

T. BERGMANN.
AUTOMATIC MACHINE GUN.
APPLICATION FILED SEPT. 26, 1901.

NO MODEL.

5 SHEETS—SHEET 1.

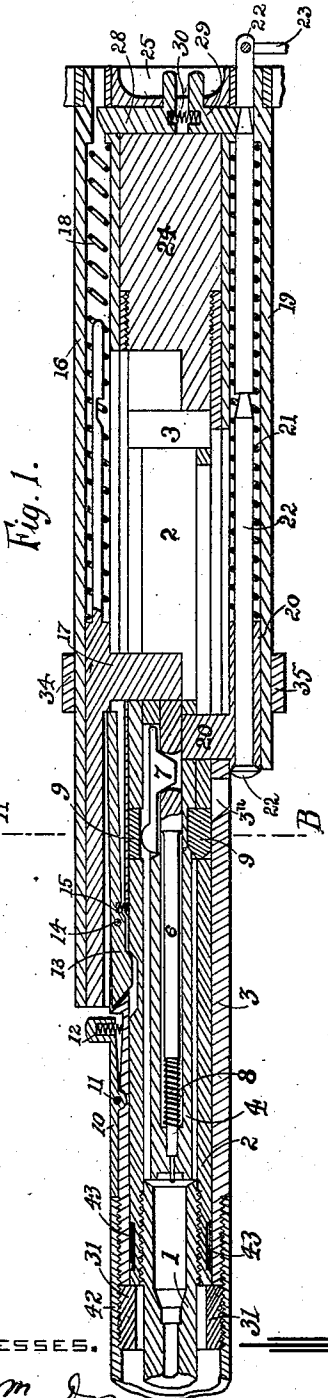


Fig. 1.

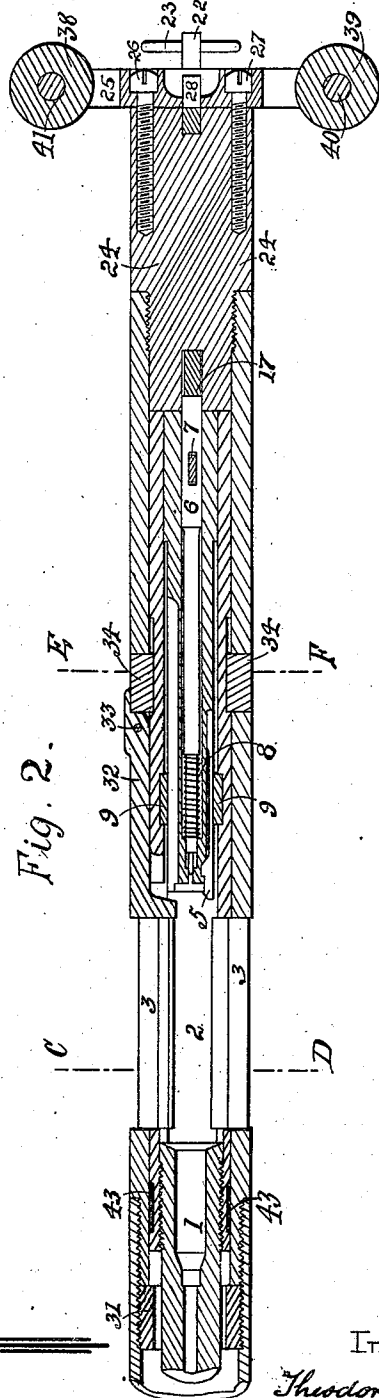


Fig. 2.

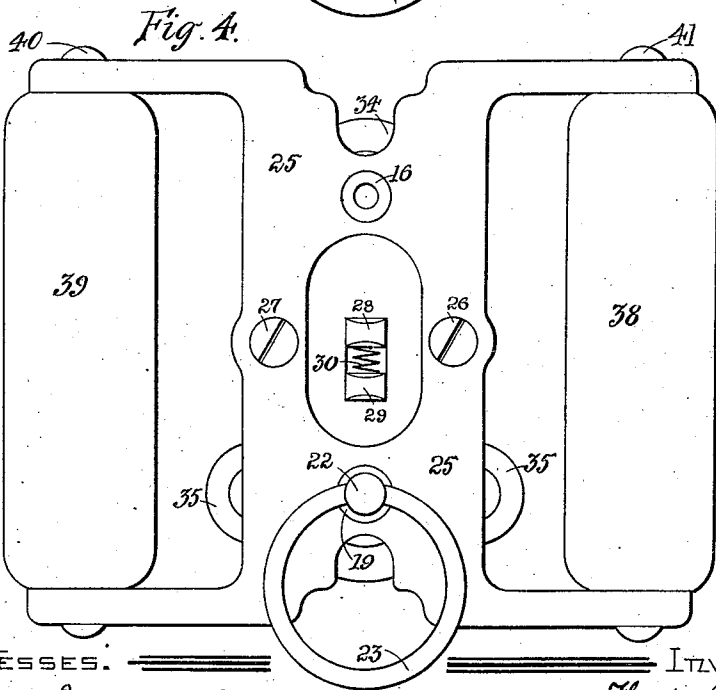
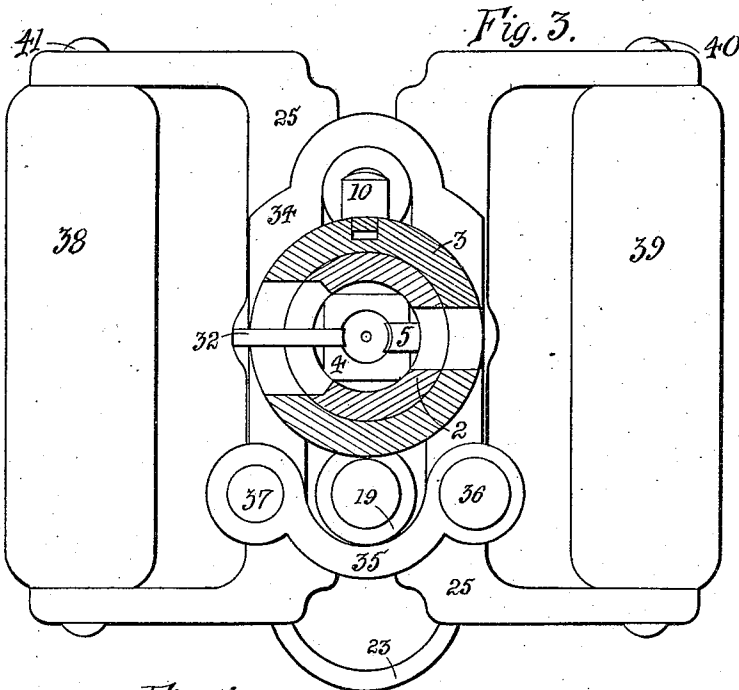
WITNESSES.
Wm. D. Bell.
James B. Newton.

INVENTOR,
Theodor Bergmann
 by *Partner & Shaw and,*
 Attorneys.

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5 SHEETS--SHEET 2



Witnesses: _____
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James B. Newton.

INVENTOR,
Theodor Bergmann,
 by *Arthur Steward,*
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No. 723,232.

PATENTED MAR. 24, 1903.

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5 SHEETS—SHEET 3.

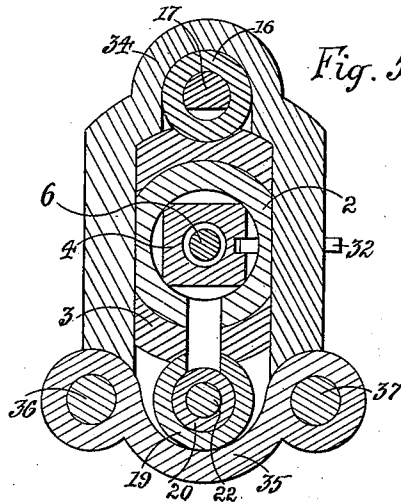


Fig. 5.

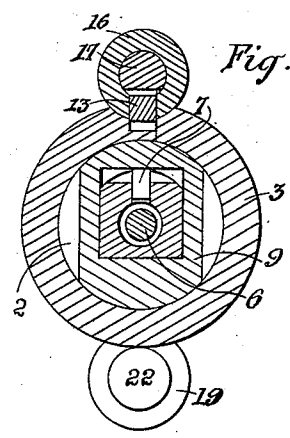


Fig. 6.

WITNESSES
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No. 723,232.

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6 SHEETS—SHEET 4.

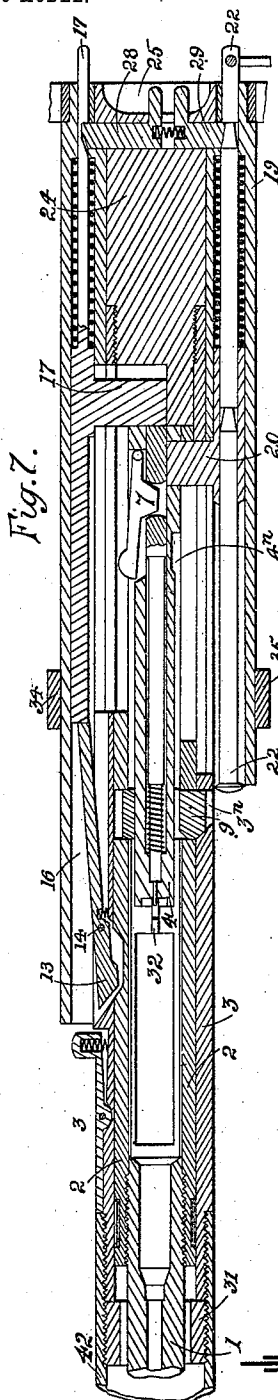


Fig. 7.

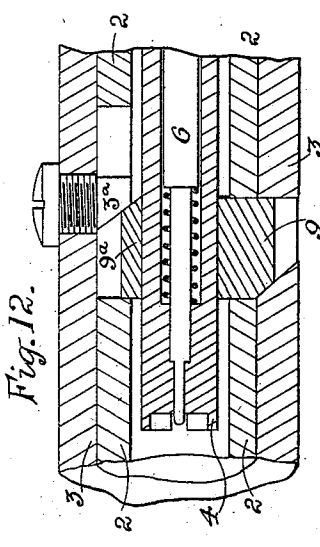


Fig. 12.

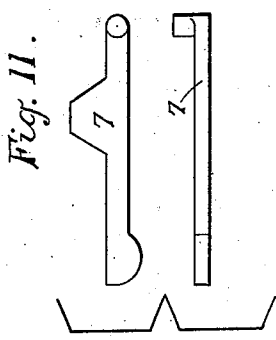


Fig. 11.

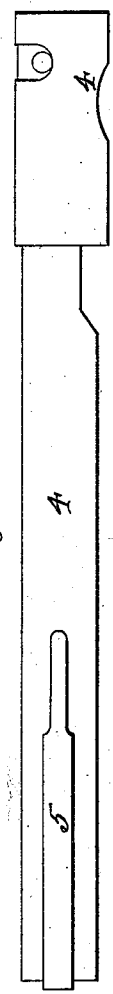


Fig. 10.

WITNESSES.
J. M. Bell.
James B. Newton

IN WITNESS WHEREOF,
Theodor Bergmann,
by Gartner & Steind,
Attorneys

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5 SHEETS—SHEET 5.

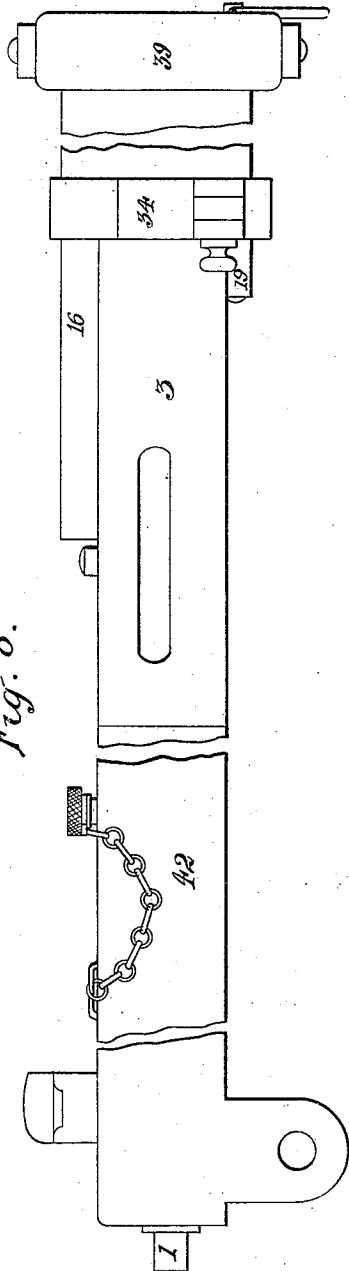


Fig. 8.

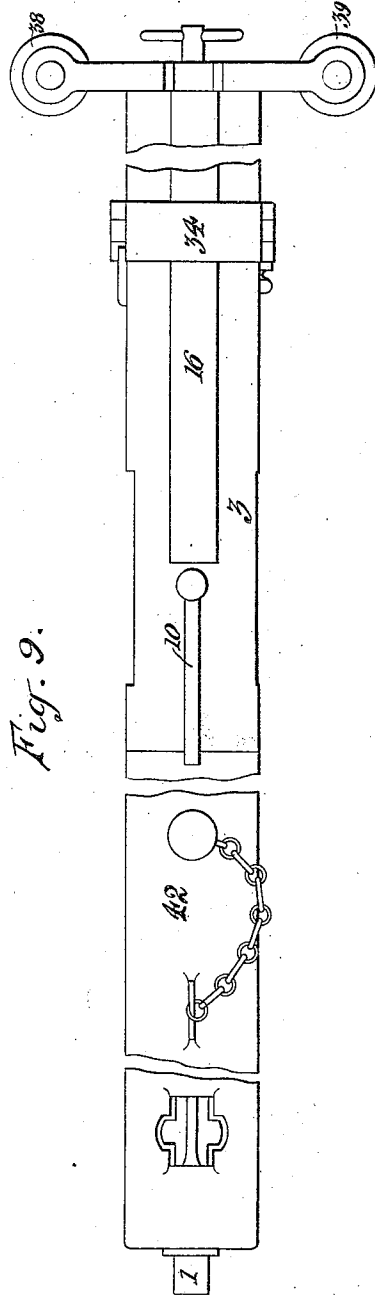


Fig. 9.

Witnesses.
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UNITED STATES PATENT OFFICE.

THEODOR BERGMANN, OF BADEN, GERMANY.

AUTOMATIC MACHINE-GUN.

SPECIFICATION forming part of Letters Patent No. 723,232, dated March 24, 1903.

Application filed September 26, 1901. Serial No. 76,600½ (No model.)

To all whom it may concern:

Be it known that I, THEODOR BERGMANN, a subject of the Emperor of Germany, residing at Baden, Germany, have invented certain new and useful Improvements in and Relating to Automatic Machine-Guns, of which the following is a specification.

My invention relates to automatic machine-guns, and is chiefly designed to simplify the construction and increase the efficiency of such firearms.

An important feature of my said invention consists in an improved locking piece or wedge for automatically securing the breech-bolt in its closed position at the proper times during the forward-and-backward motion of the barrel in the operation of the gun, which locking-piece can be employed as well for an infantry recoil-loading gun as for a so-called "machine-gun." The said locking piece or wedge is arranged so as to slide in a transverse slot in a guide-sleeve secured to and moving with the barrel and is formed with an aperture or passage through which the breech-bolt passes, the transverse motion of the said wedge or locking-piece in its slot in locking the breech-bolt to the said sleeve and in releasing it therefrom being obtained by means of inclined surfaces on the said wedge engaging with corresponding inclined planes on the casing of the gun or on the casing of the gun and on the breech-bolt.

According to another part of my said invention I provide a pivoted lever, which may be termed a "firing-pin holder," and prevents the firing-pin from being moved forward to fire the cartridge except at such times when the breech-bolt is locked to the said sleeve, the said lever also serving to retain the firing-pin in position in the breech-bolt.

My said invention also relates to an improved construction, to be hereinafter described, whereby the main operative parts of the gun move rectilinearly, so as to simplify the construction and prevent forces being set up tending to interfere with the steadiness of the aim.

In the accompanying drawings I have shown how my said invention can be conveniently and advantageously carried into practice.

Figure 1 is a vertical longitudinal section

through the rear part of a machine-gun with the breech closed; Fig. 2, a horizontal longitudinal section of the same gun with the breech open; Fig. 3, a transverse section on the line C D, Fig. 2, seen from the front and with the rearward parts made visible. Fig. 4 is a rear elevation of the gun. Fig. 5 is a transverse section on the line E F, Fig. 2, looking toward the front. Fig. 6 is a transverse section on the line A B, Fig. 1, looking toward the rear. Fig. 7 is a vertical longitudinal section of the same gun with the breech-bolt moved back and the lock cocked. Fig. 8 is an elevation of the whole gun, drawn to a reduced scale, seen from the left. Fig. 9 is an elevation, of similar size, of the same gun seen from above. Fig. 10 shows the breech-bolt seen from the left, with the extractor. Fig. 11 shows the firing-pin holder in two views. Fig. 12 is a vertical longitudinal section of the casing and breech-bolt in the neighborhood of the locking wedge or block in another modification of the latter.

Like reference characters indicate corresponding parts throughout the drawings.

The barrel 1 is screwed into a guide sleeve or frame 2, which slides in the tubular casing 3 of the gun. The breech-bolt 4, which slides in the sleeve 2, bears externally an extractor 5 and is provided with an internal passage or bore in which slides the firing-pin 6. The said firing-pin is pressed rearward by a spring 8 and is retained within the said breech-bolt by a firing-pin holder 7. A locking piece or wedge 9 is mounted so as to slide transversely in the sleeve 2 and is formed with a rectangular passage, through which the front angular part of the breech-bolt 4 can pass. The casing 3 is, moreover, provided at a suitable position with a groove 3', into which the locking-wedge 9 can pass in order to move out of engagement with the breech-bolt 4, and the said breech-bolt has a locking-groove 4', with which the locking piece or wedge 9 can interlock. The locking-piece can also be made in a somewhat different manner to that shown in the drawings, and according to this only the corresponding grooves are to be formed.

The firing-pin holder 7, which prevents the firing-pin 6, acted upon by its spring 8, from moving rearward out of the breech-bolt 4, also

forms a safety device, whereby no firing of the cartridge can take place unless the breech-bolt 4 has previously been locked to the sleeve 2. For this purpose the point of the firing-pin can only be moved up to the percussion-cap when the front end of the firing-pin holder, which moves beneath the upper part of the locking-piece 9, can move upward. Thus if the locking-piece 9 is not in its upper locked position the firing-pin holder 7, swinging about its pin, cannot move upward at its front end, and the middle part of the firing-pin holder, which passes through the firing-pin 6, prevents the forward motion thereof, and consequently also the firing.

On the upper part of the casing 3 is mounted a guide-sleeve 16 for a striker 17, the flat arm of which extends through the slotted tubes 16, 3, and 2 into the interior far enough for the firing-pin 6 to be struck thereby. The striker 17 extends rearward in the form of a round rod, in which the notch for the trigger is cut, and is driven forward by a spring 18, which bears at its rear end against a stop in the bore of the sleeve 16.

At the lower part of the casing 3 is mounted a sleeve 19, in which the cocking-piece 20 slides. This cocking-piece, in the same manner as the striker 17, has a flat arm extending into the casing and engaging in a corresponding recess in the breech-bolt 4, so as to couple the cocking-piece 20 with the breech-bolt 4 in such a manner that both parts must move together.

Behind the cocking-piece 20 in the sleeve 19 is arranged the closing-spring 21, which bears at the rear against a stop in the sleeve 19. The cocking-piece 20 is bored through in its cylindrical part, so that a setting-rod 22, which is surrounded by the spring 21, can pass through. The rod 22 is formed with a head at its front end to engage with the front part of the cocking-piece 20 and is provided with two annular turned notches into which the sear-bolt 29 can enter when the said rod is in its foremost or rearmost position, respectively. At the rear end the rod 22 bears a ring 23 to enable it to be conveniently grasped.

The casing-tube 3 is closed at its rear end by the base-screw 24, which limits the rearward travel of the breech-bolt and also of the sleeve 2, bearing the barrel. To this base-screw 24 is also rigidly connected the base-plate 25 through the screws 26 and 27. The base-plate 25 is provided at both its right and left hand sides with arms between which are secured two turned handles 38 and 39, of wood, horn, &c., by means of screws 40 and 41, extending through them. These handles serve for the manipulation of the machine-gun.

As can be seen from Fig. 5, the two sleeves 16 and 19, which are mounted in corresponding seats in the casing 3, are held fast on the casing 3 by a clamp 34, while displacement of the said sleeves is prevented in a rearward direction by their abutting against the base-plate 25 and in a forward direction by abut-

ting against the shouldered or stepped end of the seats in the casing 3. The clamp 34 bears at its lower end the yoke 35, which turns by means of hinges about the pin 36 and is secured by a bolt 37, the handle or knob of which is visible in Figs. 8 and 9 and which is prevented from coming loose of itself by a spring-catch.

The ejector 32, Fig. 2, which is mounted in a groove in the casing 3 and is secured by means of the pin 33, has its nose projecting into the breech-bolt 4, which is provided for this purpose with a corresponding longitudinal groove, as can be seen from Figs. 2, 3, and 5. In the casing-sleeve 3 is also mounted the detent-lever 13, which oscillates about the pin 14, and the longer rearwardly-extending end of which is continually forced upward by the spring 15.

For the protection and cooling of the barrel 1 a cooling-jacket 42 is screwed onto the front end of the casing 3, this jacket bearing the fore sight. The said cooling-jacket, which can be unscrewed by hand, is secured in its proper position by a jacket-holder in the form of a pivoted lever 10, which oscillates about a pin 11 on the casing 3 and is actuated by a spring 12, arranged in a recess in the press-knob of the jacket-holder. The form of this jacket-holder 10 and its engagement with the jacket 42 can be seen from Figs. 1, 3, 7, and 9. The movement of the barrel 1 with the breech-sleeve 2 is limited forward by a stop-ring 31, which is screwed into the cooling-jacket 42. In order to prevent the water in the cooling-jacket 42 from running out backward, a joint 43 is made, with suitable packing material, in front of the breech-sleeve 2. A similar packed joint is arranged at the muzzle. As shown in Figs. 8 and 9, the water can be introduced into or run out of the cooling-jacket after the removal of a screw-plug attached to a chain. A valve, which is not shown, permits the escape of the steam when the pressure exceeds a predetermined limit. The eye shown in Fig. 8 and arranged beneath at the front end of the jacket permits connection of the gun with a gun-carriage or other object.

The back sight is not shown and can be the same as on the infantry weapon with the cartridges of which the machine-gun is arranged to work. Likewise the safety device is not specially shown and the arrangement which permits the firing of single shots, while both of these facilities can be very efficiently provided for and carried out. The feeding of the cartridges is likewise not shown, and takes place from the right hand and the ejection to the left hand. It can, however, be effected at any desired side, suitable passages being formed for this purpose in the casing 3 and sleeve 2, as shown in Figs. 2, 3, and 7.

Fig. 9 shows on the right-hand side at the top the passage through which the cartridges are fed in, preferably on sheet-metal strips. Operation without cartridges: If the set-

ting-rod 22 is drawn back by the ring 23, the head of the rod 22 moves back the cocking-piece 20 and the breech-bolt 4, coupled thereto. At the same time the breech-bolt 4 also carries back the barrel 1, together with the sleeve 2, which is locked to the breech-bolt 4 by the locking-piece 9. As soon as in the rearward motion of the parts the locking-piece 9 reaches the position 3ⁿ the sleeve 2 will be simultaneously brought to rest by the engagement of its rear end with the base-screw 24. Since the rearward travel of the sleeve 2 and barrel 1 is limited here, the breech-bolt 4 will continue its rearward motion by the force exerted thereon, and the locking-piece 9 will be forced out of the locked position by the interaction of the inclined locking-surfaces on the said locking-piece 9 and on the breech-bolt 4. If now the breech-bolt is drawn farther back by means of the rod 22 and the cocking-piece, it will carry back the striker 17 at the same time, so that the striker-spring 18 and the closing-spring 21 will be compressed together. As soon as the pull has continued so far that the rear end of the breech-bolt abuts against the base-screw the cocking-notch of the striker 17 is brought opposite the sear 28 of the trigger, and, pressed by the spring 30, the said sear springs into the cocking-notch of the striker and holds the latter fast. At the same time the rear end of the detent-lever 13, acted upon by its spring 15, is also rapidly moved upward and places itself against the front surface of the striker 17, Fig. 7. The sear 29, pressed by the spring 30, simultaneously engages with the inner notch in the setting-rod 22 and holds the whole in the open rearmost position. If now the sear 29 is released by pressing against the end thereof in front of the base-plate 25, the setting-rod 22 will be free and be driven forward, together with the breech-bolt, by the spring 21, while the striker 17 will remain in its cocked position. As soon as the breech-bolt has moved forward so far that its front surface strikes against the rear end of the barrel and the locking-piece 9 has its locking-surface opposite the locking-surface 4^a in the breech-bolt 4 the locking-piece 9, by means of the inclined surface on its under side, slides upward on the inclined-plane surface of the recess 3ⁿ in the casing and locks itself with the breech-block, and then the two parts move forward together under the action of the spring 21 over the remaining short part of the travel until the sleeve 2 strikes against the stop-ring 31 on the cooling-jacket. The locking thus takes place under control. In the last stage of the forward travel of the sleeve 2 an inclined surface on the sleeve 2 strikes against an inclined surface on the detent-lever 13, so that the rear arm of the said lever, which previously had the position shown in Fig. 7, takes up the position shown in Fig. 1 and allows the striker 17 to move rapidly forward as soon as the sear 28 at the

rear has been pressed down and has thus released the notch of the striker 17.

In firing the operations take place in a somewhat different manner. If a magazine, or band-like strip with loaded cartridges is applied and the drawn-back cocking-piece 20 is released in the manner above described, the breech-bolt 4 will take the first cartridge from the magazine and push it into the cartridge-chamber of the barrel, in which operation the extractor claw or hook slides over the edge of the base of the cartridge, engages in the channel or groove thereof, and the gun is ready for firing. If now the trigger 28 is pressed down, the striker 17, driven by the striker-spring 18, flies forward and strikes against the firing-pin 6, the point of which fires the cartridge. The recoil of the shot throws the barrel 1, together with the sleeve 2 and the breech-bolt 4, locked thereto, backward, and as the sleeve 2 strikes against the base-screw 24, and is thus prevented from moving farther back, the locking-piece 9 unlocks the breech-bolt 4 in the manner above described, and thus allows the said breech-bolt to continue its travel and to move rearward up to the base-screw 24. In this operation the breech-bolt 4 carries back the striker 17, as well as the cocking-piece 20. The striker and closing springs 18 and 21 are meanwhile compressed, and the detent-lever 13 places itself in front of the striker 17 and holds the latter in its cocked position. The cartridge-case in this rearward motion is now struck on the right-hand side by the nose of the ejector 32, and since it is held on the left-hand side by the extractor-claw it is ejected to the left hand through the openings in the casing 3 and in the sleeve 2. The setting-rod 22 during this rearward motion of the other parts remains in its forward position, Fig. 7. If now the pressure on the trigger 28 be continued, the breech-bolt, acted upon by the closing-spring 21 through the cocking-piece 20, immediately flies forward again, and thus takes the next cartridge out of the magazine into the barrel. Locking of the breech-bolt then takes place, and at the last moment the detent-lever 13 is released. The striker, which is held thereby, flies forward against the firing-pin, and the next shot is fired, and the firing proceeds continuously until the last cartridge in the magazine has been fired.

Fig. 12 shows another form of construction wherein the locking-wedge 9 is arranged so as to engage with an inclined surface in the breech-bolt, and be thus unlocked. For this purpose the inclined surface 3^a of a projection extending into the sleeve 2 strikes against the upwardly-inclined surface 9^a on the locking-wedge in the rearward travel of the parts of the breech mechanism, and the locking-wedge is thereby forced out of the locked position. The method of operation of the parts relatively to each other remains the same in other respects.

What I claim is—

1. The combination of three members the first and second of which have conjoint movement and also a movement the first independently of the second in substantially the same direction, and the third of which is relatively stationary, and an interlocking device for said first and second members movable therewith and also substantially transversely thereof to effect the unlocking thereof, said third member having an abutment adjacent the limit of movement of said second member adapted to be engaged by said locking device so as to lock the second and third members together upon the unlocking of said first and second members, substantially as described.

2. The combination of a substantially tubular casing having a recess, the barrel, a sleeve movable with said barrel within said casing, the breech-bolt inclosed in said sleeve and movable therein, means for limiting the movement of said sleeve and barrel, means for moving the breech-bolt longitudinally, and a locking device adapted to interlock said breech-bolt and sleeve and movable relatively thereto rectilinearly to unlock them, said casing being adapted to maintain said device in locking engagement with the breech-bolt and sleeve, and said recess being adapted to receive said device when moved to unlock said breech-bolt and sleeve, substantially as described.

3. The combination of a tubular structure, a breech-bolt arranged in said structure, the one being movable relatively to the other longitudinally, a firing-pin in said breech-bolt, a firing-pin holder fulcrumed in the breech-bolt and engaging the firing-pin to control the position thereof, and a transversely-movable part in said structure controlling the position of said holder, said breech-bolt and said part having engageable surfaces one of which is inclined, said part being movable upon the relative movement between said structure and the breech-bolt, substantially as described.

4. The combination of a tubular structure, a breech-bolt movable in said tubular structure longitudinally thereof, a locking device for interlocking said breech-bolt and tubular structure and movable transversely thereof to unlock the same, said tubular structure being also longitudinally movable, a firing-pin in said breech-bolt, and a holding device controlling the firing-pin arranged in said breech-bolt, said holding device being adapted to engage said locking device to be thereby actuated, and said locking device and said breech-

bolt having engageable surfaces one of which is inclined, substantially as described.

5. In an automatic machine-gun, the combination of a casing-sleeve and base-plate having longitudinal seats, guide-tubes for the striker and cocking-piece fitted into said seats, and a clamp provided with a swinging yoke for securing the said guide-tubes in the said seats, substantially as, and for the purpose, specified.

6. The combination, in an automatic machine-gun, of a casing, a guide sleeve or frame to which the barrel is secured, a locking-piece sliding transversely in said sleeve or frame, a breech-bolt sliding in said sleeve or frame and extending through said locking-piece, surfaces on said locking-piece coacting with surfaces on the casing and on the breech-bolt, a firing-pin in said breech-bolt, and a lever pivotally mounted in said breech-bolt and engaging with said firing-pin and said locking-piece, substantially as, and for the purposes, hereinbefore described.

7. In a machine-gun, a casing, a cooling-jacket secured to said casing, a barrel sliding in said casing and jacket, a guide frame or sleeve on said barrel, a breech-bolt sliding in said guide frame or sleeve, a firing-pin sliding in said breech-bolt, a locking-piece sliding transversely in said guide frame or sleeve, a setting-rod sliding in said casing and having an external handle, a spring-pressed cocking-piece sliding on said setting-rod and engaging said breech-bolt, a spring-pressed striker sliding in said casing, sears for engaging said setting-rod and said striker, a detent-lever for engaging said striker and a surface on said guide frame or sleeve for tripping said detent-lever, substantially as hereinbefore described.

8. In an automatic machine-gun, the combination of a casing-sleeve having longitudinal seats along its exterior, a base-screw, a base-plate bearing handles, guide tubes or sleeves fitted into said seats, a clamp having a swinging yoke for securing the said guide-tubes in their seats, a cooling-jacket secured to the forward end of said casing, a barrel and guide frame or sleeve sliding in said casing and jacket, and packed joints at the ends of said jacket, substantially as hereinbefore described.

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

THEODOR BERGMANN.

Witnesses:

E. BEISSWÄNGER,
MAX ADLER.