Feb. 3. 1925. 1,525,066

J. M. BROWNING

AUTOMATIC FIREARM

Filed April 11, 1924 4 Sheets-Sheet 1

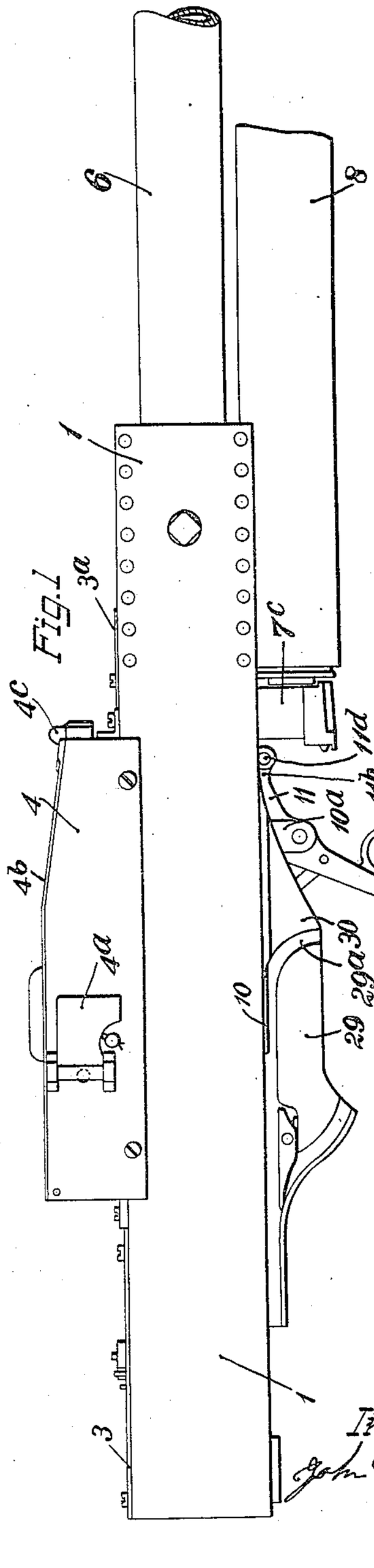

Fig. 1

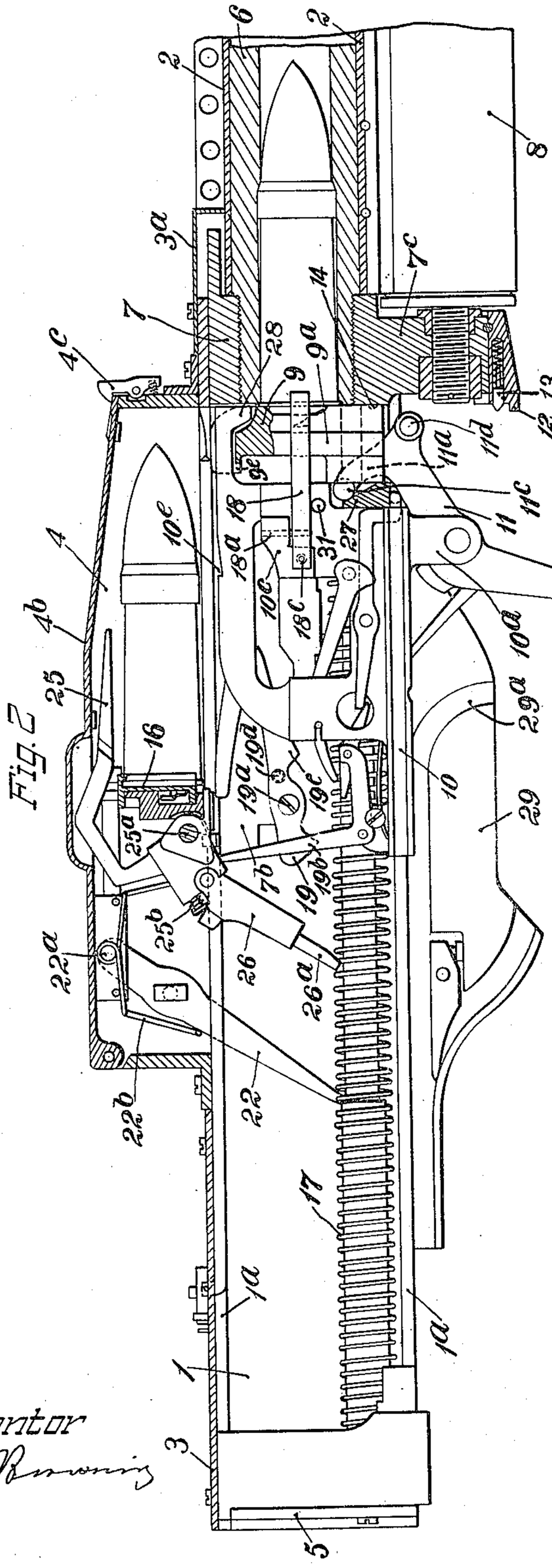

Fig. 2

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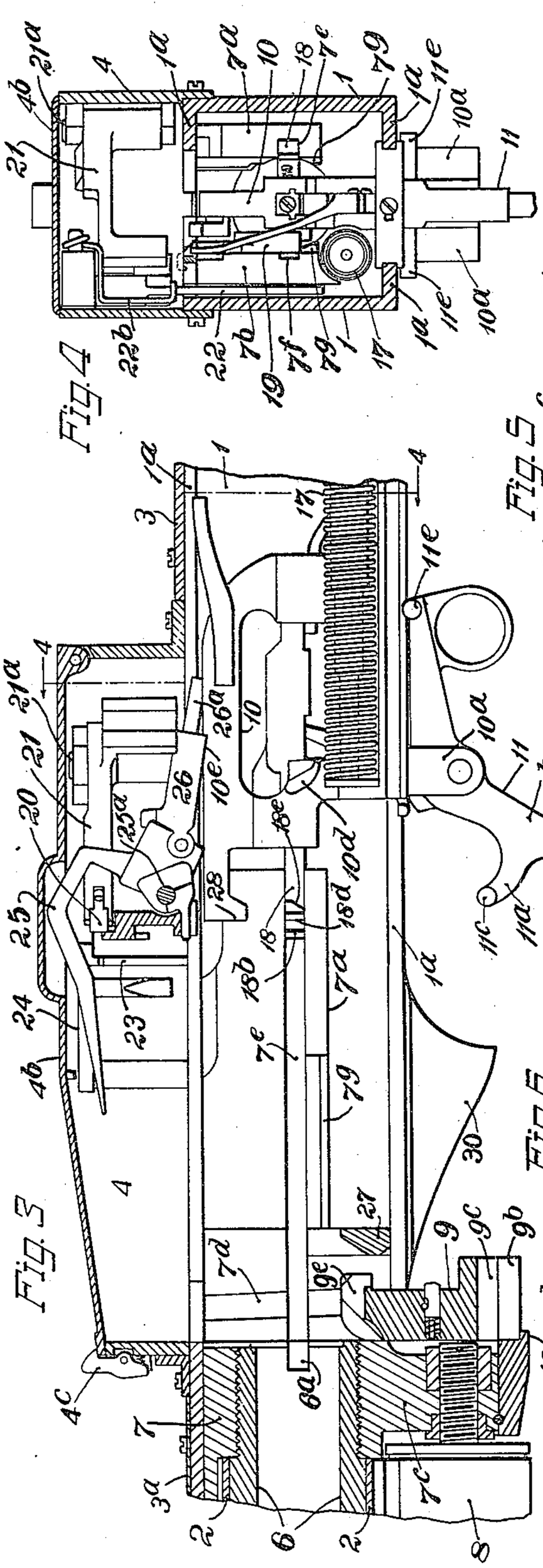

Fig. 4

Fig. 5

Fig. 3

Fig. 6

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Fig. 7

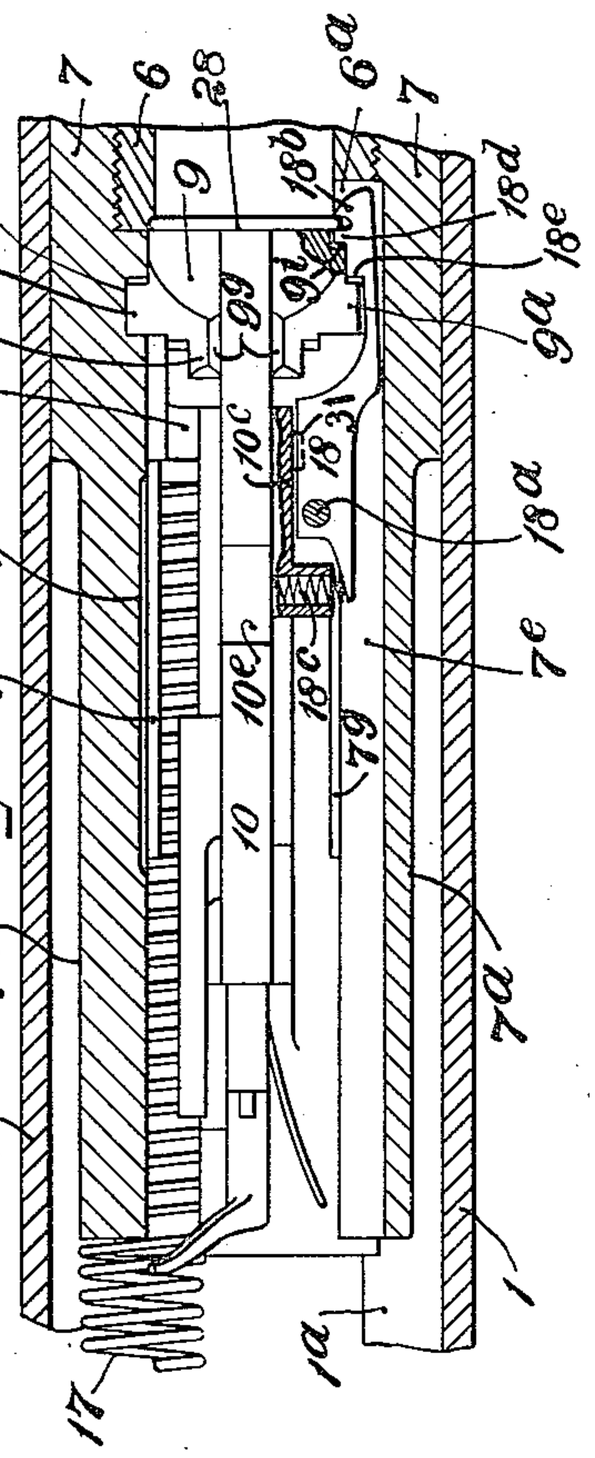

Fig. 8

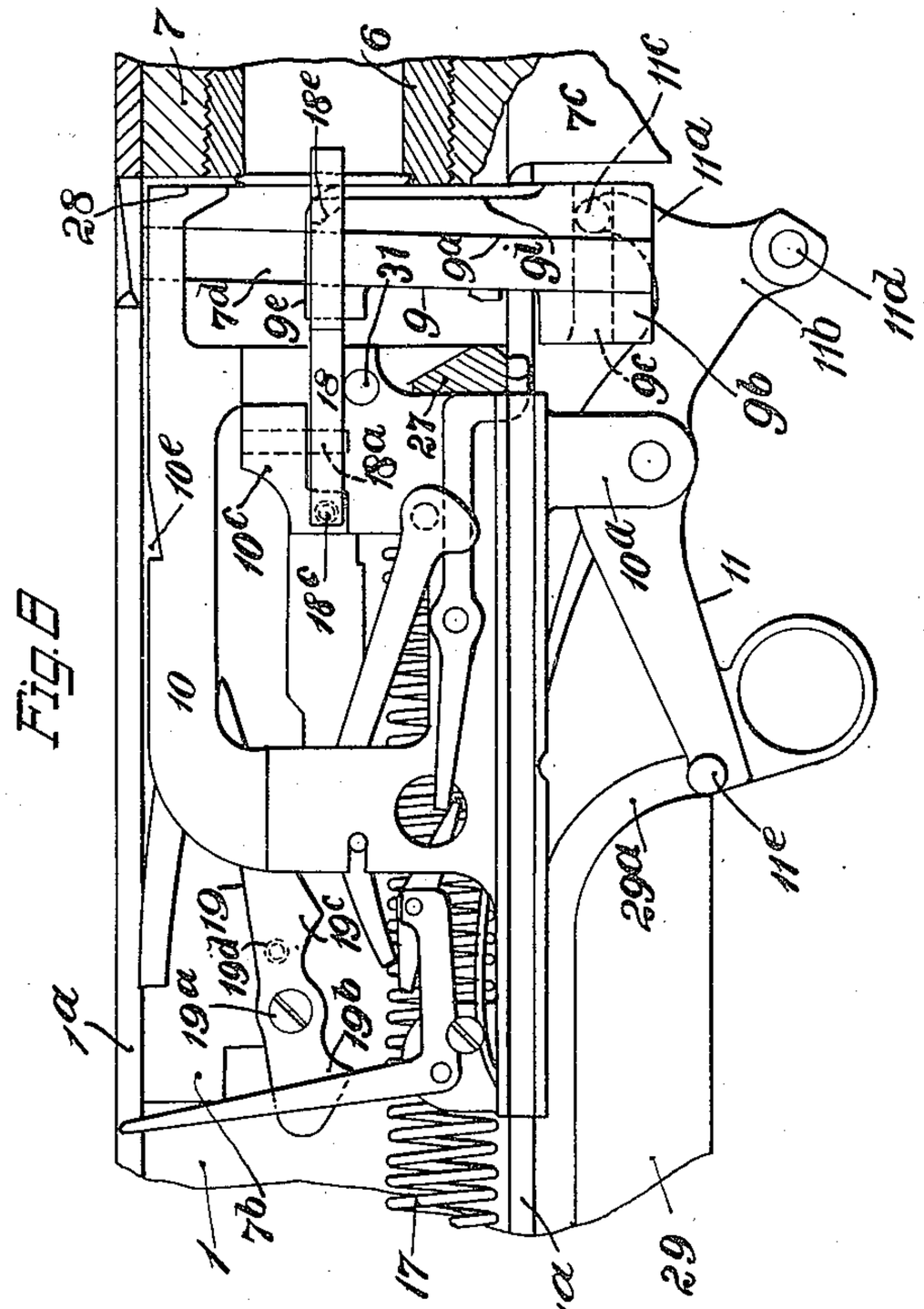

Fig. 9

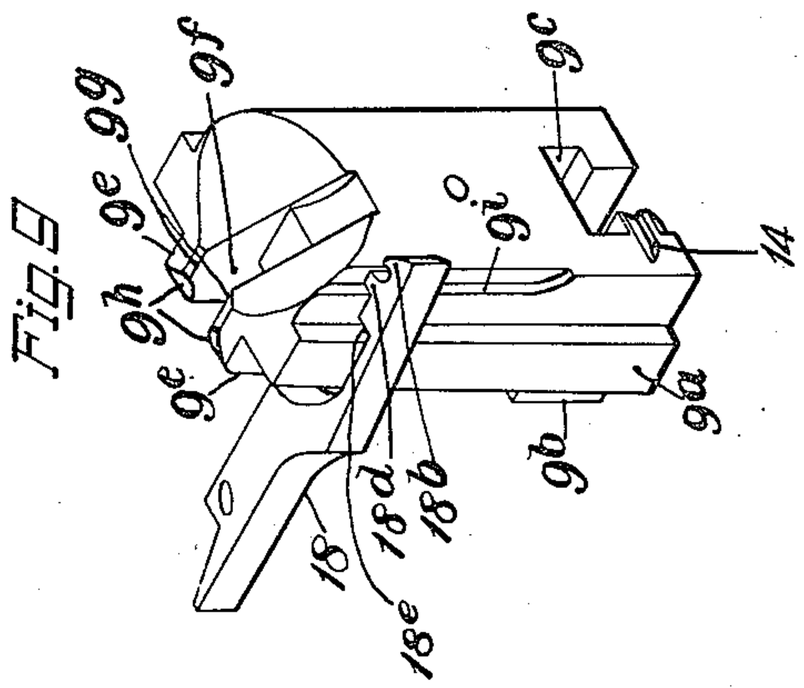

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Fig. 13

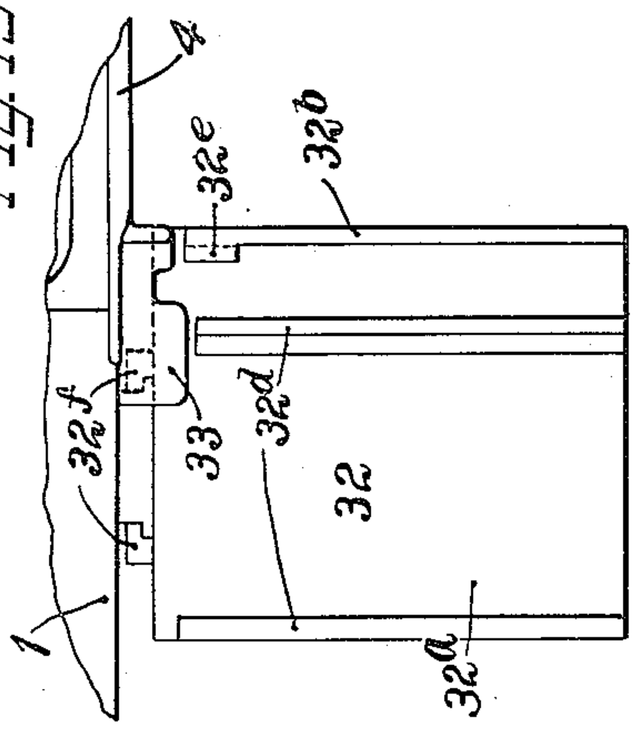


Fig. 12

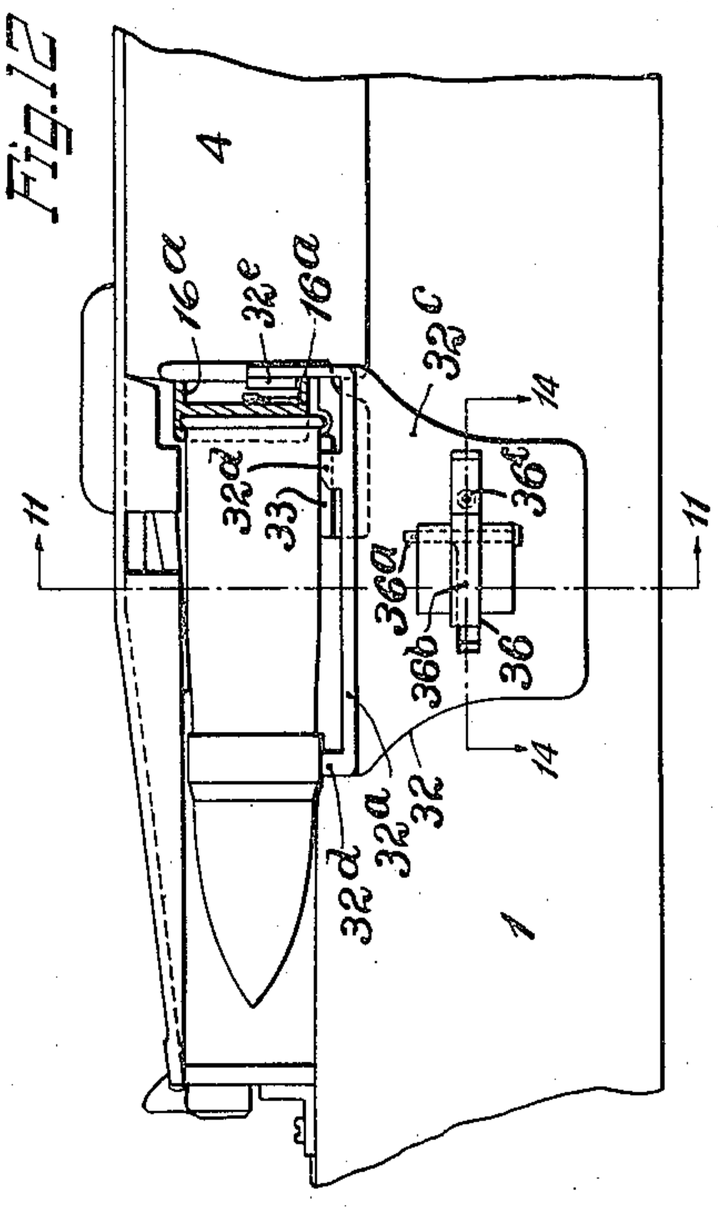


Fig. 10

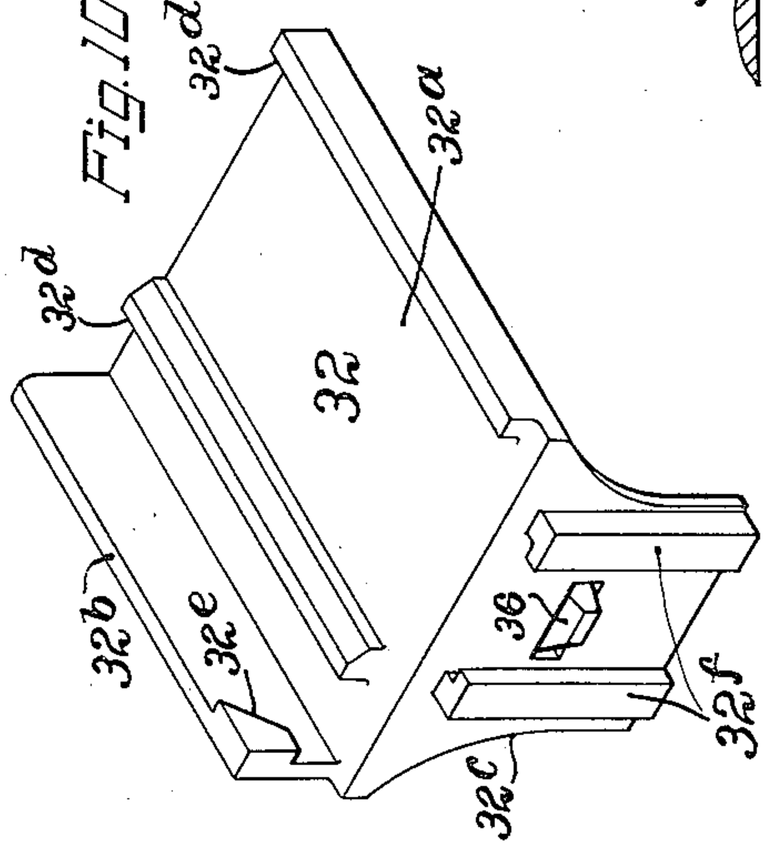


Fig. 14

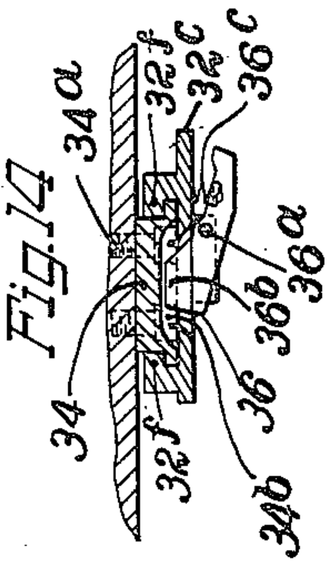
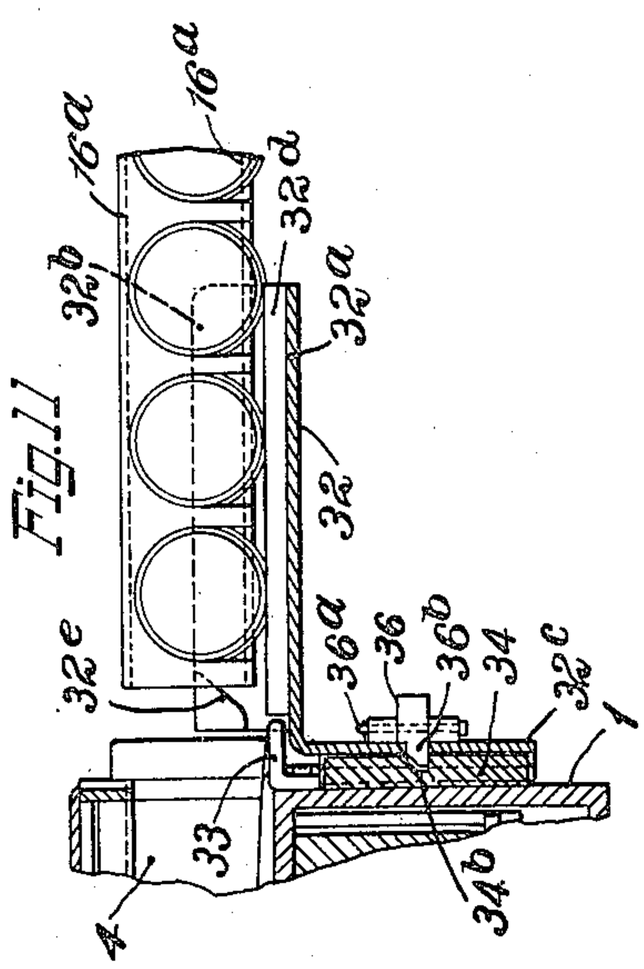


Fig. 11



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Patented Feb. 3, 1925. 1,525,066

UNITED STATES PATENT OFFICE.

JOHN M. BROWNING, OF OGDEN, UTAH.

AUTOMATIC FIREARM.

Application filed April 11, 1924. Serial No. 705,895.

To all whom it may concern:

Be it known that I, JOHN M. BROWNING, a citizen of the United States, residing in Ogden, in the county of Weber and State of Utah, have invented certain new and useful Improvements in Automatic Firearms, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

The invention relates to automatic firearms and more particularly to automatic firearms of the recoil-operated type in which all the operations of the mechanism, except that of the trigger, are automatically effected.

In my prior application for Letters Patent of the United States, Serial No. 680,963, filed December 15, 1923, for automatic firearms, there is shown and described an improved automatic gun of this character adapted to fire large caliber projectiles such as can be loaded with a high explosive charge, but so light in weight as to be mobile, adapted to be mounted on aircraft and fired from any position, and yet most durable.

It is an object of the present invention to improve certain features of the automatic gun disclosed in said prior application and guns of similar character whereby said guns are rendered still more efficient and reliable in operation, simple in construction, and easier of manufacture. The improved features by which this object is attained comprise novel means for pushing the cartridges into the chamber of the barrel and for supporting and guiding said cartridges before and during such movement, novel means for extracting the empty shell and for steadying and guiding it during extraction, novel means for locking together the transversely movable breech block and the longitudinally movable lock frame, novel means for readily positioning, supporting and guiding a transversely movable feeder carrying a plurality of cartridges for quick insertion into the transverse feed channel of the gun, and various other details of construction, and combinations and constructions of parts hereinafter more fully described and claimed.

In the accompanying drawings:

Fig. 1 represents a right-hand side elevation of a gun in which the novel, improved features of the invention are embodied.

Fig. 2 represents a central, vertical, longitudinal section through the gun as seen from the right and on an enlarged scale; the barrel and barrel extension and the upper portion of the breech block are shown in section, while the lock frame and parts carried thereby are shown in elevation. The front portion of the breech casing, and the greater portions of the barrel and of the recuperator have been broken away.

Fig. 3 represents a partial central vertical longitudinal section through the gun as seen from the left, the breech block being shown in its open position and the lock frame in its rearward position.

Fig. 4 represents a vertical transverse section through the gun in the line 4—4 of Fig. 3 as seen from the rear; the mechanism within the breech casing is shown in elevation and a portion of the breech block actuating lever is broken away.

Fig. 5 represents a partial central vertical longitudinal section through the gun showing the parts of the mechanism at the instant when the lock frame is released and with a cartridge in position to be pushed into the barrel chamber.

Fig. 6 represents a vertical transverse section through the gun in the line 6—6 of Fig. 5 as seen from the front, the carrier has been omitted and the cartridge about to be inserted into the barrel is shown in elevation.

Fig. 7 represents the gun in a partial horizontal section through the axis of the barrel as seen from above and on an enlarged scale; a portion of the lock frame is broken away to show the mounting of the extractor and the extractor spring. A portion of the breech block is also broken away.

Fig. 8 represents a partial vertical longitudinal section through the gun as seen from the right and on the same scale as Fig. 7, showing the breech block and its actuating lever in an intermediate position during the manual opening of the breech.

Fig. 9 is a perspective view of the breech block and the extractor, detached, showing the cooperative relation between these parts when the breech block is in its raised breech-closing position.

Fig. 10 represents in a perspective view a loading shelf, detached.

Fig. 11 represents a partial vertical transverse section through the gun in the line 11—11 of Fig. 12, showing the loading shelf in assembled position and a loaded cartridge feed plate on said shelf in position to be inserted into the transverse feed channel of the gun; the outer portion of the feed plate is broken away.

Fig. 12 represents a partial left-hand side elevation of the parts shown in Fig. 11.

Fig. 13 represents a plan view of a portion of the gun and of the loading shelf in assembled position thereon.

Fig 14 represents a longitudinal section in the line 14—14 of Fig. 12, showing the means for detachably securing the loading shelf on the gun.

Similar reference numerals refer to similar parts throughout the several views.

The gun represented by the drawings is similar generally to the gun fully disclosed in my prior application, hereinbefore referred to. It comprises the breech casing having side plates 1 provided, except, at their front end portions where they are secured to the trunnion block 2, with inturned flanges 1^a at top and bottom, as shown in Figs. 4 and 6. The top of the casing is closed at the rear by the top plate 3, from the front end of said top plate to a point some distance in rear of the rear end of the trunnion block 2 by the feed box 4 and between the front end of the feed box and the trunnion block by the small plate 3^a.

The feed box 4 contains members of the cartridge feeding mechanism and is provided with a transverse channel into which the cartridges and the feed plate carrying the same may be fed from left to right. When the gun is not in use this channel is closed by outwardly swinging doors, one of which 4^a is shown in Fig. 1, the other one being omitted in the drawings. To permit access to the parts of the mechanism, the feed box 4 is provided with a hinged top cover 4^b, normally held in closed position by a latch 4^c, see Fig. 2.

At the rear the casing is closed by the vertically slidable rear plate 5 which is held in place by suitable means, not shown. The bottom of the casing in the space between the lower inturned flanges 1^a of the side plates is left open for the ejection of the cartridge cases and for other purposes as will hereinafter appear.

The barrel 6 and barrel extension 7, which are firmly secured together, as by screw threads, are supported and guided for longitudinal reciprocation in the trunnion block 2 and by the inside walls of the side plates 1 of the breech casing. In rear of the breech end of the barrel 6, the barrel extension comprises the laterally spaced arms 7^a and 7^b, which are also each spaced from the side plates 1 of the casing and the bottom flanges 1^a of the side plates 1 for the greater portion of their length, as shown in Figs. 4 and 6, to minimize friction and to accommodate certain members of the mechanism.

To check the recoil of the barrel and barrel extension and to return them to their forward firing position after recoil, a recuperator 8 of a usual construction is provided, the same being securely attached to the under side of the trunnion block 2 and having the rear end of its piston rod removably secured in a downwardly projecting lug 7^c of the barrel extension by suitable means, such as that clearly shown in Figs. 2, 3 and 5 and fully described in my prior application, hereinbefore referred to.

The breech block 9, as in said prior application, is arranged to slide transversely between the arms 7^a and 7^b of the barrel extension, being formed for this purpose with ribs 9^a fitting corresponding grooves 7^d in the arms of the barrel extension, see Fig. 7. The breech block 9 is provided at its lower portion with a rearward projection 9^b, see Figs. 3, 5, 8 and 9, and in the thus longitudinally widened lower portion of the breech block the T-shaped slot 9^c, forming a part of the means for raising and lowering the breech block to close and open the breech of the barrel, is provided.

Mounted for longitudinal reciprocation in the breech casing in rear of the barrel, is the lock frame 10 guided, as clearly shown in Fig. 4, by the engagement of the inwardly projecting flanges 1^a of the side plates in corresponding longitudinal grooves provided in the lower widened portion of said lock frame. As shown in Fig. 4, the upper portion of the lock frame takes its position and reciprocates between the arms 7^a and 7^b of the barrel extension.

Pivotally mounted between the downwardly projecting lugs 10^a of the lock frame is the breech block actuating lever 11, having its forward arm ending in two diverging branches 11^a and 11^b, the upper arm 11^a having short lateral studs 11^c adapted to enter the wide portion of the T-shaped slot 9^c in the breech block and the lower branch having long lateral studs 11^d adapted to cooperate with cam surfaces formed on cam plates 29, see Figs. 1 and 2, and 30, see Figs. 3 and 5, secured, respectively, to the bottoms of the left-hand and right-hand side-plates 1 of the breech casing. The rear arm of the lever 11 is also provided with long lateral studs 11^e adapted to cooperate with cam surfaces on the cam plates 29 and 30. The manner in which the breech block 9, breech block actuating lever 11 and the cam surfaces on the cam plates 29 and 30 cooperate to move the breech block from the closed position, shown

in Fig. 2, to the open position shown in Figs. 3 and 5, during the recoil and subsequent return forward of the barrel and barrel extension and the lock frame, has been fully disclosed in the prior application hereinbefore referred to, and will not be further described herein.

After recoil, the lock frame 10 is kept in a rearward position, as shown in Fig. 3, by means to be hereinafter described, said means being also disclosed in my prior application above referred to, while the barrel 6 and barrel extension 7 are returned to their forward firing position by the recuperator spring. In this separating movement of the barrel and barrel extension from the lock frame, the breech block and breech block actuating lever are disconnected, see Figs. 3 and 5, and, while so disconnected, the breech block is frictionally but firmly kept in its lowest position, where it rests against the stop 12 carried by the lug 7^c of the barrel extension, by the cooperation of the spring-pressed plunger 13 with the corresponding notch 14, Fig. 9, in the front face of the breech block in a manner fully described in my prior application hereinbefore referred to.

On the return of the barrel, barrel extension and breech block to forward position, if any cartridges remain in the feed plate 16, the lock frame will be automatically released, and under the tension of the reaction springs 17 will be returned forward, pushing a fresh cartridge into the barrel chamber, and finally raising the breech block 9 to the breech closing position, as shown in Fig. 2.

On such return of the barrel and barrel extension after firing a shot, the empty shell is extracted from the barrel, and the present invention provides novel improved means for extracting and guiding said shell during extraction until it is finally forcibly ejected downward through the opening between the bottom flanges 1^a of the side plates. As is most clearly shown in Figs. 2, 7 and 8, the extractor 18 is pivoted on a vertical pin 18^a fitting a hole in a laterally extending boss 10^c near the forward end of the right-hand side of the lock frame 10.

The extractor is of a strong, rugged construction and is arranged to swing in a horizontal plane passing substantially through the axis of the barrel. A portion of said extractor is positioned, in the relative reciprocation of the barrel and barrel extension and the lock frame, in a longitudinal groove 7^e, see Figs. 3, 4, 6 and 7, provided in the inside face of the right-hand arm 7^a of the barrel extension. The extractor has a strong hook 18^b at its forward end adapted to engage in front of the rim of a cartridge case, as shown most clearly in Fig. 7. The forward face of the hook 18^b has the usual forward and outward incline to permit it to ride over the rim of the cartridge head, if the same is in front of the extractor in the forward movement of the lock frame. The rear end of the barrel is recessed at 6^a to receive the forward hooked end of the extractor when the parts are in the forward firing position, see Fig. 7. The extractor has a short rear arm, against the rear end of which a strong coiled spring 18^c seated in the boss 10^c of the lock frame acts to swing said lever on its pivot to move the long hooked forward arm of the extractor inwardly so as to firmly engage the cartridge head.

In the separation of the lock frame and barrel, with the breech block in the open position, the empty cartridge case is withdrawn from the barrel chamber by the extractor 18. Means have been provided for guiding the head of the cartridge case to insure that the same, after it has been withdrawn some distance from the barrel, will resist any tendency the shell head may have to roll upwardly between the arms of the barrel extension which might cause the rim of the cartridge head to move from engagement with the extractor hook and thus result in imperfect extraction. Such means may comprise, as shown in Figs. 4, 6 and 7, a wide shallow groove 7^f in the inner face of the left-hand arm 7^b of the barrel extension into which groove the head of the shell being extracted is pressed by the tension of the extractor spring 18^c acting through the extractor, thereby yieldingly resisting any rolling tendency and insuring the full extraction of the cartridge case. The cartridge case is further guided during extraction by the inwardly extending guiding ledges 7^g provided on the inside bottom portion of the barrel extension arms, see Figs. 3 and 6. As shown in Fig. 3, said ledges extend retarwardly only a distance sufficient to insure that the cartridge case is fully extracted before the case is left unsupported by said ledges, when it can fall downwardly or be forcibly ejected from the gun in the manner fully described in my prior application hereinbefore referred to. Suffice it to state here that when the empty cartridge case has been brought under the forward arm of the two-armed ejector lever 19 pivotally mounted at 19^a on the left-hand arm 7^b of the barrel extension 7, see Fig. 2, the said arm is swung downwardly to strike the top of said cartridge case and thereby forcibly eject the same. The ejector lever 19 is so swung because of the engagement of a downward projection 19^b on its rear arm with a lateral stud 10^d, see Figs. 3 and 5, on the lock frame. When the lock frame moves forward to insert a cartridge into the barrel chamber, the said ejector lever is again swung on its pivot to bring its forward arm to its raised position because of the engage-

ment of the stud 10^d on the lock frame with a second downward projection 19^c on the ejector lever forward of its pivot. The ejector lever 19 is yieldingly held in all positions by means of a spring indicated at 19^d, Figs. 2 and 5, in a manner fully described in my said prior application.

In addition to its normal function just described, the extractor 18 has several other important functions which will presently be described.

During the last of the forward movement of the barrel and barrel extension, said members operate the mechanism for moving the feed plate 16 carrying the cartridges one step forward that is, from left to right, through the gun so as to bring a cartridge in such plate centrally over the casing, where it is automatically released from the feed plate, and moved downward between the arms of the barrel extension to the position shown in Figs. 5 and 6. The mechanism for performing these operations is that fully disclosed in my prior application above referred to and will consequently be only briefly described herein.

The mechanism for moving the feed plate transversely with a step-by-step movement comprises a feed pawl 20 adapted to cooperate with a series of equally spaced notches, not shown, on the feed plate. Said pawl is carried by a feed pawl lever 21 pivoted on a vertical pivot pin 21^a at the right hand side of the feed box 4, see Fig. 4, and the lever 21 is actuated by a feed lever 22 pivoted on a horizontal pivot pin 22^a at the left-hand side of the feed box. This feed lever 22 extends downwardly into the space between the left-hand arm 7^b of the barrel extension and the left-hand side plate 1 of the breech casing and into the path of a stud 7^h on said arm of the barrel extension. A spring 22^b returns the feed lever to a position intermediate the limits of movement to which it is swung by the stud 7^h on the barrel extension, which stud passes beyond the end of the lever in both directions of movement of said barrel extension. In this manner the movements of the barrel extension produce, through the feed lever 22, feed pawl lever 21 and feed pawl 20, the automatic step by step movement of the feed plate 16.

As the cartridge nears the central position, it is automatically released from the feed plate by suitable means, not shown herein, and started downward by the fixed cam 23, see Fig. 6. In this downward movement, the cartridge engages and operates a spring pressed latch 24, see Fig. 3, which normally locks the long bent forward arm of the carrier 25, pivoted at 25^a in the feed box 4, in raised position against the action of the spring 25^b seated in the short rear arm of the carrier 25. When the lock frame is held rearward, as shown in Fig. 3, the forward carrier arm is raised, and the spring 25^b is compressed between said short arm and an upwardly extending lug on a dog 26 pivoted to the lower portion of said short arm of the carrier and having its rear end cooperating with a notch 10^e in the upper surface of the lock frame to keep the same rearward.

When the latch 24 is operated by the downwardly moving cartridge to release the carrier 25, the spring 25^b expands and swings the forward arm of the carrier downward, thereby positively lowering the cartridge to the position shown in Fig. 5. At the same time, by the engagement of a tail 26^a, extending rearward from the dog 26, with the top of the lock frame the dog is swung out of the notch 10^e, thereby releasing the lock frame for forward movement under the tension of the reaction spring 17, see Fig. 5.

The invention comprises as one of its features novel means for supporting and guiding a cartridge while being inserted into the barrel chamber, and also novel means for injecting it into said chamber, which will now be described.

Some distance in rear of the breach end of the barrel so as to leave sufficient space for the operation of the breech block 9 and its actuating lever 11, a transverse tie member 27 connects the lower portions of the arms 7^a and 7^b of the barrel extension. The top of this tie member has a semi-circular depression to accommodate the cylindrical cartridge case and its central portion, see Figs. 3 and 5, is slightly below the level of the bore of the barrel and thus supports the forward end of the cartridge in position for insertion into the barrel, see Fig. 5. The rear end of the cartridge is at the same time supported between the top of the ejector lever 19 and the side of the barrel extension arm 7^a.

To cooperate with the tie member 27 in properly guiding and supporting the forward end of the cartridge during its insertion into the barrel, the breech block is provided with the rearward projections 9^e on opposite sides of a central slot 9^f in its top. These projections 9^e serve together with the top of the breech block and the top of the tie member 27 to form a substantially continuous guiding and supporting surface from the rear face of said tie member to the breech of the barrel, whereby the forward end of the cartridge is guided into the barrel chamber. As best shown in Fig. 9, the portions of the top of the breech block 9 and of the rearward projections 9^e adjacent the central slot 9^f are chamfered as at 9^g, and at the rear, the projections 9^e are correspondingly chamfered as at 9^h, thereby eliminating the possi-

bility of any part of the cartridge catching on a sharp corner while being inserted into the barrel. By the time the nose of the cartridge has been inserted some distance into the barrel chamber, the rear end will have left the ejector and the cartridge will have assumed a substantially horizontal position with its rear end now resting on the inwardly projecting ledges 7^g on the barrel extension arms. The tie member 27 also serves to strongly brace the spaced rearwardly extending arms 7^a and 7^b of the barrel extensions. It will be noted that the upper portion and, to a slight extent, the lower portion of the forward wall of said member, are cut away so as not to interfere with the full upward movement of the forward arm of the breech block actuating lever, see Figs. 2, 3 and 5.

The cartridge is pushed into the chamber of the barrel from the position shown in Fig. 5 by the combined action of a forward extension or charger 28 on the lock frame and the shell extractor 18. For this purpose, the charger 28 has a downward projection at its forward end which engages the head of the cartridge to start its forward movement. The extractor has, for this purpose, an inward projection 18^d a short distance in rear of its hook 18^b, and the forward face of this projection is in substantially the same vertical plane as the forward face of the charger 28, so that as the cartridge is moved forward by the charger, the rim of its head moves into the space between said inward projection 18^d and the rear face of the hook 18^b until, when the cartridge rim is firmly seated in said space and the cartridge nears the horizontal position, the head of the cartridge falls below the downward projection on the charger and the cartridge is pushed home by the extractor alone in the forward movement of the lock frame.

In its final forward movement, the lock frame is slowed down and buffeted by the action of the breech block, the breech block actuating lever, and the cam surfaces cooperating with said lever as fully disclosed in my prior application hereinbefore referred to. If the cartridge were not securely held by the extractor, its momentum would carry it forward more rapidly than the lock frame and throw it into the barrel chamber with great force, which might start the projectile from the case or cause a premature explosion of the charge in cartridges of a highly sensitive character.

The arrangement of the extractor 18 at the side of the lock frame with its hooked end pressing against the loaded cartridge head or the empty cartridge case head, as the case may be, combined with the guiding groove 7^f in the inner face of the left-hand side wall, in which that part of the cartridge case head opposite the part engaged by said extractor is held by the tension of the extractor spring, has the further advantage of making it possible, under certain conditions, to dispense with the inwardly projecting guiding ledges 7^g on the arms of the barrel extension, a cartridge case head being then solely supported against upward or downward movement between the arms of the barrel extension during a portion of the inserting movement of a cartridge and during a portion of the withdrawing movement of an empty cartridge case by the cooperation of the spring-actuated extractor and the said guide groove. The extractor spring must of course be powerful enough, in such case, to keep that portion of the head of a loaded cartridge opposite the extractor in the guiding groove against the action of gravity.

Another important function performed by the extractor 18 is that of serving to lock the lock frame and breech block together when these parts are in the firing position to permit the manual opening of the breech and the retraction of the lock frame by a continuous rearward pull on the finger piece on the rear arm of the actuating lever 11. To this end, the rear face of the inward projection 18^d of the extractor is adapted when the parts are in the position shown in Figs. 2, 7 and 9, to co-operate with a corresponding vertically extending shoulder 9^i on the breech block 9 to lock these parts against relative longitudinal movement. Some distance in rear of said shoulder the extractor is considerably thinner laterally, to accommodate the right-hand rib 9^a on the breech block when the same is in raised position. A shoulder 18^e is thus formed on the extractor which is spaced as shown in Figs. 7, 8 and 9, a slight distance from the front face of the rib 9^a on the breech block.

It is evident that, as an alternative construction, the shoulder 18^e might be made to co-operate with the forward face of the rib 9^a to lock the breech block and lock frame against relative longitudinal movement while the rear face of the inward projection 18^d of the extractor could be spaced from the vertically extending shoulder 9^i on the breech block.

In the construction shown, the shoulder 18^e inclines forwardly and downwardly at its lower portion, see Fig. 8, to provide clearance for the upper end of rib 9^a on the breech block in the initial longitudinal separating movement of the breech block and lock frame during the manual operation now to be described.

In the manual operation of the actuating lever 11 to open the breech and move the lock frame to its rearward position, the barrel and barrel extension being kept in

forward position by the powerful recuperator spring, not shown, the rearward pull on the finger piece of the actuating lever, causes the breech block to be lowered because of the engagement of the lateral studs 11^c on the forward arm of said lever in the wide portion of the T-shaped slot 9^c in said breech block in the manner described in my prior application hereinbefore referred to.

The lock frame is prevented from moving rearwardly by the engagement of the rear face of the inward projection 18^d thereon with the shoulder 9^i on the breech block until the parts reach substantially the position shown in Fig. 8, where these surfaces are represented as about to pass out of engagement with each other. In this position of the parts, the left-hand lateral stud 11^e on the rear arm of the actuating lever has entered the cam groove 29^a in the left-hand cam plate 29. On continued pull on the finger piece the stud 11^e passes rearwardly and upwardly, being guided by the cam groove 29^a, thereby moving the lock frame rearwardly and swinging the lever 11 about its pivot to fully lower the breech block.

On the return forward of the lock frame and the extractor carried thereby, just before the breech block has been raised to the position shown in Fig. 8, the lock frame and extractor will have reached their full forward position, so that on the further swinging of the lever 11 to raise the breech block to its upper breech closing position, the vertically extending shoulder 9^i of the breech block again engages with the rear face of the inward projection 18^d of the extractor, thereby once more locking the breech block and lock frame against relative longitudinal movement. In the upper breech closing position of the breech block, the charger 28 is seated in the central slot 9^f in the top of the breech block.

The extractor 18 may be readily disassembled from the lock frame when said frame has been rearwardly withdrawn from the breech casing, after the removal of the rear plate. To disassemble it, the long forward arm of the extractor is swung outwardly a distance sufficient to clear a short stud 31 projecting from the side of the lock frame near the end of the same and normally adapted, by its engagement with the under side of the extractor, to keep the same from downward movement on its pivot pin 18^a, which is fixed at its upper end in the boss 10^c of the lock frame. After the extractor has been so swung outwardly it may be slipped downwardly off its pivot pin 18^a. This also frees the extractor spring 18^c for removal. To reassemble the extractor, the operations are reversed.

The firing mechanism of this improved gun is substantially similar to that fully disclosed in my prior application above referred to and, since said mechanism forms no part of the present invention, no description thereof in this application is necessary.

Another feature of the invention comprises novel improved means for quickly locating a loaded cartridge feed plate 16, which for use in large caliber guns of this class preferably contains five cartridges, in alignment with the transverse feed channel in the feed box 4, whereby said feed plate with the cartridges therein can be pushed with the least possible delay into the feed channel of the gun and thus the firing continued automatically without interruption even though the cartridges in one feed plate are rapidly exhausted. Where the fire is directed against rapidly moving objects, such as airplanes, this uninterrupted automatic fire is highly desirable so that the greatest possible number of shots may be directed at the object in the short time during which it remains within range.

As shown in Figs. 10 to 14, inclusive, such means comprises a loading shelf 32 adapted to be detachably secured to the left-hand side plate 1 of the breech casing. Said shelf has a horizontal portion 32^a, which is of substantially rectangular form, with its longest side at right angles to the axis of the gun, a vertical portion 32^b extending upwardly at the rear of said horizontal portion, and a downwardly extending vertical portion 32^c for attaching the shelf to the gun.

When the shelf is in assembled position, the top of the horizontal portion 32^a is somewhat below the level of the top of the left-hand side plate 1 and of the small ledge 33 forming a lateral extension of the top of said plate, all as clearly shown in Figs. 11 and 12. To bring the lower surfaces of the cartridges in a loaded feed plate resting on the loading shelf substantially to the level of the top of the side plate so that they may enter smoothly and easily into the feed channel, the top of the horizontal portion of the shelf is provided at the front and some distance forward of its rear, with two upwardly projecting guiding and supporting ribs 32^d. See Figs. 10, 11, 12 and 13. An important advantage in having the feed plate and cartridges so supported by the projecting ribs 32^d on the loading shelf instead of by the flat surface of a shelf raised to the level of the transverse feed channel consists in greatly diminishing the possibility of dust, dirt or snow, which might collect on the loading shelf, being pushed with the loaded feed plate into the breech casing of the gun. The rear guide rib 32^d has the top of its forward face inclined to aid in guiding a loaded plate placed on the shelf from the front.

The vertical rear portion 32^b of the shelf facilitates the placing of a loaded feed plate

16 in a position transversely aligned with the feed channel and in maintaining such alignment while pushing said loaded plate into the feed channel of the gun. This is particularly advantageous if the gun is being fired at a high angle of elevation, the weight of the cartridges and plate keeping the feed plate resting against said rear portion 32[b] which then forms with the portion 32[a] a tray-like supporting and guiding member.

The feed plate 16 shown is that fully described in my prior application hereinbefore referred to, and has rearwardly projecting flanges 16[a] at top and bottom, see Fig. 12. The invention further comprises means co-operating with the bottom flange 16[a] in guiding the feed plate vertically into the gun. Such means may comprise a forwardly projecting lug 32[e] having its outer face inclined inward and downward, whereby, if the inner end of the plate should happen to be tipped up slightly, when pushed transversely into the gun this incline co-operates with said bottom flange of the feed plate to lower said plate and thereby align it vertically with the transverse feed channel of the gun.

Since the loading shelf when attached to the gun projects laterally a considerable distance, it is preferable to have it attached to the gun only when the same is in use. In order that it may be quickly detached and with equal speed again attached to the gun when the same is suddenly needed for use in active service, a means for quickly mounting or dismounting the same has been provided. Such means may comprise the vertical plate 34. T-shaped in cross section, see Figs. 13 and 14, secured to the left-hand side plate 1 of the breech casing and over which the correspondingly shaped groove formed by the under cut ribs 32[f] at the rear of the vertical portion 32[c] of the loading shelf are adapted to be slid from the bottom. When mounted on the gun, the loading shelf is held in place by a latch 36 mounted on a vertical pin 36[a] supported by brackets on the outside face of the vertical portion 32[c] of the loading shelf. This latch 36 has an inward projection 36[b] on the forward arm thereof passing through a slot in said vertical portion 32[c] and projecting into a corresponding notch 34[b] in the plate 34, see Fig. 14. To move the latch into its operative position and keep it in said position, a spring 36[c] is provided, said spring resting at its outer end in a seat in the rear arm of the latch and at its inner end, against the plate 34. When sliding the loading shelf vertically into its operative position, the inward projection 36[b] on the latch is automatically moved outward by the engagement of its upper inclined surface with a corresponding surface at the bottom of the plate 34, and is kept in such position by said plate until it comes opposite the locking notch in said plate when it is automatically caused to enter said notch by the tension of the spring 36[c].

To remove the loading shelf 32 the rear arm of the latch is manually pressed inward to withdraw the inward projection 36[b] on its forward arm from its co-operating notch, after which the shelf can be downwardly removed from its engagement with the T-shaped plate 34.

While the invention has been described herein as applied to an automatic gun adapted for firing large caliber projectiles, it is equally applicable to small caliber guns.

What I claim and desire to secure by Letters Patent is:

1. In an automatic firearm, the combination of a barrel, a barrel extension having rearwardly extending spaced arms, means for feeding cartridges to successively move them into the space between said arms and in position to be inserted into the chamber of said barrel, means for supporting a cartridge in said position comprising a member connecting said arms at the rear of the breech of the barrel and means mounted for reciprocation between said arms to engage and push said cartridge into said chamber.

2. In an automatic gun, the combination of a barrel, a barrel extension secured thereto and having spaced rearwardly extending arms, means to feed a cartridge between said arms to position it in substantial alignment with the bore of the barrel, and means for supporting and guiding a cartridge so positioned, said means comprising a member connecting said arms at the rear of the breech of the barrel and a pivoted guiding and supporting lever on one of said barrel extension arms.

3. In an automatic firearm, the combination of a barrel, a barrel extension having rearwardly extending spaced arms, means for feeding cartridges to successively position them between said arms in a downwardly inclined position with the cartridge nose in position to enter the chamber of said barrel, means to support a cartridge in said position comprising a member connecting said arms at the rear of the breech of the barrel and a guiding and supporting member on one of said arms, and means to engage the rear end of said cartridge and push it into said chamber, said guiding and supporting member permitting the rear end of said cartridge to drop as said cartridge is moved forwardly.

4. In an automatic gun, the combination of a barrel, a barrel extension secured thereto and having openings in its top and in its bottom, respectively, for the feeding of a cartridge into position for insertion into the barrel chamber and for the ejection of

the empty shell from said barrel extension after its withdrawal from the barrel, means for moving a cartridge so positioned into the barrel chamber, and means for supporting a cartridge in such position and guiding the same in such movement, said means comprising a substantially continuous support for the cartridge extending from the forward end of said ejection opening to the breech of the barrel and a member carried by said barrel extension in rear of said substantially continuous support.

5. In an automatic firearm, the combination of a breech casing having an opening through its top, a barrel and barrel extension, said extension having rearwardly extending spaced arms, means to feed cartridges successively through said opening into a forwardly and downwardly inclined position with the nose of a cartridge in position to enter the barrel chamber, means for moving a cartridge so positioned into the barrel chamber, said means comprising a member connecting said arms at the rear of the breech of the barrel and an ejector lever carried by one of said arms in the rear of said connecting member.

6. In an automatic gun, the combination of a barrel, a barrel extension secured thereto, a transversely movable breech block mounted on said barrel extension and adapted to open and close the breech of the barrel, means for feeding a cartridge into position for insertion into the barrel chamber, a pusher in rear of said barrel for moving a cartridge so positioned into the barrel chamber, and means for supporting a cartridge in said position and for guiding it in such movement, comprising the top surface of said breech block and a member carried by the barrel extension.

7. In an automatic firearm, the combination of a barrel and a barrel extension secured thereto, a transversely movable breech block mounted on said barrel extension, means for feeding a cartridge into position for insertion into the barrel chamber, a pusher in the rear of said barrel for moving a cartridge so positioned into the barrel chamber and means for supporting a cartridge in said position and for guiding it in such movement, said means comprising the top surface of said breech block and a pivoted cartridge ejector lever carried by said barrel extension.

8. In an automatic gun, the combination of a barrel, a barrel extension secured thereto and having an opening in its top and in its bottom, respectively, for the feeding of a cartridge into position for insertion into the barrel chamber and for the ejection of an empty shell after its withdrawal from the barrel, a transversely movable breech block to open and close the breech of the barrel, and means including said breech block providing a substantially continuous supporting and guiding surface for the forward end of a cartridge when so positioned and during the first part of the forward movement of said cartridge to insert it into the barrel chamber, and a forwardly and downwardly inclined guide for the rear portion of said cartridge during such movement.

9. In an automatic firearm, the combination of a barrel, a barrel extension having lateral arms spaced apart a distance sufficient to permit a cartridge to be fed therebetween to position it in substantial alignment with the bore of the barrel and to permit an empty shell to be ejected downwardly therebetween, a vertically slidable breech block to open and close the breech of the barrel, means for moving a cartridge so positioned into the barrel chamber, and means for supporting and guiding the cartridge in such movement, said means comprising a member connecting the arms of said barrel extension and forming with the top of said vertically slidable breech block a substantially continuous supporting and guiding surface extending for some distance in rear of the breech of the barrel, and a forwardly and downwardly inclined surface on a member carried by an arm of said barrel extension.

10. In an automatic firearm, the combination of a barrel, a barrel extension having laterally spaced arms, a member mounted for longitudinal movement in the space between said arms, means for feeding a cartridge into the space between said arms when said member is in rearward position, and means for supporting and guiding said cartridge in the space between said arms for insertion into the barrel chamber, said means comprising a member connecting said arms some distance rearward of the front ends of the same thereby serving also to brace the said arms.

11. In an automatic gun, the combination of a barrel, a barrel extension, said barrel extension having rearwardly extending spaced arms, a transversely movable breech block to open and close the breech of the barrel, said breech block being mounted between said arms directly in rear of the breech of the barrel, a member in rear of said breech block connecting said arms below the bore of the barrel, and an ejector carried by one of the arms of the barrel extension, said breech block connecting member and ejector together forming means for supporting and guiding a cartridge while the same is being inserted into the barrel chamber.

12. In an automatic firearm, the combination of a barrel, a barrel extension secured thereto and having laterally spaced arms, a longitudinally reciprocating member movable in the space between said arms and

adapted on its forward movement to push a cartridge into the barrel chamber, and means to guide the head of the cartridge in such movement comprising a depression in the inside surface of one of said arms, and means for yieldingly keeping a portion of the head of the cartridge in said depression.

13. In an automatic firearm, the combination of a barrel, a barrel extension having laterally spaced arms in rear of the breech of said barrel, a longitudinally reciprocating member movable in the space between said arms and adapted on its forward movement to push a cartridge into the chamber of the barrel and in its rearward movement to extract the empty shell from the barrel, means for guiding the head of said cartridge or shell in their respective movements comprising a longitudinal depression in the inside face of one of said arms and a spring-actuated extractor carried by said member, said extractor yieldingly keeping a portion of the head of said cartridge or shell seated in said depression.

14. In a firearm, the combination of a barrel, a receiver in which said barrel is secured at the breech, said receiver having an opening at the top and at the bottom, respectively, to permit placing a cartridge therein through the top and the ejection of an empty shell through the bottom, means for pushing a cartridge so placed into the barrel chamber and for withdrawing an empty shell from said chamber and means for guiding the head of a cartridge or shell in such movements, said means comprising a longitudinal groove in a side wall of the receiver and an extractor carried by said member and arranged to yieldingly keep said cartridge or shell partly seated in said groove.

15. In an automatic firearm, the combination of a barrel, a barrel extension having rearwardly extending spaced arms, a longitudinally reciprocating member movable in the space between said arms, means for holding said member rearwardly following discharge while the barrel and barrel extension return to forward position, means for feeding a cartridge between said member and the breech of the barrel while said member is held rearwardly, means carried by said member for engaging the rim of the head of a cartridge thus positioned whereby on the forward movement of said member the cartridge is pushed into the barrel chamber and whereby, when said member is held rearwardly following discharge, the empty shell is extracted from said chamber, said extractor member comprising a lever pivotally mounted on said reciprocating member, a spring engaging the rear arm of said extractor and guiding means on one of the barrel extension arms against which the head of the cartridge is pressed by said extractor lever during the insertion of the cartridge and the extraction of the shell, whereby the head of said cartridge or shell is held from movement transverse to the axis of the firearm.

16. In an automatic firearm, the combination of a barrel, a member mounted for reciprocation at the rear of said barrel, a breech block movable transversely of the axis of the barrel to open and close the breech of the same, means carried by said reciprocating member to move said breech block to open and close said breech, and means to interlock said reciprocating member and breech block when said block is in breech closing position, said interlocking means comprising a shell extractor carried by said member.

17. In an automatic firearm, the combination of a barrel and barrel extension, a breech block slidably mounted on said extension for movement transverse to the axis of said barrel, a member mounted for longitudinal reciprocating movement at the rear of said barrel and adapted to engage and push a cartridge into the barrel chamber in its forward movement, and cooperating elements on said block and said member which come into locking engagement on the breech closing movement of the block to lock together said block and said member, said cooperating elements comprising a shell extractor carried by said member and a shoulder on said breech block.

18. In an automatic firearm, the combination of a barrel, a reciprocating member mounted at the rear of said barrel, a breech block movable transversely of the axis of the barrel to open and close the breech of the same, and means for interlocking said member and breech block when the breech is closed, said means comprising a shell extractor carried by said member and a shoulder on the breech block cooperating therewith.

19. In an automatic firearm, the combination of a barrel, a reciprocating member mounted at the rear of said barrel and carrying a shell extractor, a breech block movable tansversely of the axis of said barrel to open and close the breech of the same, a common means for manually moving said breech block to its open position and said member to a rearward position, and means for interlocking said breech block and said member whereby rearward movement of said member is prevented during the first portion of the opening movement of said breech block, said interlocking means comprising a shoulder on the breech block cooperating with the shell extractor.

20. In an automatic firearm, the combination of a barrel, a breech block movable transversely of the axis of said barrel to open and close the breech of the same, a

member mounted for longitudinal movement and adapted to push a cartridge into the barrel in its forward movement, an extractor carried by said member and having a shoulder thereon, and a shoulder on said breech block cooperating with said shoulder on the extractor to prevent relative longitudinal movement of said member and said block when the parts are in firing position and during the first portion of the opening movement of said breech block.

21. In an automatic firearm, the combination of a barrel and barrel extension, a member mounted for longitudinal reciprocation at the rear of said barrel, means for feeding a cartridge between said member and the barrel when said member is in rearward position, means for supporting said cartridge in a forwardly and inwardly inclined position for insertion into the barrel chamber, and means for inserting said cartridge into the barrel on the forward movement of said member, said inserting means comprising a charger adapted to engage the head of the cartridge to start the inserting movement and an extractor carried by said member and adapted to complete the insertion of the cartridge after the head of the same has moved inward in its forward movement out of the path of said charger.

22. In an automatic firearm, the combination of a barrel, a member mounted for longitudinal reciprocation at the rear of said barrel, an extractor carried by said member and having an inward projection adapted to engage the head of a cartridge, and means for feeding a cartridge between said member and the breech of said barrel when said member is in rearward position, whereby on the forward movement of said member the said inward projection on the extractor engages the head of said cartridge and pushes it into the barrel chamber.

23. In an automatic firearm, the combination of a barrel, a breech block movable transversely of the axis of the barrel to open and close the breech of the same, a longitudinally reciprocating member, and a pivoted extractor carried by said member and adapted to engage the rim of a cartridge to insert said cartridge into the barrel chamber on the forward movement of said member.

24. In an automatic firearm, the combination of a barrel, a member mounted for longitudinal reciprocation in rear of said barrel, means for moving a cartridge into a forwardly and inwardly inclined position ready for insertion into the barrel chamber when said member is in rearward position, inwardly inclined means for supporting said cartridge in such position which permits the head of the cartridge to be moved inward to bring the cartridge axis in substantial alignment with the barrel axis as it is moved forward into said chamber, and means on said member for so moving the cartridge forward, said means comprising a charger for engaging the head of the cartridge during the first of such movement, and an extractor having a groove therein adapted to receive the rim of the cartridge head as the same is moved inward in the forward movement of the cartridge by said charger and to thereby control the movements of the cartridge during the last of the inserting movement.

25. In an automatic firearm, the combination of a barrel and barrel extension, a breech block mounted for transverse movement on said barrel extension to open and close the breech of the barrel, a longitudinally reciprocating member at the rear of said barrel, a pivoted extractor carried by said member, and a groove in said barrel extension for receiving a portion of said extractor in the movements of said member and adapted to guide said extractor in such movements.

26. In an automatic firearm, the combination of a barrel and barrel extension, a breech block mounted for transverse movement on said barrel extension to open and close the breech of the barrel, a longitudinally reciprocating member at the rear of said barrel, a pivoted extractor carried by said member, said extractor being provided with a hook and an inward projection a slight distance in rear of said hook to form therewith a transverse groove, said groove being adapted to receive the head of a cartridge being pushed into the barrel, thereby controlling the movement of said cartridge.

27. In an automatic firearm, the combination of a casing having a transverse feed channel adapted to receive a loaded cartridge feeder and to guide the same in its movements transversely of the gun, and a readily detachable loading shelf at the entrance to said feed channel, said shelf being constructed and arranged to support and guide a loaded feeder while the same is being pushed into said feed channel.

28. In an automatic firearm, the combination of a casing having a transverse feed channel adapted to guide a cartridge feed plate through the gun, and a readily detachable shelf at the side of said casing for positioning a loaded feed plate in alignment with said channel and for guiding the same in its lateral movement into the feed channel.

29. In an automatic firearm, the combination of a casing having a transverse feed channel adapted to receive a loaded cartridge feed plate and guide the same in its movement through the gun, and a loading shelf at the entrance to said feed channel, said shelf having transverse ribs for supporting the feed plate and the cartridges

carried thereby in transverse alignment with said feed channel, whereby extraneous matter collecting on said shelf is prevented from being pushed into said casing with the movement of the loaded feed plate into said feed channel.

30. In an automatic firearm, the combination of a casing having a transverse feed channel having a bottom and a rear wall, a loading shelf adapted to be detachably mounted at the side of said casing for receiving and guiding a loaded cartridge feeder into said feed channel, said shelf having guiding portions in lateral alignment, respectively, with the bottom and the rear wall of said transverse feed channel.

This specification signed and witnessed this 10th day of April A. D., 1924.

JOHN M. BROWNING.

In the presence of:

J. CALVIN BRIGHT,

MARY SPEIRS.