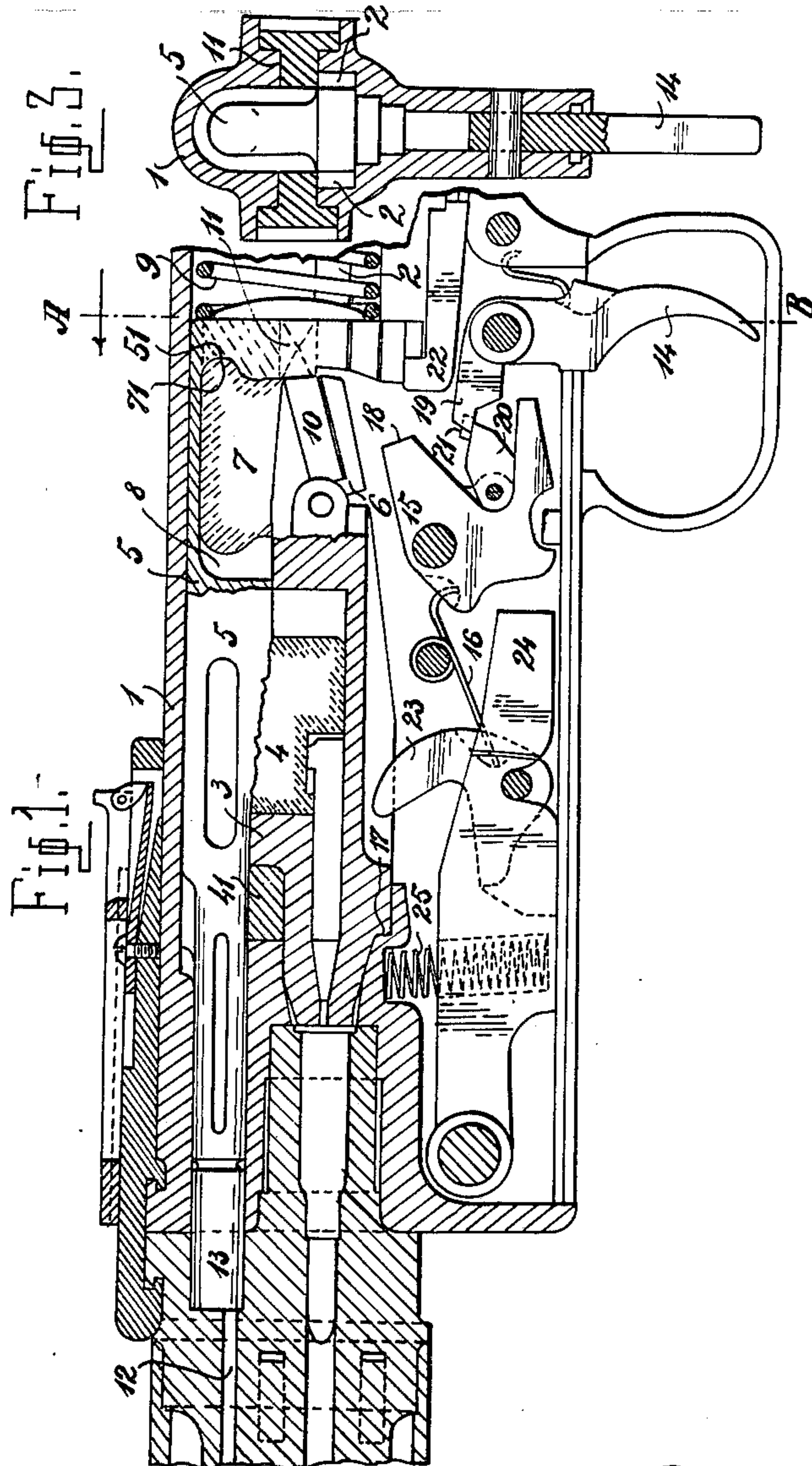


No. 831,923.

PATENTED SEPT. 25, 1906.

A. O. VON AUGEZD.
AUTOMATIC MACHINE GUN.
APPLICATION FILED FEB. 21, 1906.

4 SHEETS—SHEET 1.



Witnesses:-
Stephen Pineta
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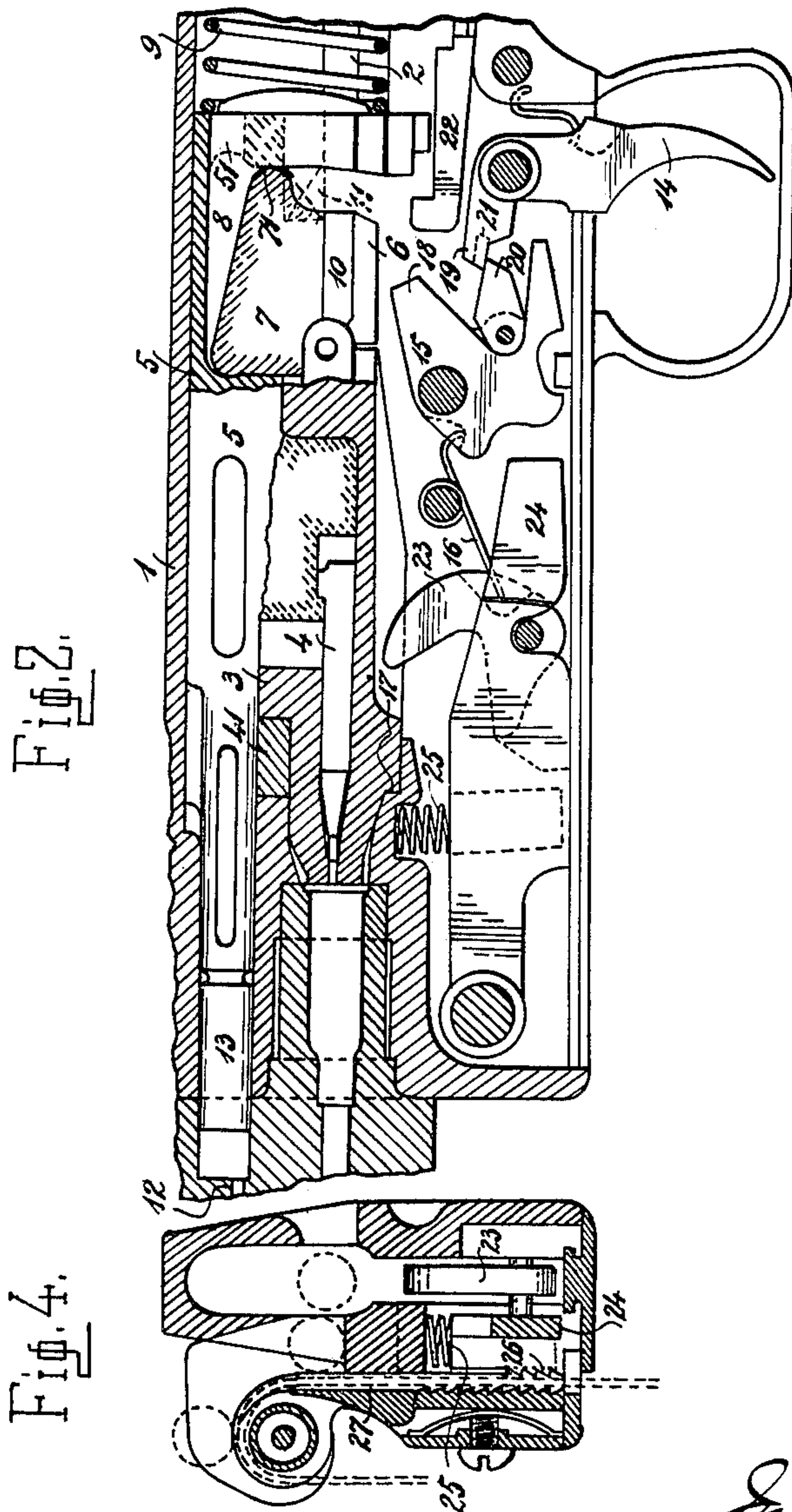
Inventor:-
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4 SHEETS—SHEET 2.



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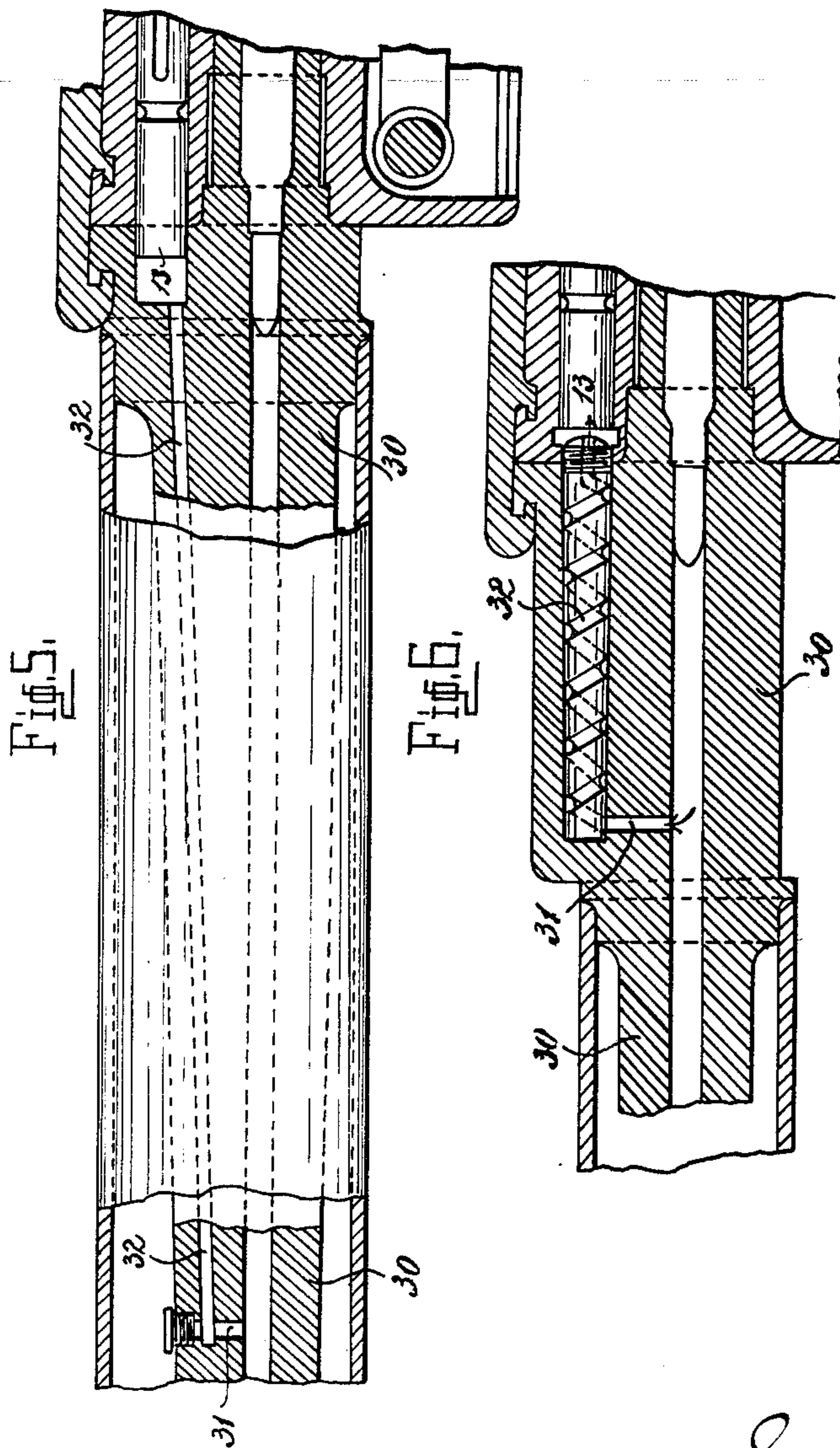
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4 SHEETS—SHEET 4.

Fig. 7.

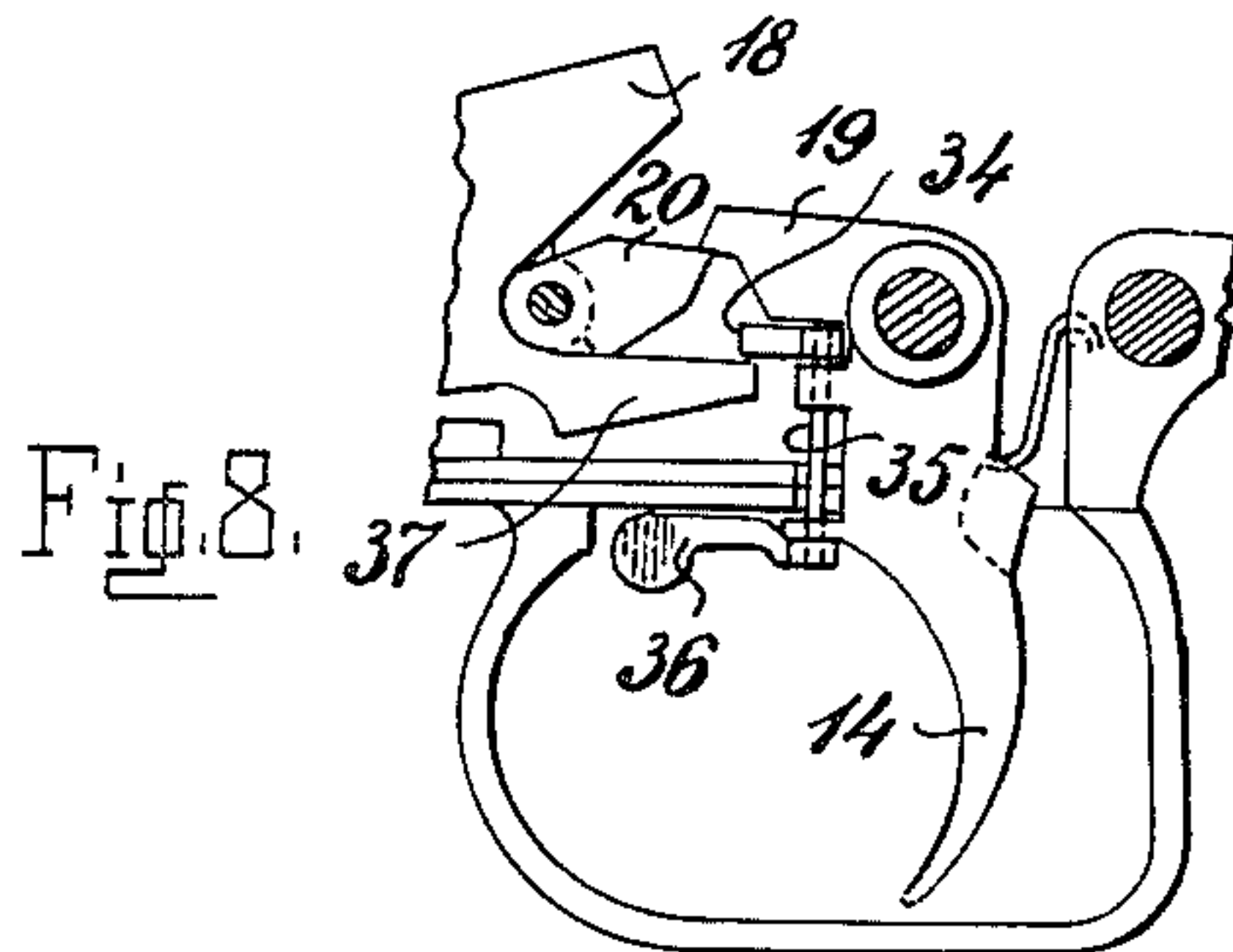
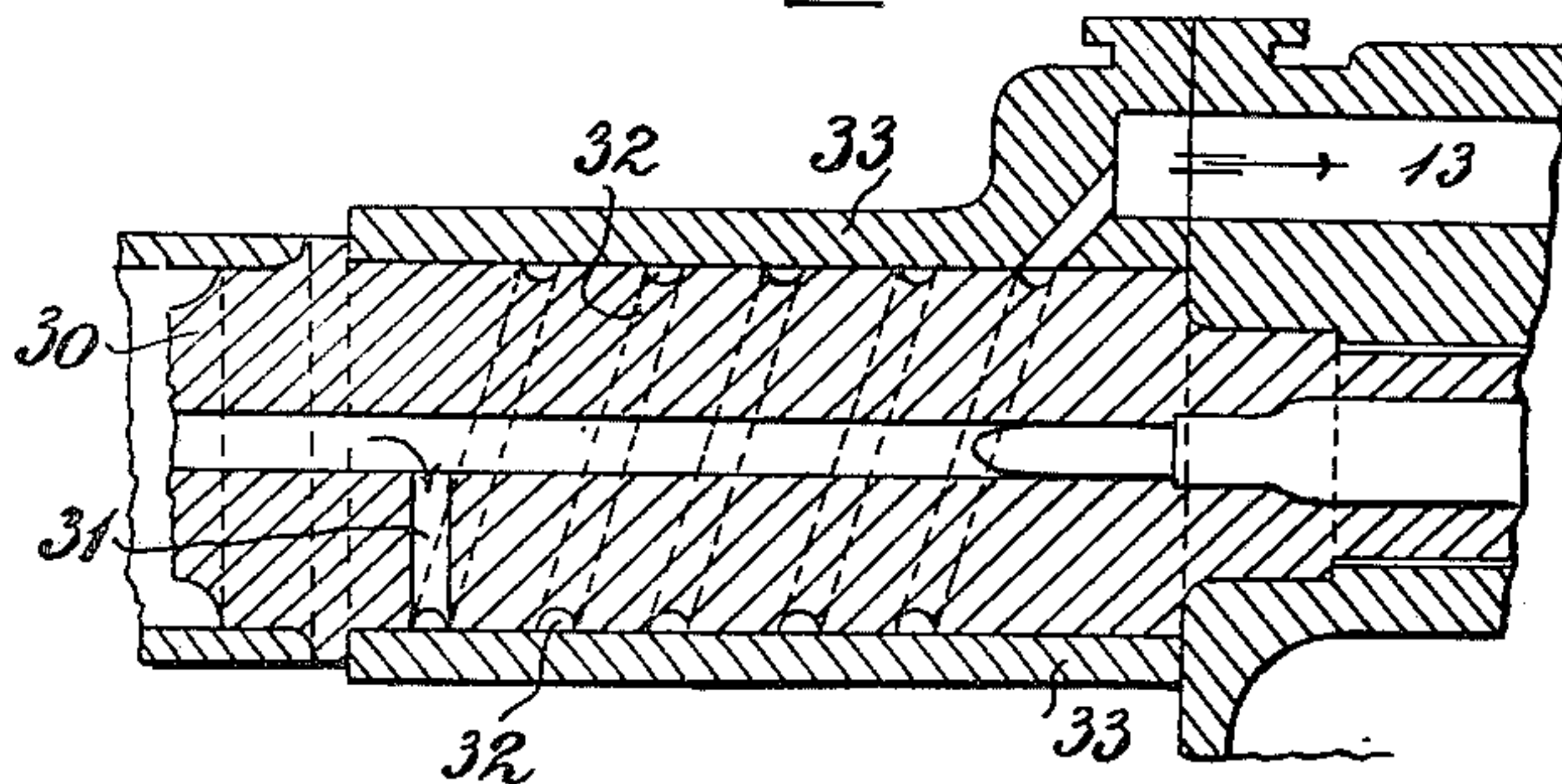
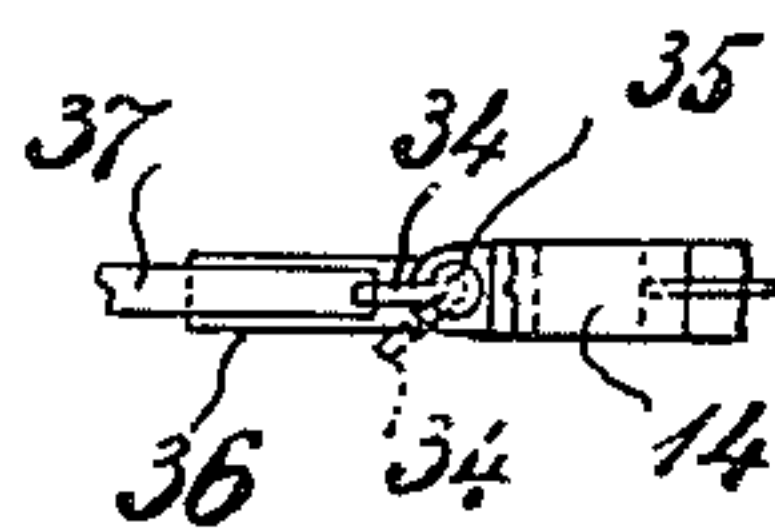


Fig. 9.



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UNITED STATES PATENT OFFICE.

ADOLF ODKOLEK VON AUGEZD, OF VIENNA, AUSTRIA-HUNGARY.

AUTOMATIC MACHINE-GUN.

No. 831,923.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed February 21, 1906. Serial No. 302,233.

To all whom it may concern:

Be it known that I, ADOLF ODKOLEK VON AUGEZD, a subject of the Emperor of Austria-Hungary, residing at Vienna, Empire of Austria-Hungary, have invented certain new and useful Improvements in Automatic Machine-Guns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has for its object an automatic machine gun, in which the unlocking of the breech-piece is effected by a short backward movement imparted to a locking-piece, whereupon the breech-piece, together with the locking-piece, is thrown backward, owing to the unlocking impulse against the action of a returning-spring, whereby the empty cartridge-shell is extracted and ejected. The breech-piece, together with the locking-piece, is then pushed forward by the returning-spring, and after the breech-piece has arrived in the breech-closing position the locking-piece continues its forward movement, owing to its inertia, through a certain distance in order to cause, on the one hand, the breech-piece to be locked and, on the other hand, the fresh cartridge introduced into the barrel by the forward movement of the breech-piece to be fired. The cartridges are fed by means of a band, to which the required intermittent forward movement is imparted by means of the breech mechanism.

A further object of the present invention is to provide means for enabling each cartridge to be fired at will by hand or a series of cartridges to be fired automatically in rapid succession, as may be desired.

Still another object of my invention is to provide improved means for imparting the unlocking impulse to the breech mechanism of automatic machine-guns.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of a breech mechanism constructed in accordance with the present invention, the breech being closed and the breech-piece locked. Fig. 2 is a similar view, the breech-piece being unlocked, the breech, however, being still closed. Fig. 3 is a section on the line A B, Fig. 1. Fig. 4 is a transverse sectional view showing the actuating mechanism for the cartridge-band.

Figs. 5, 6, and 7 show, in section and partly in side elevation, various arrangements of the gas-channel. Figs. 8 and 9 show, in side elevation and bottom view, a modification of the firing mechanism.

In automatic firearms in which the breech mechanism is actuated by explosion-gases taken from the barrel the hole in the wall of the barrel through which such gases are taken must be at a comparatively great distance from the breech in order to make the channel leading from such hole to the gas-cylinder sufficiently long for preventing the breech mechanism from being opened prematurely. Heretofore this gas-channel consisted of a separate tube located outside the barrel, and great difficulty was encountered in tightly and accurately fitting this tube into the hole in the wall of the barrel and into the gas-cylinder. Besides, the gases passing through this tube were liable to cool down to some extent, which under unfavorable conditions might impair the efficiency of the breech mechanism. Finally, the construction and the mounting of the cooling-jacket for the barrel was rendered more difficult and complicated by the use of this external gas-tube. Moreover, experience has shown that even with the very most careful and accurate fitting and mounting of the external gas-tube gases begin to leak through the joints after a few series of shots. Such gases can penetrate into the cooling-jacket, and then the latter is liable to burst. Therefore with automatic machine-guns with an external gas-tube no cooling-jackets are used at present, but heat-radiating rings, as in the Hotchkiss machine-gun. In order to remedy these defects, I use, instead of an external gas-pipe, a gas-channel provided in the metal of the barrel itself, as shown in Fig. 5, in which 30 is the barrel, 31 the hole leading to the bore of the barrel, and 32 the gas-channel bored in the wall of the barrel itself.

Instead of making the gas-channel straight, as shown in Fig. 5, which necessitates a separate bore and a reinforcement of the barrel, both extending over a considerable length of the latter, the gas-channel may be made in the form of a coil, as shown in Fig. 6. The gas-channel 32 is in this figure formed by a helical groove cut in the circumference of a slightly-tapering mandrel tightly fitting into

a corresponding recess in the metal of the barrel and suitably secured thereto. Thus a coiled channel is obtained between the walls of the groove in the mandrel and the inner wall of the said recess. The front end of such channel is permanently connected to the hole 31, leading to the bore of the barrel, and the rear end of the same is connected to the gas-cylinder, in which works the gas-plunger 13.

In Fig. 7 the helical groove 32 is cut on the outside of the barrel-body, onto which a sleeve 33 is tightly fitted. In all other respects the construction shown in Fig. 7 is the same as that shown in Fig. 6. In Fig. 7 the barrel-body and the sleeve 33 are substituted for the mandrel and the recess, respectively, of Fig. 6. Obviously the groove might be cut in the inner wall of the recess of the sleeve 33, and the mandrel or the barrel-body, respectively, might be left smooth on the outside.

I wish it to be understood that in the claims the term "mandrel" also includes the barrel-body itself, and, on the other hand, the term "sleeve" also includes a recess in the barrel-body.

With the arrangement shown in Figs. 6 and 7 the hole 31, connecting the bore of the barrel with the front end of the gas-channel, may be far nearer the breech of the gun for a given length of the gas-channel than in the arrangement shown in Fig. 5, and the reinforcement of the barrel necessitated by such gas-channel may be much shorter. By this arrangement I obtain the advantage that a separate external gas-tube extending from the hole 31 to the gas-cylinder in which works the gas-plunger 13 is dispensed with, which greatly facilitates the construction of the gun. Further, the objectionable cooling down of the gas taken from the barrel is avoided, and, moreover, the cooling water-jacket may be so arranged as if there were no gas-channel. Finally, the gas-cylinder, the barrel, and the gas-channel constitute a rigid entirety, whereby the mechanical strength of the gun is greatly increased.

The breech mechanism consists of a breech-bolt 3, movable in the direction of the axis of the bore of the gun and guided by lateral ribs 2, engaging into corresponding grooves in the breech-casing 1. A firing-pin 4 slides freely in a central longitudinal bore of the breech-bolt and is carried by a locking-piece 5, movable along and guided on the breech-bolt.

The firing-pin may be connected to the locking-piece either rigidly or with some longitudinal play, but in any case without the interposition of a spring, as shown in Figs. 1 and 2. To the rear end of the breech-bolt a lever 6 is pivoted, having an arm 7 engaging into a recess 8 in the locking-piece 5. When the breech is closed, the breech-bolt, together with the locking-piece, is held against the rear end of the barrel by the returning-spring

9, and the rear end of the locking-piece abuts against the rear side of the arm 7, thereby holding the lever 6 in such a position that lateral projections 10 on such lever 6 engage projections 11 in the breech-casing.

Any known or preferred means are provided for pushing back the locking-piece on firing the gun. Such means may consist either of a plunger 13, working in a gas-cylinder in the body of the gun, to which cylinder explosion-gases are admitted by a channel 12 from the bore of the gun, (preferably in the manner hereinbefore described,) or of a lever fulcrumed in the breech-casing and operated by the recoil of the gun. Thus on firing the gun the locking-piece, together with the firing-pin, is pushed backward relatively to the breech-bolt and on striking against the front side of arm 7 turns the lever 6 so that the lateral projections on the latter are disengaged from the projections 11 in the breech-casing and are brought into line with the guide-ribs on the breech-bolt. The latter, together with the lever and the locking-piece, are thrown rearward by the impulse imparted to the locking-piece overcoming the resistance of the returning-spring 9. The empty cartridge-shell is thereby extracted and ejected in the well-known manner and the returning-spring and the spring actuating the cartridge-feed mechanism are put under tension.

If it is desired to fire a single shot, the trigger 14 is released immediately after pulling the same, so that the sear 15 is turned upward by the sear-spring 16 and the breech-bolt is arrested in its rear position, the shoulder 17 on the breech-bolt abutting against the outer end of the arm 18 of the sear. For firing the next shot it is only necessary to pull the trigger again, whereby the trigger-arm 19, engaging a lug 20 on the sear, so turns the sear that its arm 18 is disengaged from the shoulder 17. The returning-spring then throws forward the breech-bolt and the locking-piece. As in this movement the projections 10 on the lever 6 slide in the guide-grooves in the breech-casing, the locking-piece cannot move forward relatively to the breech-bolt until the latter has reached the rear end of the barrel. In this position the breech-bolt is arrested by a fixed stop 41 in the breech-casing in order to prevent the breech-bolt from striking violently against the cartridge-head, which has been found to be very objectionable. While the breech-bolt is thus arrested the locking-piece continues its forward movement, owing to its momentum, and the action of the returning-spring 9, acting on the rear side of the arm 7 of the lever 6, turns upward the latter, so that its lateral projections 10 come into engagement with the projections 11 on the breech-casing, whereby the breech-block is locked. Finally, the firing-pin strikes against the primer of the cartridge and fires the same.

At the upper rear end of the arm 7 there is provided a projection 71, which after unlocking the breech-bolt rests against a solid portion in the rear wall of the recess 8 in the locking-piece 5, and thus transmits the pressure exerted by the returning-spring upon the locking-piece and the breech-bolt; but when the latter on being pushed forward strikes against the rear end of the barrel and is thus arrested and the lateral projections 10 of the block 6 have come clear of the front ends of the projections 11 in the breech-casing the locking-piece by acting upon the projection 71 turns the lever 6 into locking position, as above mentioned, whereby the projection 71 is brought opposite a recess 51 in the rear wall of the locking-piece and fully enters the same when the locking-piece arrives at the front end of its stroke. Thus an accidental turning back of the lever 6 into the unlocking position is prevented, and at the same time the last part of the forward movement of the locking-piece serves to throw the firing-pin against the primer with certainty, so that the cartridge is fired only after the breech-bolt is perfectly locked. After firing the breech-bolt is thrown back, together with the locking-piece, as before described, and when the trigger has been released immediately after pulling the same the breech-bolt 3 is arrested by the arm 18 of the sear when it has reached its rearmost position.

In the forward movement of the breech-bolt a cartridge is taken from a cartridge-band and introduced into the barrel, as hereinafter described.

If it is not desired to fire single shots at will by hand, but to fire automatically a series of shots in rapid succession, it is only necessary that the trigger after having turned the sear so as to bring its arm 18 out of engagement with the shoulder 17 holds the sear in this position as long as it is desired to continue to fire. The breech-bolt and the locking-piece after having reached their rearmost position are then not arrested by the sear 15, but are immediately thrown forward by the returning-spring and the next shot is fired, and so on until the sear is permitted to rise again.

In order that either single shots or series of shots may be fired automatically, as may be required, with certainty, the trigger-arm 19 is provided with an adjustable slide 21, which can be pushed forward or backward by means of a handle (not shown) projecting from the breech-casing. When pushed forward, as shown in Fig. 1, the slide 21 overlaps the lug 20 of the sear to such an extent that the two are still in engagement and the sear is held down even if the trigger is fully pulled. In this position of the slide 21 the sear cannot come into engagement with the breech-bolt, and consequently automatic fir-

ing will be continued as long as the trigger is pulled.

If it is desired to interrupt the automatic firing, it is only necessary to release the trigger, whereupon the sear is turned upward by its spring so as to arrest the breech-bolt at the end of its next rearward movement.

If it is desired to fire single shots only, the slide 21 is pushed back into the position shown in Fig. 2, in which such slide and the trigger-arm 19 come out of engagement with the lug 20 after having turned downward the sear on the trigger being pulled, so that toward the end of the pulling of the trigger the sear is again turned upward by its spring and by arresting the breech-bolt in its rearmost position prevents the next shot from being fired. The lug 20 is pivoted to the sear and is held by a spring (not shown) against an arch or shoulder fixed to the sear, so that when the trigger is pulled the lug transmits the pressure of the trigger-arm 19 and the slide to the body of the sear; but when after the lug has come out of engagement with the trigger-arm 19 and the slide 21 and the sear has been turned upward by its spring 6 into arresting position the trigger is released its arm 19 turns upward the lug 20 against the action of the spring of the latter until it has passed its point, whereupon the lug returns into its normal position and the trigger-arm 19 slips over the point of the same, so that the parts return into the normal position. (Shown in Fig. 2.)

Instead of the slide 21 an arm 34, Figs. 8 and 9, journaled to the trigger, may be used, the axis 35 of such arm passing outward through the trigger-plate and carrying at its outer end a handle-arm 36, located within the trigger-guard. In the position of the parts shown in Fig. 8 and in full lines in Fig. 9 the arm 34 is between the trigger-arm 19 and the bottom arm 37 of the sear, so that as long as the trigger is held in the pulled position the sear 15 is held turned downward by its arm 34 and its arm 18 is out of the path of the breech-bolt, and thus a series of successive shots is automatically fired. If, however, the arm 34 is turned by means of the handle-arm 36 so that it comes out of the space between the trigger-arm 19 and the bottom arm 37 of the sear, as shown in dotted lines in Fig. 9, the trigger acts upon the sear only through the medium of the lug 20 and only single shots are fired at will, as above described.

In order to avoid jamming of the parts and to prevent the firing-pin from penetrating too far into the primer, the forward movement of the locking-piece is arrested by a fixed stop 22 in the breech-casing.

The step-by-step forward movement of the cartridge-band required for feeding the cartridges may be derived from the locking-piece or from the breech-bolt. As shown in

the drawings, it is derived from the breech-bolt, which in its rearward movement turns a lever 23, pivoted in the breech-casing, which raises another lever 24, pivoted in the breech-casing, thereby putting under tension a spring 25. At the free end of the latter lever teeth or pawls 26 are provided, which project into a band-guide 27 in the breech-casing and are so shaped that when the lever 24 rises they do not actuate the cartridge-band, but that when the lever 24 after the breech has been opened is depressed by its spring 25 they act upon such band and move the same forward. The parts are so proportioned that the band is advanced each time through the distance between two adjacent cartridges, so that by each such movement a fresh cartridge is brought into position for being introduced into the barrel by the forward movement of the breech-bolt.

I claim—

1. In an automatic machine-gun the combination of a breech-bolt, a locking-piece adapted to move relatively to and lengthwise of the breech-bolt, a recess in the locking-piece, a lever pivoted to the breech-bolt and having an arm engaging into the recess in the locking-piece, means for imparting to the locking-piece a rearward movement relatively to the breech-bolt and a returning-spring acting upon the locking-piece, lateral projections in the breech-casing and lateral projections on the said lever adapted to come into and out of engagement with the lateral projections in the breech-casing, substantially as and for the purpose described.

2. In an automatic machine-gun the combination of a breech-bolt, a locking-piece adapted to move relatively to and lengthwise of the breech-bolt, a recess in the locking-piece, a lever pivoted to the breech-bolt and carrying an arm engaging into the recess in the locking-piece, a firing-pin engaging the locking-piece, and adapted to slide longitudinally in the breech-bolt and relatively to the locking-piece, means for imparting to the locking-piece a rearward movement relatively to the breech-bolt and a returning-spring acting upon the locking-piece, lateral projections in the breech-casing and lateral projections on the said lever adapted to come into and out of engagement with the lateral projections on the breech-casing substantially as and for the purpose described.

3. In an automatic machine-gun the combination of a breech-bolt, a locking-piece adapted to move relatively to and lengthwise of the breech-bolt, a recess in the locking-piece having in its rear wall a full portion and a recess, a lever pivoted to the breech-bolt and carrying an arm engaging into the recess in the locking-piece, a projection on the rear side of such arm adapted to come against the full portion of the rear wall of the recess in the locking-piece in one position of such lever

and to engage the recess in said rear wall in another position of such lever, a firing-pin engaging the locking-piece and adapted to slide longitudinally in the breech-bolt and relatively to the locking-piece, means for imparting to the locking-piece a rearward movement relatively to the breech-bolt and a returning-spring acting upon the locking-piece, lateral projections in the breech-casing and lateral projections on said lever adapted to come into and out of engagement with the lateral projections on the breech-casing, substantially as and for the purpose described.

4. In an automatic machine-gun, the combination of a reciprocating breech-bolt with means for moving such breech-bolt backward and forward and for locking the same, a sear pivoted in the breech-casing and having an arm adapted to engage with the breech-bolt in the rearmost position of the latter, a trigger pivoted in the breech-casing, a lug pivoted to the sear and adapted to engage with an arm rigidly secured to the trigger in one position of the latter and to come out of engagement with such arm in another position of the trigger and an element adjustably attached to the trigger and adapted in one position to permanently engage with the sear, substantially as and for the purpose described.

5. In an automatic machine-gun, the combination of a reciprocating breech-bolt with means for moving such breech-bolt backward and forward and for locking the same, a sear pivoted in the breech-casing and having an arm adapted to engage with the breech-bolt in the rearmost position of the latter, a trigger pivoted in the breech-casing, a lug pivoted to the sear and adapted to engage with an arm rigidly secured to the trigger in one position of the latter and to come out of engagement with such arm in another position of the trigger, a bottom arm on the sear and an arm pivoted to the trigger and adapted in one position to be in permanent engagement with such bottom arm of the sear and to be out of engagement with the latter in another position, substantially as and for the purpose described.

6. In an automatic machine-gun the combination of a reciprocating breech-bolt, means for moving the same backward and forward and for locking the same, a spring-actuated lever pivoted in the breech-casing, means actuated by the breech-bolt for rocking said lever against its spring, a cartridge-band guide, a cartridge-band guided in such guide, teeth operated by said lever and projecting into such guide such teeth being adapted to engage into the cartridge-band when moving in one direction and to move idly along such band when moving in the opposite direction, substantially as and for the purpose described.

7. In an automatic firearm the combination of a barrel, a breech mechanism, means

for operating such mechanism including a
gas-cylinder and a plunger working in such
cylinder a coiled gas-channel formed in the
body of the barrel between a mandrel and a
5 sleeve and a hole leading from the bore of the
barrel to the gas-channel, substantially as
and for the purpose described.

In testimony whereof I affix my signature
in presence of two witnesses.

ADOLF ODKOLEK VON AUGEZD.

Witnesses:

T. GEORGE HARDY,
ALVESTO S. HOGUE.