 is a right hand lateral view, the force accumulating spring being uncovered, the cartridge chamber being shown in longitudinal section, with the breech cover in its forward posi-

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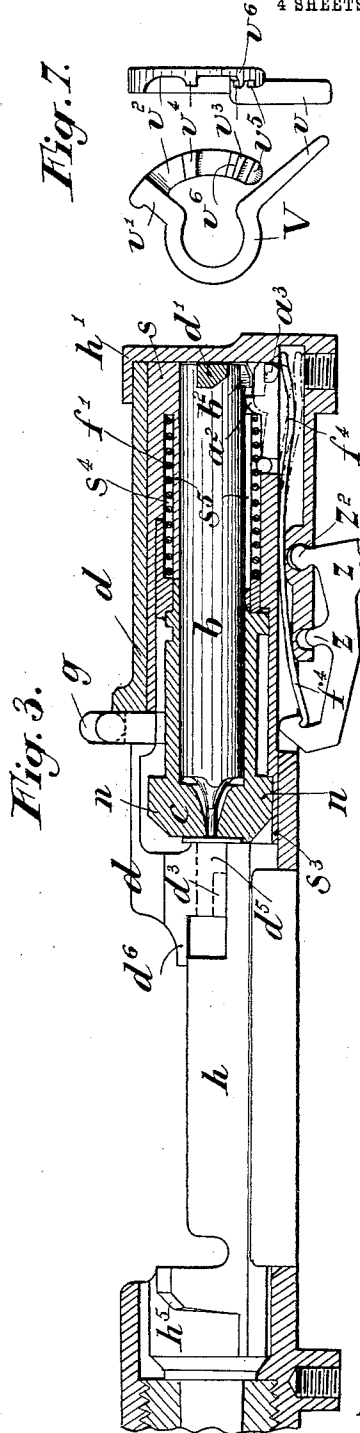
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 8.

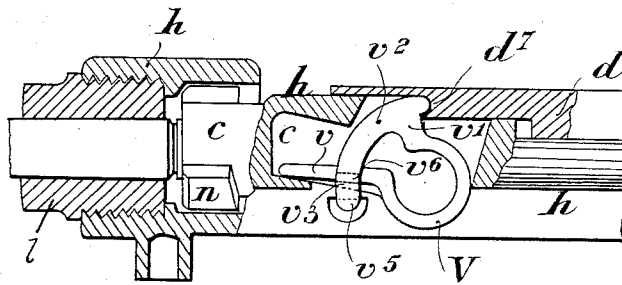
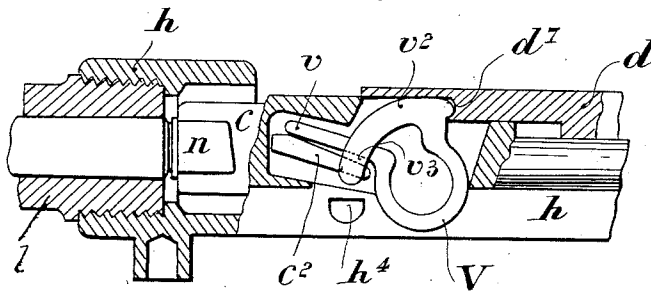


Fig. 9.



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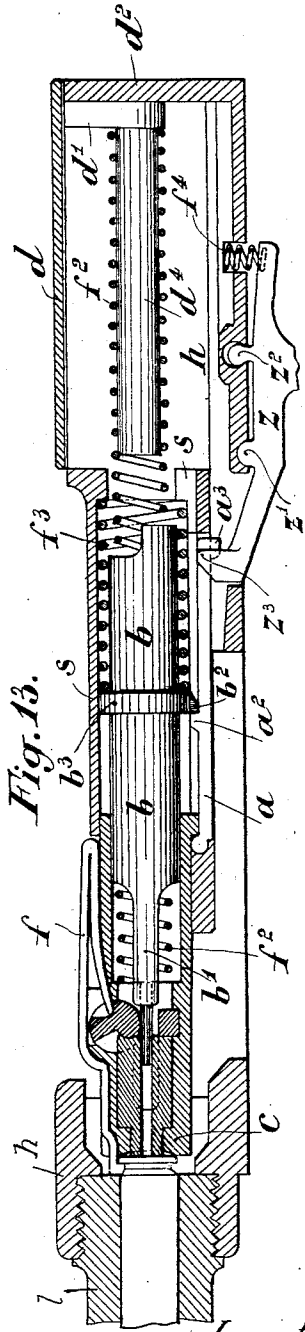
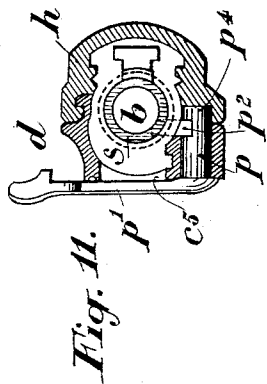
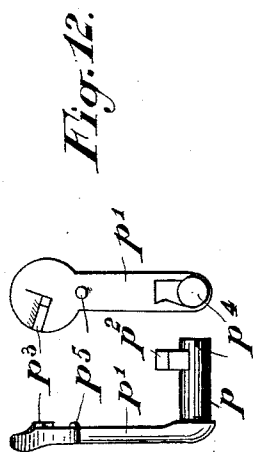
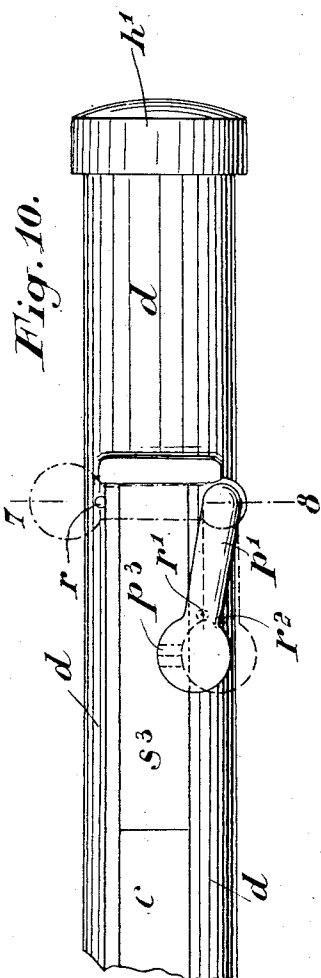
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4 SHEETS—SHEET 4.



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shape of a cranked lever. When applying said cranked spring, the relative forward stroke of that part which remains in a fixed position while the shot is fired may become shorter than the unlocking stroke of the breech piece, while in the beginning of the unlocking action it acts on a longer lever arm, consequently with greater force for securing the required opening of the breech. The accumulating spring thus directly unlocks the breech and still works while the part which is not influenced by the recoil is moving forward, or at least in immediate connection therewith, that is to say not merely when said part is thrown backward as is the case in the arrangements heretofore. The breech cover constitutes here the unlocking device, said cover closing at the same time the upper part of the barrel extension and completely covers the loading way of the breech parts. In order to increase the sliding mass, several auxiliary parts of the breech may be used simultaneously as unlocking means. For instance the safety device, rigidly secured on said cover, acts upon the accumulating spring to which may be imparted thus a degree of tension, which was not to be secured heretofore.

By this invention the well known process which consists in unlocking the breech by a part which is not influenced by the recoil, is improved to such an extent that the rotating cylindrical breech bolt may also be used in the simplest way as an automatic loader without any drawback which could result from the uncovered breech being thrown back while firing. Furthermore the length of the breech is considerably shortened in this improved lock arrangement and the sear arrangement is considerably simplified. The safety device of the firing pin is also improved, said device connecting at the same time the breech cover with the barrel extension and serves when firing single shots, for fixing automatically the breech in its opened position.

The invention is shown in the accompanying drawings, in which:

Figure 1 is a vertical longitudinal section through the barrel extension of a gun with cylindrical breech bolt, in the open position and under tension. Fig. 2 is a right hand lateral view, the force accumulating spring being uncovered, the cartridge chamber being shown in longitudinal section, with the breech cover in its forward posi-

tion and the accumulating spring in its position just before the unlocking motion is produced. Fig. 3 is a longitudinal section, the breech being wholly open. Figs. 4, 5, and 6 are cross sections on lines 1—2, 3—4, and 5—6 of Figs. 1 and 2. Fig. 7 shows the force accumulating spring on the left hand side in side elevation and on the right hand side in front elevation. Fig. 8 is a detail sectional view showing the accumulating spring when the breech is unlocked, the cover being withdrawn. Fig. 9 is a similar view showing the spring when the breech is in its locked position, the cover being withdrawn. Fig. 10 is a top view of the rear end of the barrel extension. Fig. 11 is a cross-section on line 7—8 of Fig. 10, viewed toward the left. Fig. 12 shows the safety device at the left in front elevation and at the right in side elevation. Fig. 13 is a vertical longitudinal section of a modified construction, the positions of the various parts corresponding to the breech parts of Fig. 1.

The breech bolt c is provided at its front end with two studs w by means of which it is locked with the barrel extension h , in the well known manner, when in the closed position. By means of the handle g Figs. 3 and 4 it may be moved to and fro by hand into the barrel extension h , and may also be locked and unlocked. On its rear end is slipped a small lock s which is guided non-rotatably in the barrel extension h by means of the longitudinal projections s^2 . Said lock s closes in a dust proof manner all the apertures of the barrel extension h which are necessary for allowing the motion of the breech bolt c while loading and said breech bolt c is sliding in the longitudinal hollow s^4 of said lock s in the last portion of the rearward movement, when opening (Fig. 2). Owing to this arrangement the total length of the breech is shortened to such an extent that the barrel extension h is not larger than that of the hand-actuated army rifles now in use. In the longitudinal hollow s^4 of the small lock s is located a coiled auxiliary spring f^1 the front end of which bears on the breech bolt c while its rear end bears on the bottom of the small lock s , so that it is put under tension when both said parts are slid into each other and causes said parts to separate after the counterpressure ceases. The small lock s is inwardly provided with a tubular extension s^5 which serves as a guide to the rear part of the firing pin b , while the front end of said pin is located in the chamber c^3 of the breech bolt c . The firing pin b is made in the shape of a hollow body and the firing spring f^2 bears on the stud d' of the breech cover d . Said spring f^2 is guided in the rear part by a bolt d^4 axially projecting from the cover end.

The sear a is pivotally mounted on two

pins a' in a rear slot of the small lock s . It maintains the firing spring f^2 under tension by means of the catch a^2 which is placed in front of the catch or rest b^2 of said pin b . Said sear a is provided on its rear end with two lateral hooks a^3 which engage the claws z^3 of the trigger (Fig. 6) when this last, pushed by its spring f^4 , is tilted upward. A small longitudinal play is provided for the sear a in the small lock s so that said sear may be withdrawn to a small extent by the claws z^3 . The firing spring f^2 , which has been compressed by the firing pin b , then pushes the firing pin and the sear forward after the claws z^3 have entirely passed beyond the hooks a^3 . The engaging of the catch a^2 in front of the catch b^2 of the firing pin is produced when the breech is open (Fig. 2) by the action of the sear spring f^4 . The rear end of said spring bears freely under a shoulder of the breech sleeve and is pressed downward in the position shown by dotted lines in Fig. 3, when the catch b^2 of the firing pin b slides over the catch a^2 of the sear a . The spring throws the rear end of the sear upward as soon as the catches a^2 and b^2 have passed each other. The firing pin b and the small lock s are coupled together in such a manner that when the breech bolt is repelled by means of the spring f' , said bolt passes beyond the front end of the firing pin b so that the firing spring gets the necessary tension for firing. When the bolt c is repelled, the spring f^2 again pushes the firing pin, the small lock and the breech bolt against the barrel after which the breech bolt c is locked with the barrel extension h in the well known manner. During the above mentioned forward and back movement of the breech parts the trigger z is secured in its withdrawn position by means of the lower rib s^3 of the small lock s . But it is pushed forward by means of its spring f^4 after the small lock has been thrown forward and its finger lever released by the shooter and engaged with the sear a in the above described manner. Consequently the sear is again thrown backward, the hooks z^3 pull the sear a downward, and the catch a^2 slides away from the catch b^2 , after which the firing spring f^2 pushes the firing pin b forward against the firing cap, which causes the firing.

As shown in the drawings, the trigger z is loosely suspended inside the barrel extension h so that, when firing, its fulcrums z^1 and z^2 bear on the sleeve one after the other. The rear fulcrum z^2 serves at the same time as a supporting means, its lower projecting portion engaging, when in the position of rest, with corresponding projections of the barrel extension. For removing the trigger z from the barrel extension h , the spring f^4 is pulled back to such an extent that its

front end jumps out of its trigger seat. The front part of the trigger is then thrown downward to such an extent that it comes out of its aperture in the barrel extension, after which the stud z^2 may be laterally slid out of its seat.

The form of the locking device shown in Fig. 13 differs only from that above described in the arrangement of the firing spring. In this form, the firing spring f^2 serves also for sliding the breech bolt c out of the small lock s , and with this object in view it passes in front through the laterally cut firing pin b and its front end bears directly on the bottom of the bore or chamber of the bolt. The firing pin b , by means of two arms b' which support on the front of their connecting piece the firing point, surrounds the front end of the spring, when the spring is put under tension. The small lock itself is provided with the firing spring f^2 which bears on the annular abutment b^3 of the firing pin b and throws it forward when firing. Said abutment b^3 is also provided with the projection b^2 which engages the sear catch a^2 and for this reason the sear a is much longer in this case. Instead of a plate spring, a coil spring f^4 is used as the trigger spring; the upper end of said spring bears on a bearing of the barrel extension through which passes the sear when moving back, thus being able to put the spring under tension. The lower end of the spring f^4 bears on an arm of the trigger projecting backward beyond the fulcrum z^2 and acts on said trigger as in the first described case.

The breech cover d is connected with the barrel extension h in such a manner that its rib d^2 (Figs. 2, 5 and 6) engages a longitudinal groove h^2 of the barrel extension h , while the opposite side of the cover is provided with a projection d^3 (Figs. 3, 5) which enters behind a corresponding part of the sleeve h . The spring f^2 continuously presses the breech cover, (which is slidable to a short extent on the barrel extension), against the bottom h' , so that said bottom forms the rear abutment for the cover, while the forward stroke of said cover is limited by the safety device (Figs. 2, 10 and 12). The safety device is provided in the cover itself in such a manner that its shaft p projects down beyond the cover, while the end p^4 engages an elongated groove h^5 of the barrel extension (Fig. 2). When the cover is thrown forward, the pin p^4 strikes the front end of the groove h^5 thus preventing further forward motion of said pin.

The breech cover, by means of the left hand rest notch d^1 (Figs. 2, 8 and 9), bears against the rearward arm v^1 of the force accumulating spring V which is put in position from above in a corresponding chamber cut in the barrel extension h . The front

arm v of said spring, when the breech is locked, bears against the stud c^2 of the breech bolt c . The rear arm is provided with a bent portion v^2 which, by means of a hook v^3 , passes under the front arm v and maintains the spring in a determined preliminary tension when the device is at rest and the cover d in its rear position, and this occurs without any pressure exerted on the breech bolt c by said front arm v and without opening said bolt c . But if the breech cover, when firing, moves forward on the barrel extension owing to the recoil, it moves the rear arm v' of the spring out of the rear position shown in Fig. 9 into the front position shown in Fig. 2. The hook v^3 is thrown downward and disengages the front arm v which is freed and transmits the full spring pressure to the bolt stud c^2 . As soon as the pressure of the accumulating spring V becomes stronger than the friction of the supporting studs w on their bearing surfaces in the barrel extension, which friction is produced by the pressure of the gases, the breech bolt is rotated toward the left with a great velocity and unlocked.

For preventing the spring from becoming distended before the bolt is completely rotated, a hook v^5 of the bent portion of said spring engages a rest or notch h^4 of the barrel extension h as soon as the rear arm v^1 has been entirely thrown forward by the cover d . Said coupling is only disengaged when the front arm v of the spring has been thrown entirely downward, and has reached its lowest position shown in Fig. 8. With this end in view, the bent portion v^2 , above the hook v^3 , is provided with a wedge surface v^6 (Fig. 7) which is provided in the path of the arm v . The lower end of the bent portion v^2 together with the hook v^5 are pressed outward and the hook below the notch h^4 of the barrel extension is pulled forward when the arm v , upon being thrown downward, strikes the wedge surface v^6 (Fig. 8).

The bent portion of the spring may be provided with a stud v^4 which is also placed in the path of the front arm v , and bears against said arm in the last period of the forward motion of the breech cover (Fig. 2). The spring thus acts as a rigid cranked lever, the motive energy, which is still accumulated in the cover, being directly transmitted onto the breech bolt thereby disengaging the latter. The stud c^2 of the breech bolt c is so positioned that the spring arm v , when opening, first passes the apex of said spring, that is to say presses with a shorter lever arm against the bolt (Fig. 2) which arm afterward becomes longer (Fig. 8) so that the spring, in the beginning of the unlocking operation, may act on the cylinder with a greater force than at the end of said operation. When firing, the bolt is rotated by the cover to only such an extent

that its bearing studs w leave the straight portion of the counter bearings in the barrel extension. The gas pressure immediately throws it away from the barrel and throws it back into the wholly open position. Thereby, owing to the beveled surface h^5 of the barrel extension (Fig. 3), the 90 degrees rotation is at first completed and the springs f^1 and f^2 are put under tension in the above described manner said springs afterward automatically again locking the breech. The stud c^2 which is again brought under the spring arm v when the bolt is rotated toward the right, then throws the spring forward again into its initial position (Fig. 9) in which the breech cover has already been pushed back by the firing spring f^2 .

The safety device, as stated hereinbefore, is located with its shaft p in the left hand side of the cover, while the wing p^1 is made springy and may, by means of its pin p^5 , be positioned in three rest notches of the cover. If the wing is rotated toward the right (shown in dotted lines Fig. 10), its pin p^5 falls in the rest notch r of the right side of the cover while the stud p^2 of the pin p pushes the firing pin b somewhat back from the sear projection (Fig. 11). At the same time the stud p^2 rotates into the breech block or into the lock in such a manner that the breech cannot be opened. If the safety wing is rotated toward the left to such an extent that it has substantially the same direction as the barrel extension (Fig. 10) the safety stud p^2 moves away from the firing pin and no safety is provided. At the same time the catching stud p^3 is placed in the way of the breech bolt c and jumps automatically in front of the shoulder c^5 of said bolt (Fig. 11) when the breech is entirely drawn back. Thus the breech remains open after each shot. When the shooter exerts a pressure underneath the handle of the safety wing, this last may be raised, while overcoming its springy tension, to such an extent, that the stud p^3 slides away from the shoulder c^5 and the breech bolt may be again thrown forward toward the barrel. When the safety wing is placed in the rest notch r^2 (dotted line of Fig. 10) the catching stud p^3 is brought into position out of the way of the breech bolt and this last is not arrested in its loading motion and the rifle is working as an automatic loader. For removing the cover, the safety device is rotated toward the left somewhat beyond the notch r^2 . Owing to this movement, the stud p^2 , which at the same time prevents the removal of the safety device from the cover in the three working positions, enters an upwardly cut portion of the cover so that the safety device may be lifted out of the cover to such an extent

that the bolt p^4 is disengaged from the barrel extension h . The breech cover is then pulled forward to such an extent that the ribs d^3 , are disengaged from the barrel extension after which said cover may be removed upward. For connecting the breech bolt with the cover when removing the latter, the safety device, as soon as it is removed from the barrel extension together with the bolt p^4 , may be rotated inward and backward so that the stud p^2 comes in front of the wholly withdrawn breech bolt c and couples the latter with the cover.

Having now fully described my said invention, what I claim and desire to secure by Letters Patent, is:

1. In an automatic fire arm of the character described, the combination of a breech bolt rotatably movable to unlocked position, a momentum block, and a force accumulating spring in the form of a crank lever operable by the momentum block to turn the breech bolt in a direction to unlock it.

2. In an automatic fire arm of the character described, the combination of a breech bolt rotatably movable to unlocked position, a momentum block, and a force accumulating spring in the form of a flat cranked lever embodying arms one of which is designed to engage the breech bolt to turn it toward unlocking position and the other of which is arranged for engagement by the momentum block as specified.

3. In an automatic fire arm of the character described, the combination of a breech bolt, a barrel extension with which the bolt is designed to detachably lock, a momentum block, and a force accumulating spring in the form of a cranked lever mounted along one side of the breech bolt and arranged to be tensioned by the momentum block and to automatically engage the breech bolt to unlock the same from the barrel extension.

4. In an automatic fire arm of the character described, the combination of a breech bolt rotatably movable to unlocking position, a momentum block, a force accumulating spring embodying overlying arms one of which is designed to engage the breech bolt to turn the same and the other of which is designed for engagement by the momentum block, the two arms being arranged for a detachable engagement with each other and the momentum block in the act of firing being arranged to disengage the said arms whereby to permit the first said arm to act and axially move said breech bolt to unlocked position.

5. In an automatic fire arm of the character described, the combination of a breech bolt rotatably movable to unlocked position, a barrel extension with which the breech bolt is designed to co-act, a momentum block movable on the barrel extension

and formed with a shoulder, and a force accumulating spring in the form of a crank lever embodying normally overlapping arms detachably connected together and one of which is arranged for engagement with the breech bolt to turn the latter, the forward movement of the momentum block causing the shoulder thereof to engage the other arm of said spring so as to disengage the detachable connection between the arms.

6. In an automatic fire arm of the character described, the combination of a breech bolt rotatably movable to unlocked position, a barrel extension with which the breech bolt is designed to co-act, a momentum block movable on the barrel extension and formed with a shoulder, and a force accumulating spring in the form of a crank lever embodying normally overlapping arms detachably connected together and one of which is arranged for engagement with the breech bolt to turn the latter, the forward movement of the momentum block causing the shoulder thereof to actuate the other arm of said spring so as to disengage the detachable connection between the arms, one of said arms being formed with a hook and the barrel extension being provided with a socket for the reception of said hook whereby to hold said arm when the momentum block moves it forwardly and downwardly

to release the other arm as and for the purpose set forth.

7. In an automatic fire arm of the character described, the combination of a barrel extension, a breech bolt movable rotatably into and out of locking engagement, a momentum block movable on said barrel extension, and a force accumulating spring in the form of a crank lever having overlapping arms, one of said arms being formed with a beveled shoulder adapted to engage with the other arms to hold the arms in detachable engagement with each other with the spring partially compressed, one of the arms being designed to engage the breech bolt to turn the latter out of locking engagement with the barrel extension when the detachable connection between said arms is broken, the other arm being formed with a bevel hook and the barrel extension being formed with a recess for engagement by said hook upon the forward movement of the momentum block and the consequent compression of the spring.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

ANDREAS WILHELM SCHWARZLOSE.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."