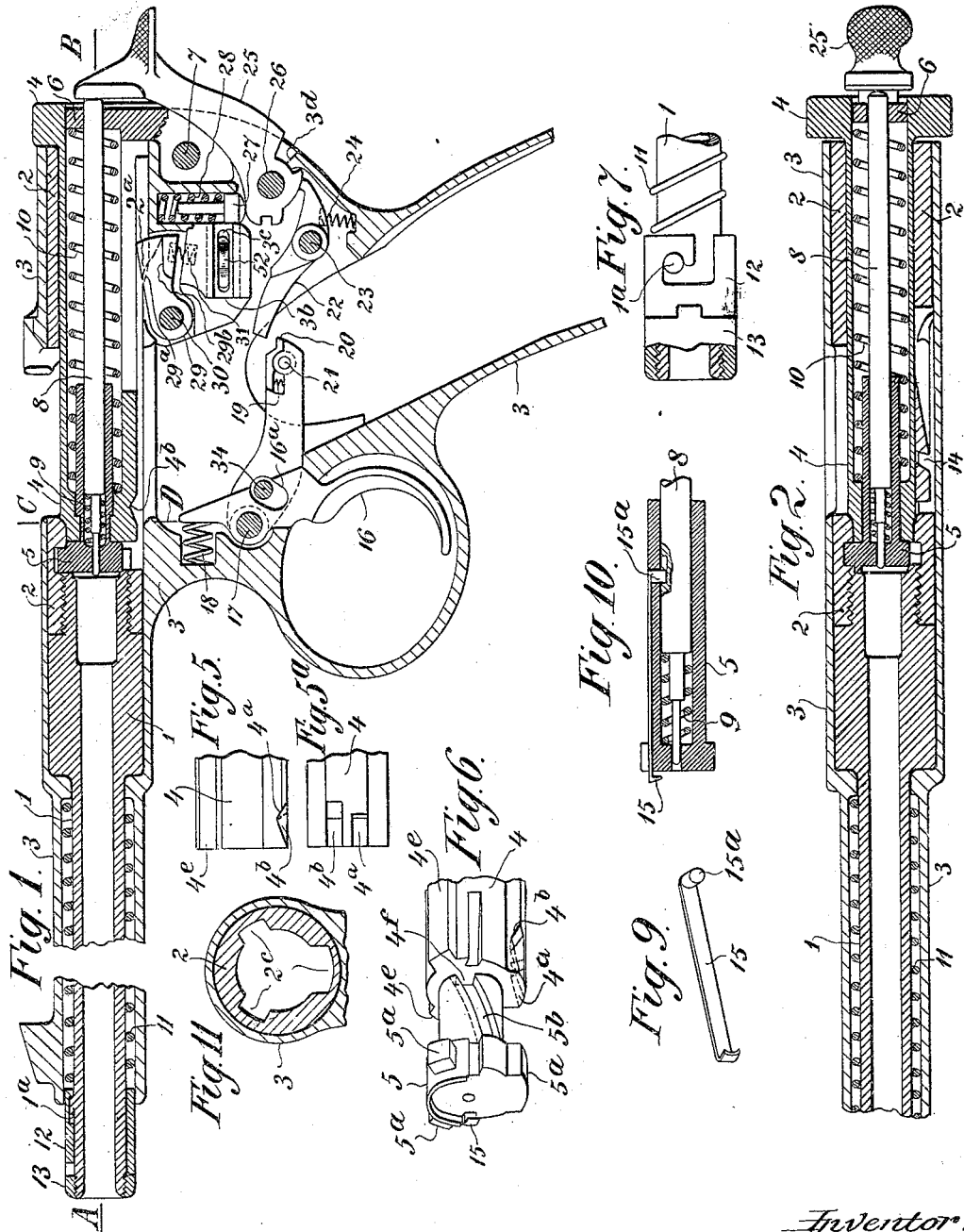


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FIREARM.
APPLICATION FILED FEB. 13, 1902.



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5 SHEETS—SHEET 2.

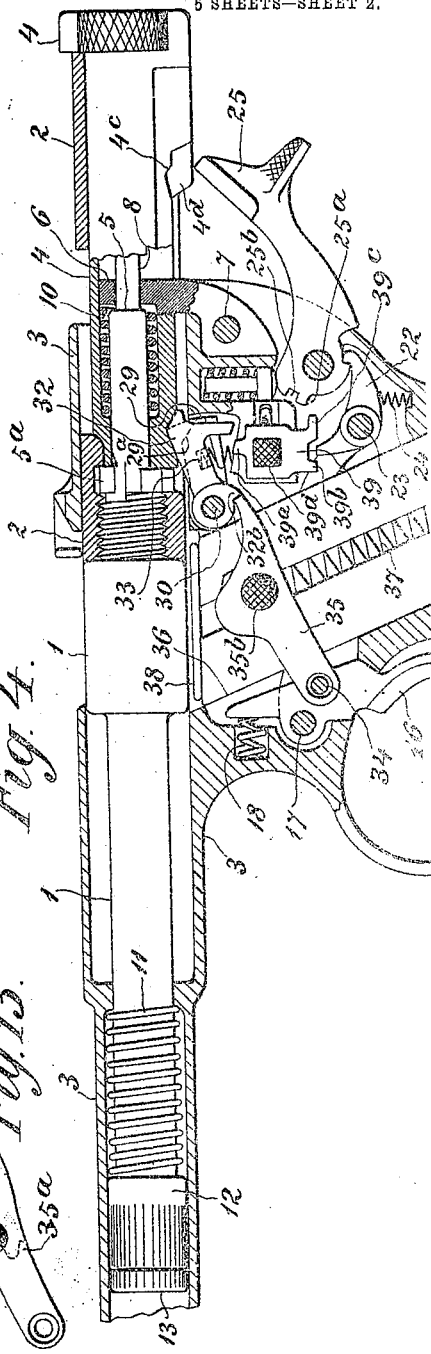
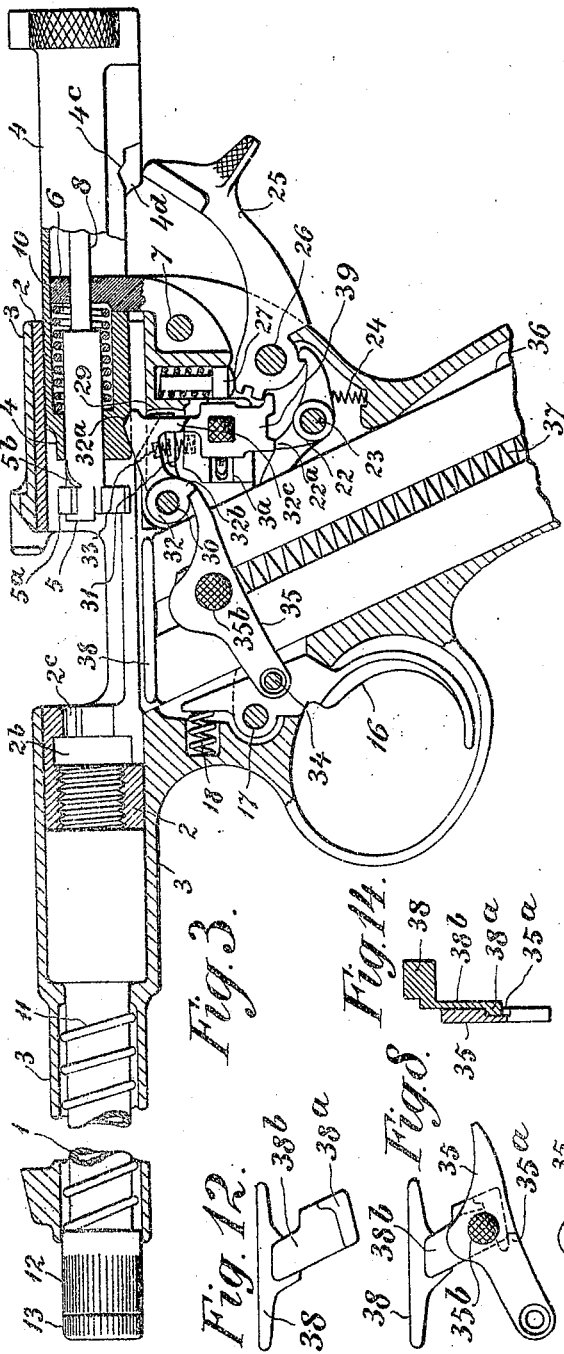


Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

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5 SHEETS—SHEET 3.

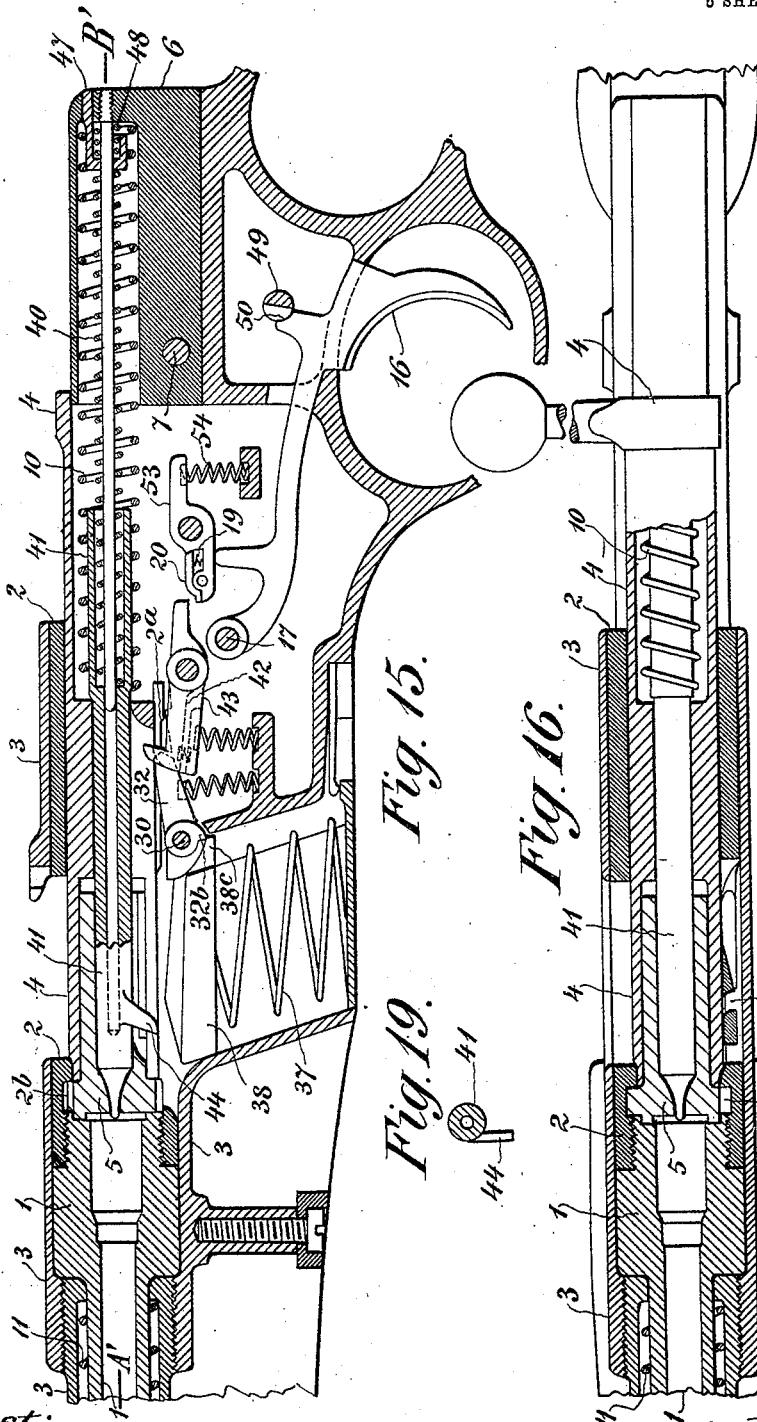


Fig. 15.

Fig. 16.

Fig. 19.

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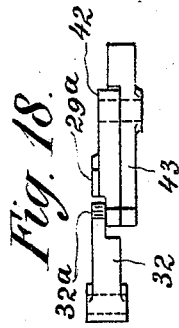
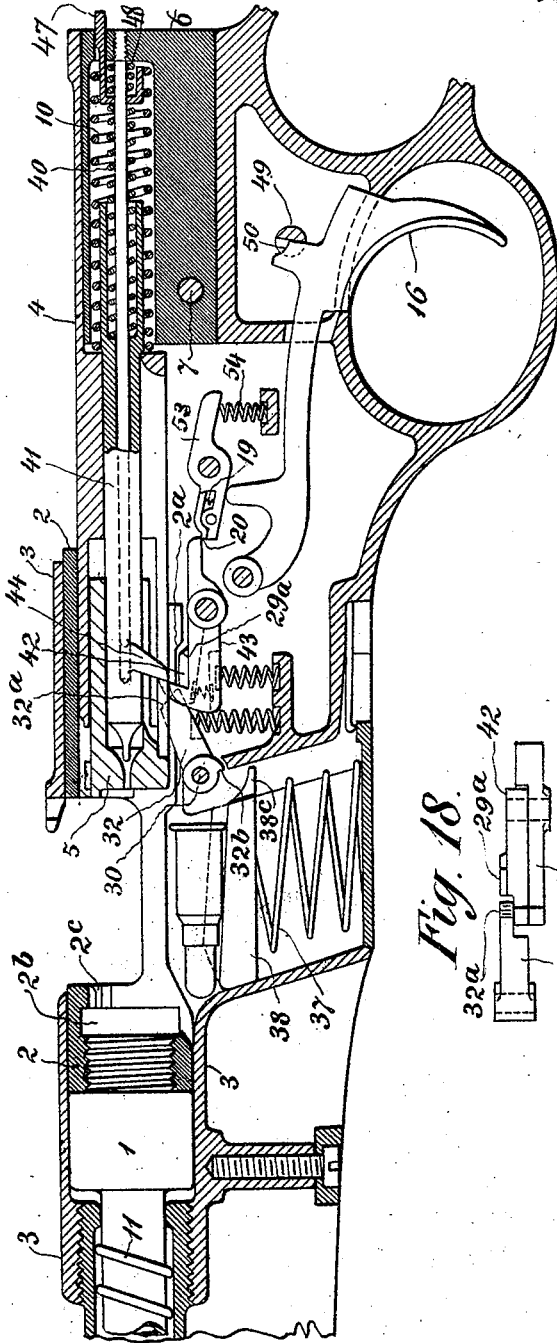
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6 SHEETS—SHEET 4.

Fig. 17.



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5 SHEETS—SHEET 6.

Fig. 20.

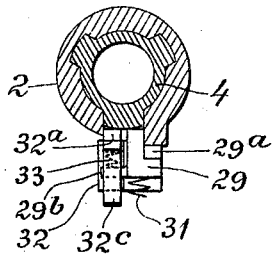


Fig. 21.

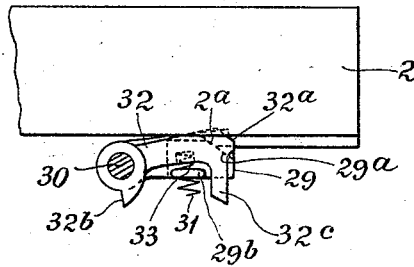
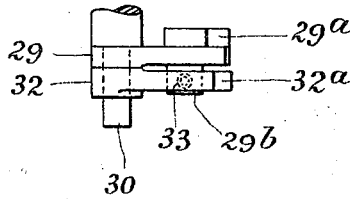


Fig. 22.



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UNITED STATES PATENT OFFICE.

RUDOLF FROMMER, OF BUDAPEST, AUSTRIA-HUNGARY.

FIREARM.

No. 802,279.

Specification of Letters Patent.

Patented Oct. 17, 1905.

Application filed February 13, 1902. Serial No. 93,823.

To all whom it may concern:

Be it known that I, RUDOLF FROMMER, a citizen of the Empire of Austria-Hungary, residing at IX Soroksari út 100, Budapest, Austria-Hungary, have invented certain new and useful Improvements in Firearms; 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.

The present invention relates to firearms, and is designed to provide an automatic firearm distinguished from those of former construction by the special simplicity, compactness and accessibility of all its parts, and the easy manner in which it can be put together and taken to pieces.

With these objects in view my invention consists in the features, means, and combinations of parts, as hereinafter described and as particularly pointed out in the claims hereunto annexed.

Two forms of construction of a firearm made according to this invention and constituting the preferred embodiment thereof are illustrated in the accompanying drawings, in which Figures 1 to 14 show it as a firearm adapted for use as a pistol, and Figs. 15 to 19 as a shoulder-firearm.

Fig. 1 is a central vertical longitudinal section of the first form of construction. Fig. 2 is a horizontal section on the line A B of Fig. 1. Fig. 3 is a vertical longitudinal section of the same when open after the last cartridge has been fired or with empty magazine. Fig. 4 is a vertical longitudinal section showing how in the same kind of firearm after the last cartridge has been fired the breech mechanism rigidly connected with the barrel and breech-chamber arrives, (together with the latter parts,) by means of the recoil in its rear-most position and how the breech after firing the last shot is automatically kept open by the coöperation of the detent-lever and detent. Figs. 5 to 14 are details of the same firearm. Figs. 5 and 5^a show, in side elevation and bottom plan view, respectively, the notches on the bolt. Fig. 6 is a perspective view of the connection between breech-block and bolt. Fig. 7 shows the means of connection of the barrel-casing and barrel-casing nut with the barrel. Figs. 8 and 14 illustrate the coöperation between detent-lever and feed-plate. Fig. 9 is a perspective view of the cartridge-extractor. Fig. 10 shows the means of connection of the firing-pin and the cartridge-

extractor. Fig. 11 is a vertical section of the breech-chamber on the line C D of Fig. 1. Fig. 12 is an elevation of the feed-plate. Fig. 13 is an elevation of the detent-lever. Fig. 15 is a vertical longitudinal section of a shoulder-firearm also embodying my invention. Fig. 16 is a section on the line A' B' of Fig. 15. Fig. 17 is a vertical longitudinal section of the firearm before the last cartridge is introduced into the charge-chamber. Fig. 18 illustrates the arrangement of the detent, the bolt-catch, and the sear. Fig. 19 is a vertical section of the firing-pin from behind the firing-pin catch. Fig. 20 is a vertical section of the breech-chamber and the breech-bolt and a back view of the tumbler and the detent. Fig. 21 is a side elevation of the parts shown in Fig. 20, and Fig. 22 is a plan view of the tumbler and detent.

The barrel 1, Fig. 1, and the barrel extension 2, which is made in one piece with or screwed onto the barrel, are adjustably placed in suitable guides of the frame 3. An annular groove 2^b, Fig. 3, is made in the barrel extension 2, which groove is connected with a series of longitudinal rearwardly-opening grooves 2^c, Figs. 3 and 11. The bolt 4 is pushed into the barrel extension 2 and is coupled with the breech-block 5 by means of the arrangement, Fig. 6, of suitably-placed ribs 4^f on the bolt 4, which engage in spiral grooves 5^b of the breech-block 5. Owing to this arrangement, the breech-block 5 has to revolve on its longitudinal axis in the bolt with each displacement.

If now during the forward movement in a straight line of the breech-block 5 (coupled, by means of the spiral grooves and ribs, with the bolt 4) the studs 5^a on the breech-block have passed the grooves 2^c, the breech-block 5 strikes against the front face of the annular groove 2^b and is thus checked in its movement forward; but the bolt 4 is still driven forward under the action of the spring 10, and by means of this relative motion of the two parts, owing to their connection by spiral grooves and ribs, the breech-block 5 revolves on its longitudinal axis, whereby the studs 5^a firmly rest against the rear end of the annular groove 2^b between the grooves 2^c, and the breech is rigidly locked. The firing-pin 8 passes through the breech-block 5, Fig. 1, and through the plate 6, which is fixed in the frame 3 by means of the screw-bolt 7. The firing-pin is normally held in retracted position by means of the spring 9.

Of the springs 10 and 11 the former (one end of which rests against a shoulder within the bolt 4 and the other end against the plate 6) operates the breech mechanism, while the latter 11 (which with its rear end rests against a shoulder of the frame 3 and with its front end against the barrel-sleeve 12) serves for bringing back the barrel 1 and the barrel extension 2 into the position they were in before the recoil. As it is of great importance that the barrel-sleeve 12, which forms the stop for the barrel-spring 11, should be connected in an absolutely-reliable manner with the barrel 1, the barrel-sleeve 12, Fig. 7, which is provided with a bayonet-groove and placed on the boss 1^a of the barrel, is furthermore secured by a nut 13, both of which, as shown, engage with one another at one or more places by interlocking tenon-and-mortise connections in the manner of a clutch-coupling. In order to obtain an absolutely secure joint with the barrel, the direction of rotation of the bayonet-groove is contrary to that of the threading of the nut 13. For instance, if the bayonet-joint is to turn to the right then the nut 13 has a left-hand screw-threading, and vice versa. It is thus obvious that the nut 13 cannot come off the barrel-sleeve 12 by accident; but even if it should the bayonet-joint alone would insure a secure connection between the barrel-sleeve 12 and barrel 1. In order to remove the barrel-sleeve 12, as well as the nut 13, the barrel-sleeve must be pressed against the barrel-spring 11, when the rib and groove of the barrel-sleeve and the nut will come out of engagement. The nut 13 can then be unscrewed and the barrel-sleeve 12 twisted out of the stud 1^a.

The ejector 14, Fig. 2, is inserted in the barrel extension 2, and preferably under spring force, while the cartridge-extractor 15, Fig. 9, is embedded in the breech-block and engages with its projection 15^a, Fig. 10, in a corresponding notch in the firing-pin 8 in order to prevent the latter falling out backward.

The trigger 16, pivoted on the trigger-pin 17, forming one piece with the frame 3, is controlled by the trigger-spring 18 and has a catch 20 controlled by a spring 19, which catch is arranged to swing on the pivot 21. The sear 22 is pivoted on the pin 23 of the frame and is controlled by the sear-spring 24, which constantly presses it against the hammer 25. This latter is pivoted on the pin 26 of the frame and is controlled by the main-spring 28, coiled round the forcing-bolt 27. The hammer 25 is limited in its swinging motion by the mantle 3 at 3^d.

The tumbler 29, Fig. 1, is pivoted on the pin 30 of the frame and is constantly pressed upward by the spring 31. The back part of the tumbler 29 is in the form of a segmental arc concentric with the pin 30, and it has also a lateral reinforcement with oblique contact-

surface, as shown in the dotted line 29^a. Also pivoted on the pin 30 is the detent 32, Fig. 3, (not shown in Fig. 1,) which is controlled by a spring 33, which is embedded in a suitable underflap 29^b of the tumbler 29.

One operative edge of the detent 32 is formed with a sloping end 32^a, while the other is formed as a catch at 32^b. The sloping edge 32^a engages in the notch 4^b, Figs. 5, 5^a, and 6, with every backward motion of the bolt 4, but is again pressed down by the inclined rear end of the notch 4^b of the bolt when the bolt moves forward, as long as the detent-lever 35, Fig. 3, does not come into engagement with the catch 32^b. On the bolt 34, forming one piece with the frame which passes through an oval aperture 16^a of the trigger, Fig. 1, is pivoted the detent-lever 35, the downward movement of which is limited at 3^a, Fig. 3, by the frame. The magazine 36 contains the feed-spring 37 and the feed-plate 38, which is illustrated in Figs. 8 and 14 in its coöperation with the detent-lever 35.

It will be seen from Fig. 12 that the feed-plate 38, which is inside the magazine 36, has a lateral tailpiece 38^b, which projects through the slot of the magazine and is reinforced outwardly by a shoulder at 38^a, while it will be seen from Fig. 13 that the detent-lever 35 is reinforced inwardly by a shoulder, as shown by the dotted line. These two reinforcements come into engagement with each other (see Figs. 8 and 14) when the feed-plate 38, controlled by the feed-spring 37, goes up as the magazine empties. Consequently the detent-lever 35 is also lifted up as the magazine 36 is about to be emptied. The tooth 35^a of the detent-lever is hereby caused to make an arc-shaped movement around the bolt 34, thereby coming under the lower edge of the tailpiece 38^b of the feed-plate 38, and so that when the feed-plate 38 is pressed down the detent-lever 35 is likewise pressed down. The feed-plate 38 can also be pressed down by pressing downward the knob 35^b of the detent-lever 35.

In the T-groove 3^b of the frame 3, Figs. 1, 3, and 4, is movably arranged the safety-device 39, Figs. 3 and 4. The latter has three projections 39^a 39^b 39^c, Fig. 4, of which one, 39^a, stops the action of the detent 32 and the others that of the sear 22 and the hammer 25, respectively, according as the safety-piece 39 by being moved forward, Fig. 4, or backward, Fig. 3, is put out of or into action. A flat spring 52, Fig. 1, serves to retain the safety-piece in its operative or inoperative position and is arranged in a groove cut in the frame at 3^c and extending into the T-groove 3^b. The knurled button 39^d of the safety-piece 39, as well as the knurled button 35^b of the detent-lever 35, project through suitable apertures in the frame. When the bolt 4 is in its forward closed position, (as in Fig. 1,) the sloping end 32^a of the detent 32 engages in the notch 4^b, Fig. 3, of the bolt 4. When this is secured

and the safety-slide moved back, the upper projection 39^a of the safety-piece 39 engages under the downwardly-bent projection 32^c of the detent 32, and thereby the bolt 4, and therefore all the parts which are movable rearward, (breach-block 5, barrel 1, barrel extension 2,) are immovably fixed. The sear 22 (at 22^a) and the hammer 25 (whether cocked at 25^a or at half-cock at 25^b) are also fixed by the two lower projections 39^b and 39^c of the safety-piece 39. Consequently the movable parts, as well as the trigger mechanism, are made safe.

The method of operation of the firearm is as follows: At the moment of firing the barrel 1, the barrel extension 2, and the whole breach mechanism are thrown back by the recoil, Fig. 4, whereby the barrel-spring 11, the spring 10, the hammer 25, and consequently the main spring 28, are set. The tumbler 29 thereby comes into engagement with the notch 4^a (see Figs. 1, 5, 5^a, and 6) of the bolt and fixes the bolt and the whole breach mechanism in its rearward position. The force of the recoil then immediately ceases, and the barrel 1 and the barrel extension 2 are again driven forward by the barrel-spring 11. The barrel extension 2 takes with it the breach-block 5, consequently drawing it out of the bolt 4, Figs. 3 and 6, whereby the breach-block twists round until the studs 5^a pass into the grooves 2^c or into the cross-head guides in the barrel extension 2, forming continuations thereof. As the barrel 1 and barrel extension 2 are now driven forward by the barrel-spring 11 and the empty cartridge-case, firmly held by the cartridge-extractor, is thrown out by the ejector 14, Fig. 2, arranged in the barrel extension 2 and operating in the well-known manner, the breach mechanism remains fixed in its rearward position by means of the tumbler 29 until the sloping edge 2^a of the breach, Figs. 1, 15, and 17, reaches the sloped raised surface 29^a of the tumbler 29, whereby the latter is pressed down, the mainspring 10 can come into operation and drive forward the breach mechanism, which pushes into the charge-chamber the fresh cartridge, (which has meanwhile been raised from the magazine,) whereby the studs 5^a of the breach-block, which have passed into the grooves 2^c, Fig. 11, in the annular groove 2^b turn in the said groove and become firmly locked with the barrel extension 2. The arm is now ready for firing—that is, cocked—rigidly closed and charged, and can again be fired off by pulling the trigger, and the above-described operation is repeated as long as there is ammunition in the magazine.

In order to insure that the hammer 25 is held securely by the sear 22 after every shot, so that there may never be more than one shot each time the trigger 16 is pulled, there is a catch 20 pivoted on the trigger and which when the trigger is pulled comes into engagement with the sear 22 and lifts the latter only to the intersecting-point of the arcs of two

circles, (the pivots 17 and 23 being taken as centers,) whereupon the sear 22, actuated by the spring 24, springs off the projection 20 at the moment when the notch of the hammer 25 is released from the nose of the sear 22, the hammer being consequently released. The sear 22, however, at the same moment being released from the trigger is returned to its operative position by means of the spring 24 and remains ready to again hold the hammer 25, which will be driven back by the recoil. The arrangement of the projection 20 being such that the same is held rigidly against movement in one direction enables the trigger 16 to return to its original position without thereby affecting the sear 22.

In order that the firearm after the last cartridge has been fired may remain open and ready for recharging, it is so arranged that after firing the last cartridge, Fig. 3, the detent-lever 35 is brought into engagement with the projection 32^b of the detent 32 by means of the feed-plate 38.

The detent 32, which with every backward motion of the bolt 4 passes into its notch 4^b, Fig. 5, but is pressed down on its sloping part 32^a by the slope of this notch, owing to the action of the spring 10 forcing the bolt 4 forward, must now remain in its upper position, owing to the engagement of the detent-lever 35 in the projection 32^b, and consequently retains the breach mechanism in its rearward position until by inserting fresh ammunition or by pressing on the knurled button 35^b of the detent-lever 35 the feed-plate 38 is pressed down. Until the breach mechanism is closed the lugs 4^d of the bolt prevent the forward motion of the hammer 25 even if the trigger is pulled.

The second form of construction of the automatic firearm forming the subject of this invention is in essentials the same as that described above, except that the hammer is in this instance replaced by a firing-pin. Figs. 15 to 19 of the drawings illustrate those modifications required by the omission of the hammer and the substitution therefor of a firing-pin 41, controlled by the mainspring 40. In this form, Fig. 17, 42 is the bolt-catch, which in this case performs the function of the tumbler 29, Fig. 1; 43 the sear, which engages with the catch 44 of the firing-pin, and 32 the detent, which after firing the last shot is rigidly held by the projection 38^c of the feed-plate in the corresponding notch of the bolt 4 and keeps the breach open until fresh ammunition is supplied or the feed-plate 38 is pressed down. The operation of the trigger mechanism is substantially the same under this construction as in the construction first described, only in the present case the movable catch 20 instead of being mounted directly on the trigger 16 is arranged on a separate lever 53, yieldingly actuated by a spring 54. This trip-lever 53 is actuated by the trigger 16 when the latter is pressed in

such a manner as to swing the sear 43 into breech-pin-releasing position. The indicator 47, Figs. 15 and 17, shows whether the firearm is cocked or not. This is arranged so that the pin 47, pressed forward by the spring 48, remains invisible, as this spring can only be overcome by the action of the compressed mainspring 40, Figs. 15 and 17. The tensions of these two springs are so adjusted relatively that the pin 47 is forced rearward when the mainspring is compressed sufficiently to cock the firearm—that is to say, to cause the catch 44 of the firing-pin to be engaged by the sear 43 when the indicator becomes visible. The safety device 49 is constructed as an eccentric which can bear at 50 on the trigger or release the same.

Fig. 18 shows the lateral arrangement of the detent 32, the bolt-catch 42, and the sear 43. Of course the bolt 4 is suitably slotted, as shown at 4^b, on account of the catch 44 of the firing-pin.

The method of operation of the shoulder-firearm is the same as that of the hand-arm. At the moment of firing, the barrel 1, the barrel extension 2, and the whole breech mechanism are driven back by the recoil, whereby the barrel-spring 11, the closing-spring 10, and the mainspring 40 are compressed. The bolt-catch 42 thereby comes into engagement with a notch (identical with the notch 4^a in Fig. 1) in the bolt 4 and fixes the bolt, and consequently the whole breech mechanism, in its rearward position, Fig. 17. The firing-pin is stopped by the sear 43, which has come into engagement with the catch 44. The forward motion of the barrel and the opening of the breech effected thereby, as also the ejection of the cartridge-case and the charging and closing of the breech after the release of the bolt-catch 42 by the sloping edge 2^a of the barrel extension, are effected in exactly the same manner as with the hand-firearm described above in detail.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In automatic guns a recoil-barrel a breech-bolt and a magazine provided with a feed-plate in combination with a detent device for the breech-bolt adapted to be released by the advance of the breech-bolt and a detent-lever, as 35, connected with the feed-plate and adapted to bear against a projection on the detent to lock it against release when the magazine has been emptied and the feed-plate has reached the upper part of the same.

2. In automatic guns a recoil-barrel a breech-bolt and a magazine provided with a feed-plate in combination with a detent device for the breech-bolt adapted to be released by the advance of the breech-bolt the feed-plate being so arranged as to bear against the detent and lock it against release when said feed-plate has reached the upper part of the magazine.

3. In automatic guns a recoil-barrel, and a magazine provided with a feed-plate, in combination with a sliding breech-bolt, a tumbler, and a detent, shoulders on the breech-bolt adapted to be engaged by the tumbler and detent, means for releasing the tumbler when the barrel reaches the firing position, an inclined face for releasing the detent as the bolt advances, and means operated by the feed-plate for locking the detent against release when the feed-plate of the magazine reaches a predetermined position.

4. In automatic guns, a recoil-barrel, a magazine provided with a feed-plate, in combination with a sliding bolt, a tumbler, and a detent, notches on the breech-bolt to be engaged by the tumbler and the detent, a sloping edge on the breech-chamber adapted to release the tumbler when the barrel reaches the firing position, a sloping edge on the breech-bolt adapted to release the detent when the breech-bolt advances, and a detent-lever connected with the feed-plate and adapted to engage a projection on the detent to lock it against release when the magazine has been emptied and the feed-plate has reached the upper part of the same.

5. In automatic guns, a recoil-barrel, and a magazine provided with a feed-plate, in combination with a sliding breech-bolt, a tumbler, and a detent, notches on the breech-bolt adapted to be engaged by the tumbler and the detent, a sloping edge on the breech-chamber adapted to release the tumbler when the barrel reaches the firing position, a sloping edge on the breech-bolt adapted to release the detent when the breech-bolt advances, and means controlled by the feed-plate and so arranged as to bear against the detent and lock it against release when said feed-plate has reached the upper part of the magazine.

6. In automatic guns a recoil-barrel and a spring for thrusting it forward, in combination with a barrel-nut and a barrel-sleeve for retaining the spring mounted on the barrel, interlocking means connecting the barrel-nut and the barrel-sleeve and means for securing the barrel-sleeve in position on the barrel, the barrel-sleeve being so arranged that to release the same it is necessary to turn in a direction opposite to the direction to unscrew the barrel-nut.

7. In a gun, a recoil-barrel, and a spring for thrusting it forward; in combination with a barrel-sleeve for retaining the spring and mounted on the barrel, and means for securing the same in position consisting of a bayonet-joint providing for longitudinal movement between the parts in a coupled position, a barrel-nut and interlocking means connecting the barrel-nut and the barrel-sleeve, the means for releasing the barrel-nut from the barrel operating in a direction opposite to the means for releasing the barrel-sleeve.

8. In a gun a recoil-barrel, and a spring for

thrusting it forward, in combination with a barrel-sleeve bayonet-jointed to the barrel in such manner as to provide for a limited relative longitudinal movement of the parts in their coupled position and a barrel-nut threaded on the end of the barrel and connected with the barrel-sleeve by a clutch-coupling, the bayonet-joint on the sleeve and the thread on the barrel-nut being so arranged as to turn in opposite directions on being released.

9. In automatic guns, a magazine feed-plate having a laterally-extending shoulder, in combination with a detent for locking the breech-bolt in its open position, a detent-lever pivoted to one side of the path of the feed-plate, a shoulder on the lever arranged to be engaged by the shoulder of the feed-plate in the upward movement of the latter, and a tooth projecting from the lever arranged to clear the feed-plate shoulder in its upward movement and to be engaged thereby in its downward movement whereby a depression of the

feed-plate will operate to positively depress the detent-lever.

10. In an automatic gun, a cock, a sear for the same, and a detent for the breech-bolt, in combination with a safety-piece mounted for movement into and out of engagement with the cock, sear and detent.

11. In a gun, an indicator engaging a slot in the same and a spring for retracting the same into the firearm, in combination with a firing-pin and a spring arranged between the firing-pin and the indicator, the two springs being of such relative strength that in compressing the latter by retracting the firing-pin, the indicator is thrust out of the firearm.

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

RUDOLF FROMMER.

Witnesses:

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SCHÖN FÜRÖSZ.