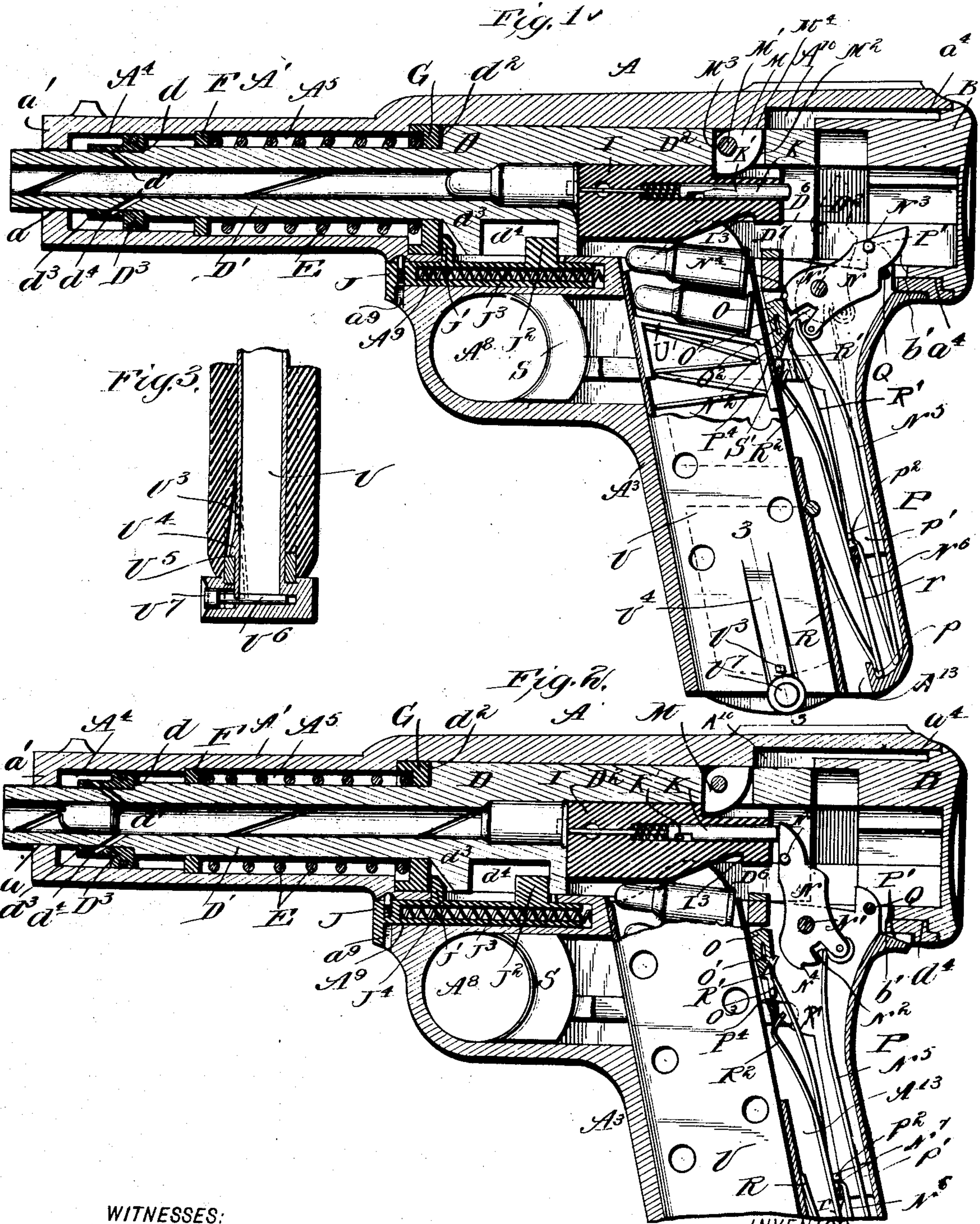


No. 834,753.

PATENTED OCT. 30, 1906.

J. J. REIFGRABER.
AUTOMATIC FIREARM.
APPLICATION FILED APR. 13, 1904.

5 SHEETS—SHEET 1.



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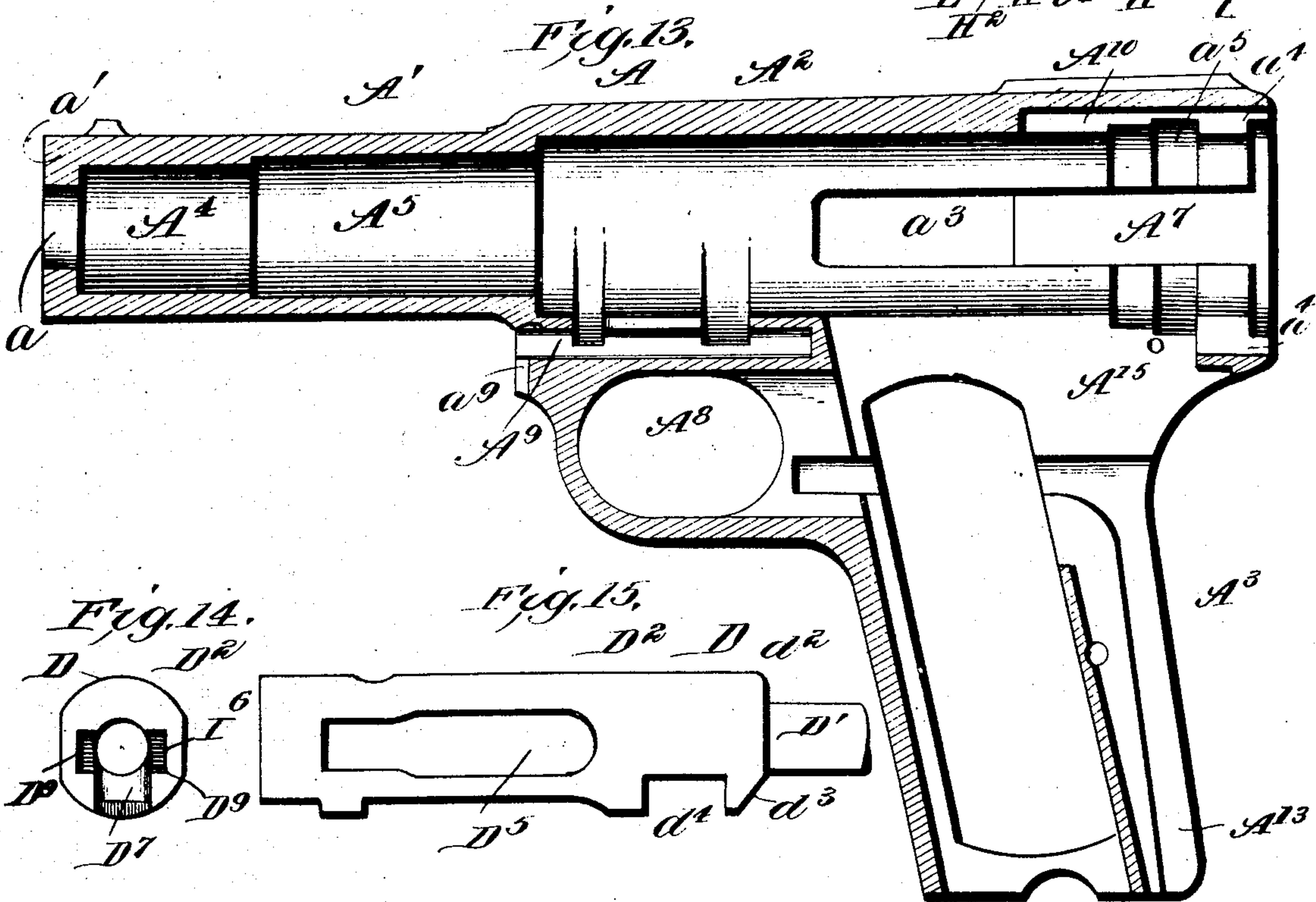
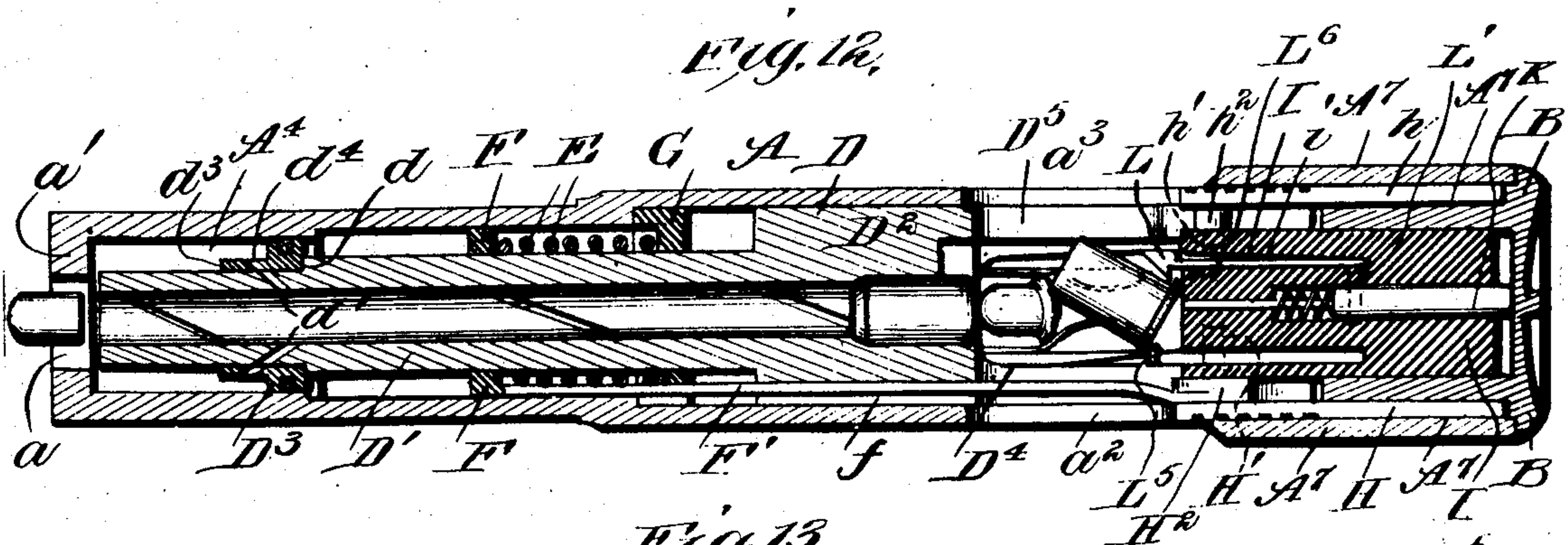
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5 SHEETS—SHEET 3.



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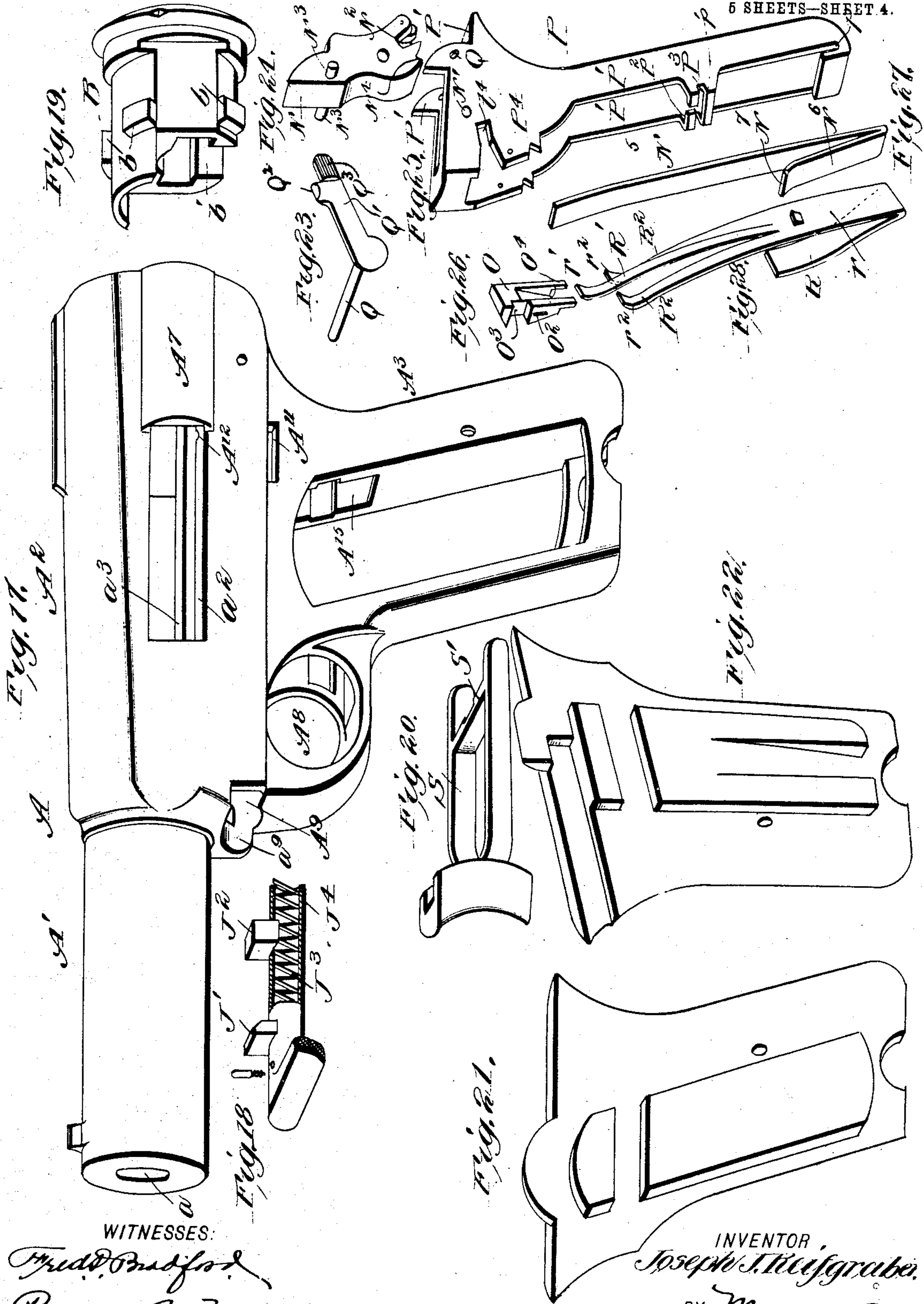
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J. J. REIFGRABER.
AUTOMATIC FIREARM.

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5 SHEETS—SHEET 4.



WITNESSES:

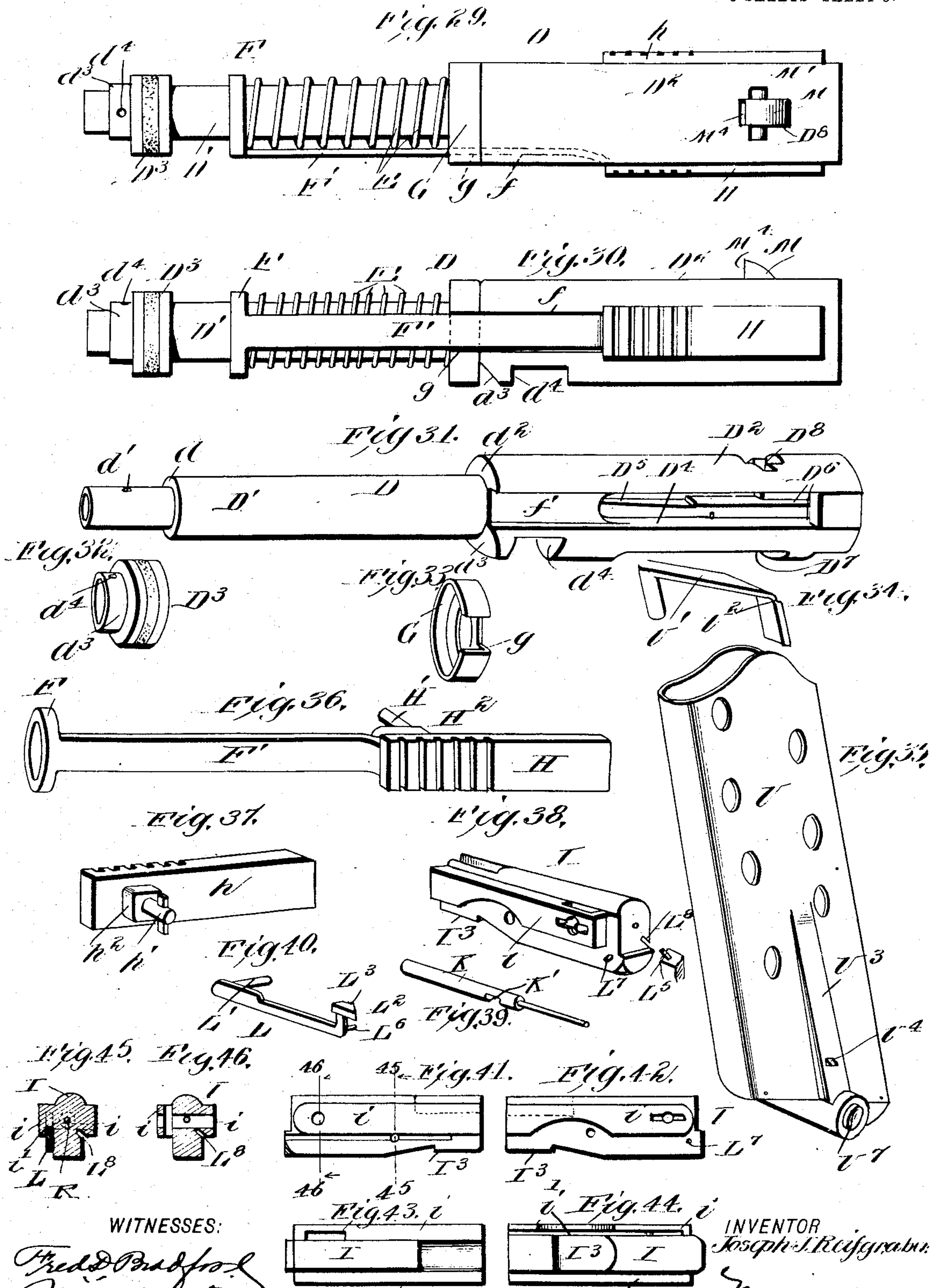
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UNITED STATES PATENT OFFICE.

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AUTOMATIC FIREARM.

No. 834,753.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed April 13, 1904. Serial No. 202,953.

To all whom it may concern:

Be it known that I, JOSEPH JOACHIM REIFGRABER, a citizen of the United States, residing in the city of St. Louis, Missouri, have invented a new and useful Improvement in Automatic Firearms, of which the following is a specification, reference being had to the drawings hereto annexed.

This invention is an improvement in firearms, and relates particularly to that class of automatic firearms in which the several operations—such as the unlocking and opening of the breech after firing a shot, the extracting and ejection of the empty cartridge-shell, the cocking of the hammer, the introduction of a fresh cartridge into the firing-chamber, and the closing and locking of the breech—are automatically effected by the pressure of the gases generated by the explosion of the cartridge.

My invention comprises further improvements in firearms of the class described, for instance, in United States Patent No. 729,413, granted to me May 26, 1903.

An important object of my invention is to construct a gun or firearm of this class which shall be simple and inexpensive in construction, safe and reliable under all conditions of use, and in which the shock of recoil shall be reduced to a minimum.

Another object of the invention is to produce a firearm of this class in which all moving parts are practically and safely incased within the frame or gun-body and in the dismounting and reassembling of which no tools whatever shall be required.

Another object of the invention is to produce a firearm of this class in which nothing shall interfere with the sighting of the gun, the recoil being reduced to a minimum by a scientific employment and accurate adjustment of the gas-pressure for that purpose, the empty shell being ejected laterally and no moving parts being provided on the outside.

Another object of the invention is to produce a firearm of this class which for safety in handling and carrying the firing mechanism whenever it is cocked or made ready for firing shall be provided with an automatic locking device, such locking device to be actuated to unlock the firing mechanism by the act of naturally grasping the gun and holding it in firing position.

Another object of the invention is to produce a firearm of this class which is provided

with an automatic, safe, and reliable indicator perceptible to touch, as well as to sight, for showing if the concealed firing mechanism is in a released position or cocked ready for instant use.

Another object of the invention is to produce a firearm of this class in which by a single move of the thumb of the right hand holding the arm the operator can lock and set positively at rest the entire firing mechanism, as well as all the rest of the moving parts of the gun, or, if locked, release the entire mechanism by a single move of the same finger and lever for the instant use of the arm.

These objects are attained by a simple and practical mechanism, which is efficient, safe, and durable.

The principal ideas of my invention are capable of various mechanical expressions and are adaptable not only to a gas-operated magazine-piston, as herein shown for purpose of illustration only, but it is to be understood that I do not intend to restrict my invention to any particular kind of firearm. Obviously, also, various changes in form and arrangement of parts may be made within the scope of my invention.

In the drawings, Figure 1 is a vertical longitudinal section of the firearm with the parts in position to fire. Fig. 2 is a similar section with the parts in fired position, the bullet being in a position between the gas vents or ports and the muzzle of the barrel. Fig. 3 is a detail section on about line 3 3 of Fig. 1. Fig. 4 is a side elevation of the firearm. Fig. 5 is a longitudinal section similar to Figs. 1 and 2 with the parts in the position they assume in ejecting the fired shell, a cartridge being in position to feed up in the place of the ejected shell and the safety-lever being pressed forward to prevent the hammer from engaging with and locking the breech-block in its rearmost position. Fig. 6 is a partial longitudinal section showing the magazine-follower up after discharging the last cartridge in a position to form a stop or abutment for the breech-block. Fig. 7 is a partial longitudinal section showing the safety-lever, hammer, and breech-block locked by the sliding side lock. Fig. 8 is a detail cross-section on about line 8 8 of Fig. 7. Fig. 9 is a detail horizontal section on about line 9 9 of Fig. 4. Fig. 10 is a detail perspective view of the side lock. Fig. 11 is a detail perspective view of the pin for locking the breech-block. Fig. 12 is a horizontal longitudinal

section on about line 12 12 of Fig. 5, showing the parts in the position they assume in ejecting the shell. Fig. 13 is a vertical longitudinal section of the frame, the movable parts being removed. Fig. 14 is a detail rear elevation, and Fig. 15 is a side elevation, of the rear portion of the barrel. Fig. 16 is a detail rear end view of the framing. Fig. 17 is a detail perspective view of the frame. Fig. 18 is a detail perspective view, partly in section, of the barrel-stop. Fig. 19 is a detail perspective view of the back plug of the frame. Fig. 20 is a detail perspective view of the trigger. Figs. 21 and 22 are detail perspective views of the inner faces of the opposite side plates of the handle. Fig. 23 is a detail perspective view of the pivot device for the safety-lever. Fig. 24 is a detail perspective view of the hammer. Fig. 25 is a detail perspective view of the casing or frame of the safety-lever. Fig. 26 is a detail perspective view of the sear. Fig. 27 is a detail perspective view of the main or hammer spring. Fig. 28 is a detail perspective view of the combined sear, trigger, and safety-lever spring. Fig. 29 is a top plan view of the barrel with the gripping-wings in place. Fig. 30 is a side elevation of the same. Fig. 31 is a detail perspective view of the barrel and its rear extension or receivers, the movable parts being omitted. Fig. 32 is a detail perspective view of the piston. Fig. 33 is a detail perspective view of the abutment-ring for the rear end of the barrel-spring. Fig. 34 is a detail perspective view of the magazine-follower. Fig. 35 is a detail perspective view of the body of the magazine or carrier for the cartridges preparatory to their insertion into the chamber of the barrel. Fig. 36 is a detail perspective view of one of the gripping-wings of the barrel. Fig. 37 is a detail perspective view of the other gripping-wing. Fig. 38 is a detail perspective view of the breech-block. Fig. 39 is a detail perspective view of the firing-pin. Fig. 40 is a detail perspective view of the extractor. Figs. 41 and 42 are side views of the breech-block. Figs. 43 and 44 are top and bottom views of the breech-block. Figs. 45 and 46 are cross-sections on, respectively, lines 45 45 and 46 46 of Fig. 41.

In carrying out my invention I provide a casing or frame A, which supports the several movable parts and comprises, as shown, a barrel portion A', a body portion A² in rear of the barrel portion, and a handle portion A³. The barrel portion is provided at its front end with the inwardly-projecting annular flange a', at the center of which is provided the opening a, in which operates the front end of the sliding barrel, presently described. The interior of the barrel portion A' immediately in rear of the flange a' forms the cylinder A⁴, in which operates the gas, which pushes back the sliding barrel and also exerts

a forward tendency against the inwardly-projecting flange a' in order to neutralize in a large measure the recoil, as will be more fully described hereinafter. Immediately in rear of the chamber A⁴ the barrel portion A' is enlarged slightly at A⁵ to receive the readjusting-spring and the parts associated therewith, presently described, and this spring-receiving portion A⁵ extends back of the forward end of the body A², which latter is chambered slightly larger than the portion A⁵ of the barrel, as shown.

The body portion is provided in its opposite sides with openings a² a³, in which operate the gripping side wings on the longitudinally-movable breech-block, and in rear of the slots a² a³ the body portion is provided with laterally-bulging portions A⁷, which form guides or receptacles for the gripping side wings when the latter are moved back to their rear-most position. The rear end of the casing is provided with longitudinal slots a⁴ and transverse grooves a⁵, in which fit lugs on the back plug when the latter is adjusted by a bayonet-like joint to the casing, as will be more fully described hereinafter.

Immediately below the front end of the body portion A² of the frame is provided the ring A⁸, in which the trigger operates, and the front end of the body A² immediately above said ring A⁸ is provided with a longitudinal opening A⁹, having in cross-section a formation similar to a keyhole-slot and adapted to receive the barrel-stop, presently described, which stop is inserted longitudinally in the frame and then partially rotated into engagement with the barrel, as will be more fully described hereinafter.

The rear end of the body A² is grooved in its inner face at its upper end at A¹⁰, forming a way in which operates the locking-cam for the breech-block, the front end of the groove A¹⁰ terminating at a point adjacent to the rear end of the stroke of the sliding barrel, so the cam, presently described, will lock the breech-block to the sliding barrel until the latter has reached the end of its stroke, when the breech-block may continue its travel past the rocking-cam, as will be more fully described hereinafter.

The frame is also provided in one side of its handle portion A³ immediately below the body portion A² with a longitudinally-extending slot A¹¹, in which operates the inwardly-projecting portion of the side lock, presently described, an opening A¹² extending upwardly through the body portion A² and into the latter for the vertically-operating pin, which acts as a lock for the sliding barrel in the use of the invention, as will be presently described.

The handle portion A³ is recessed from end to end for the magazine and is also provided in its rear side with a recess A¹³, in which operates the safety-lever, presently described.

The opening or chamber in the handle portion A^3 for the magazine communicates at its upper end with the interior of the body portion A^2 of the framing, so the cartridges may be supplied from the magazine directly to the operating parts within the body portion A^2 in the use of the invention.

The rear end of the frame A is closed by the back plug B , having lugs b operating in the slots and grooves in the rear end of the body A^2 , and such plug B is also provided with a slot b' in its lower side which is entered by projecting nose extensions P' at the upper end of the safety-lever P when the latter is connected with the handle portion A^3 of the frame in the assembled condition of the gun. By this construction the back plug is locked within the rear end of the frame at all times when the safety-lever is in place, and as said safety-lever carries the firing mechanism the plug is therefore locked in place at all times when the firearm is in condition for use.

The barrel D is movable longitudinally within the frame and is constructed with the front portion or barrel proper, D' , and the rear extension or receiver D^2 , within which latter operates the breech-block carrying the firing-pin, as will be described. At its forward end the barrel proper, D' , is formed to fit the opening a in the front end of the frame, and the barrel is provided a short distance in rear of its front end with a forwardly-facing shoulder d , against which is seated the piston-ring D^3 , which may be packed if found necessary in any suitable manner to cause it to operate with sufficient tightness within the cylinder in the front end of the frame. A port or ports d' are provided leading through the barrel portion immediately in front of the piston D^3 into the cylinder, so that after the bullet has passed the port d' part of the gas resulting from the explosion will pass into the cylinder and will operate between the flange at the front of the frame and the piston D^3 and will act to force the sliding barrel rearwardly and also to exert a forward tendency against the inwardly-projecting flange, thereby securing the rearward movement of the sliding barrel for the purpose of ejecting the fired shell and recharging the gun for another operation, as well as to neutralize by the forward pressure exerted against the inwardly-projecting flange of the frame the force of the recoil. The piston-ring D^3 has a forwardly-projecting cylindrical portion d^3 , which is provided with an opening d^4 , which may be turned into full or partial register to any desired degree with the port d' , and so act as a valve to regulate the amount of gas admitted to the cylinder A^4 .

The rearward movement of the sliding barrel by the force of the explosion is resisted in a measure by the spiral spring E , which tends to readjust the barrel and the parts carried

thereby after the force of explosion has been exhausted, which occurs when the front end of the barrel proper is forced rearwardly beyond the flange of the front end of the frame, so the gases within the cylinder can escape through the opening a . This spring E is in the construction shown caused to act between a ring F and the collar G . The ring F encircles the barrel proper and is carried at the front end of a rod F' , which projects forwardly from a gripping-wing H , which connects by an inwardly-projecting pin H' with the breech-block I .

The collar G encircles the barrel proper in advance of the rear extension D^2 and abuts in its rearmost position against the shoulder d^2 at the front end of such extension, the shoulder being sloped away or recessed on its under side at d^3 to permit the introduction in rear of the ring G of the lug on the barrel-stop J , presently described. The rear extension D^2 is also provided in its under side with a recess d^4 , in which operates the lug on said barrel-stop, which limits the movement of the sliding barrel.

The barrel-stop J is in the form of a bolt having on one side the lug J' , which operates in rear of the collar G and forms an abutment for said collar when the barrel moves rearwardly, and the stop J is also provided with a lug J^2 , which operates in the recess d^4 in the under side of the rear extension D^2 , and thus operates to limit the movement of the barrel in both directions. This barrel-stop J is inserted in the longitudinal opening A^9 in the body A^2 of the frame, the slot or wing a^9 of said opening A^9 extending laterally to permit the introduction of the barrel-stop bolt J , which when inserted may be given a quarter-turn to bring its lugs J' and J^2 into engagement with the parts with which they cooperate, as before described. The stop J is given a forward tension by a spring J^3 , operating within the hollow bolt J^4 of the stop, so the stop may operate as a cushion in relieving the shock of the rearward movement of the sliding barrel, and so ease the motion of said barrel in the movement which is given to it by the action of the gases in the cylinder at the front end of the frame. By the described mechanism it will be noticed the sliding movement of the barrel in the rearward direction is effected by the gases operating in the cylinder at the front end of the frame, and such rearward movement of the barrel compresses the spring E , which tends to readjust the barrel and the parts carried thereby after the force of explosion has been exhausted.

The gripping-wing H operates within the opening a^2 in the side of the frame A and has on its inner side a block H^2 , which carries the pin H' and which block slides back and forth in a slot D^4 , formed longitudinally in one side of the rear extension D^2 of the barrel, a slot

D⁵ being provided in the opposite side of the barrel for the gripping-wing *h*, which latter connects at its front end with the breech-block by means of a French joint, as shown, the stud *h'* of such joint being carried on a block *h*², which slides back and forth in the slot D³, said slot being widened at its front end to permit the partial rotation of the stud *h'* in adjusting the same into and out of engagement with the corresponding socket in the breech-block and the rear end of the slot D⁵ being narrowed to prevent the turning of the gripping-wing when in its rearmost position. On their outer sides the gripping-wings H and *h* are alike, and they are roughened on their outer faces at their front ends, so they can be readily drawn back when grasped by the operator. By these gripping-wings the breech-block and the sliding barrel may be drawn rearwardly in the operation of the firearm whenever desired.

The collar G is grooved in its outer side at *g*, and a groove *f'* is formed in the face of the rear extension D² to receive the rod F', which extends between the ring F and the gripping-wing H, as will be understood from the drawings.

The rear extension D² is recessed longitudinally in line with the bore of the barrel and is provided in its opposite sides with grooves D⁶, in which slide the ribs *i* on the opposite sides of the breech-block I. This breech-block I has a longitudinal opening receiving the firing-pin K, which latter may be of ordinary construction and may be secured in the usual manner, except that in the present instance I prefer to hold the firing-pin by the pivot-pin L' of the extractor L. This extractor L has at one end its pivot-pin L', which passes through the breech-block and operating in a groove K' of the firing-pin limits the movement of the latter, and at its other end with a hook L², which extends alongside the front end of the breech-block, is beveled at L³ to permit it to pass into engagement with the flange on the rear edge of a cartridge-shell, and the body of the extractor fits up within a groove *i'* in the under side of one of the ribs *i* of the breech-block, as shown in the drawings. This extractor-hook operates in connection with a projecting pin L⁵ on the side of the frame opposite said extractor to eject the shell laterally, the hook dragging the shell back at one side and the projection L⁵ forming a stop for the opposite side of the shell and causing the same to be thrown laterally out through the openings in the extension D² and the frame in the operation of the arm. The extractor L has a small pin or projection L⁶ to fit into a hole or recess L⁷ of breech-block I to hold it in normal position. The pin L⁵ operates in a groove L⁸ in the side of the breech-block. In its under side at its rear end the extension D² is slotted longitudinally at D⁷, forming an

opening in which the hammer operates to strike the rear end of the firing-pin, the walls on opposite sides of said slot or openings D⁹ forming an abutment for contact by the safety-studs on the hammer when the latter is out of firing position, as will be more fully described.

The breech-block is also provided on its under side with a forwardly-facing shoulder I³ for engagement by the hammer so the hammer can operate to hold the breech-block in firing position when the safety-lever is in normal position, such hammer releasing the breech-block when the safety-lever is pressed in, as will be more fully described hereinafter.

In its upper side the rear extension D² of the barrel is provided with an opening D⁸, in which pivots and operates the latch M, which pivots at M' in the extension D² and has a wing M², having shoulders M³ and M⁴ at its opposite ends, the latch rocking in connection with the barrel extension D², so that when the barrel is moving toward its foremost position the shoulder M⁴ riding beneath the top of the frame will retain the latch in the position shown in Figs. 1 and 2, in which its shoulder M³ will bear in rear of the breech-block and lock the same until the latch reaches a position in which it can swing up into the groove A¹⁰, so the locking latch or cam for the breech-block when adjusted may be forced up into said groove A¹⁰ by the breech-block and the latter travel rearwardly independently of the sliding barrel to the rearmost position of the said breech-block. By this means the breech-block may travel rearwardly independent of the sliding barrel to permit the withdrawal of the exploded shell, the ejection of said shell, as before described, and the feed of a fresh shell into the rear extension of the barrel, so the next forward movement of the breech-block may force the fresh shell to firing position. It will be understood that when the breech-block is in its rearmost position the shell may be fed up and the breech-block may then move forward with the barrel and the breech-blocking cam or latch will adjust in rear of the breech-block and travel with the breech-block and barrel forwardly, so that the cam will be held by the frame in advance of the groove A¹⁰ in such position as to lock the breech-block from any rearward movement until the barrel has again been pushed back into the position in which the locking cam or latch M may swing up into the groove A¹⁰ to release the breech-block. By arranging the rocking-latch in rear of the discharge of the magazine I prevent the dropping of said latch into the said discharge and prevent its interfering in any way with the passage of the cartridges to and from the position in which they are fired.

The hammer N, sear O, and the springs for operating the hammer, the sear, and the safety-lever are carried in the safety-lever

P, which is pivoted at Q to the frame and has at its rear side, below said pivot, a lug or extension P', which, engaging the frame A, limits the outward movement of the lower end of the safety-lever and stops the same in the position shown in Fig. 1 of the drawings. This safety-lever operates in the recess A¹³ in the rear side of the handle portion A³ of the frame and is pressed to its outer or normal position by a spring R, which bears between the lower end of the safety-lever and the frame, as shown in Figs. 1 and 5. By preference the spring R for actuating the safety-lever, the sear-spring R' for operating the sear, and the trigger-spring R² are made in one piece, comprising a main plate r, whose lower end is upturned to provide the spring R and whose upper end is slitted to form the spring R' for the sear and R² for the trigger, the trigger-spring being preferably made of two side sections and the upper ends of springs R' and R² being preferably deflected at r' and r², so they will exert a forward and upward tension on, respectively, the sear and the rear end of the trigger in the operation of the device as presently described. In securing the spring R in the safety-lever the latter is provided on its inner side, at its lower end, with an upwardly-facing notch p, in which the lower end of the spring-plate R is seated, the main plate r fulcruming between its ends on the forwardly-projecting lug or boxing p' on the inner face of the safety-lever, near the lower end of the latter. This construction is simple and permits the convenient application and removal of the spring without necessitating separate fastening devices and permits the removal of the spring and the securing of same in place without the necessity of screw-drivers or other tools.

The hammer N is pivoted to the safety-lever at N, by means of a cross-pin, which extends through the side plates P' at the opposite sides of the head of the safety-lever, such pin N' being prevented from displacement when the safety-lever is fitted into the frame by the ends of said pin N' bearing between the opposite sides of the frame, as will be understood from the drawings. This hammer N is of ordinary construction, except in certain particulars, whereby it operates to hold the breech-block in its rearmost position when the safety-lever is in normal position. The hammer is notched at N² at its front end to receive the side lock, which holds the hammer when in cocked position and it is not desired to fire the gun, and the hammer is also provided with stop studs or projections N³, which engage the rear end of the receiver D² if the hammer should be released when the safety-lever is out or in normal position and will prevent the hammer from moving into engagement with the firing-pin in such position of the parts, as will be understood

from the dotted lines in Fig. 1 of the drawings. In this operation if the hammer should be released from any cause its stop projections N³ will come in contact with the abutment provided by the rear end of the receiver D² on opposite sides of the slot or opening D⁹ and will prevent the hammer from passing into said slot or opening D⁹ and into contact with the firing-pin in the use of the invention. This, it will be understood, occurs when the safety-lever is out or in normal position. When the safety-lever is pressed in preparatory to firing, the hammer will be lifted by the raising of its pivot, resulting from the relative location of such pivot and the pivotal connection of the safety-lever with the frame, so that the stop-pins N³ will ride above the abutment on the rear end of the receiver D² and permit the hammer to move in into contact with the firing-pin to fire the arm. The hammer is also provided at its lower or front end with a shoulder or projection N⁴, which in the position of parts shown in Fig. 1 presses upon the upper end of the sear and forces the sear down, the action of the hammer-spring, presently described, being stronger than that of the sear-spring, so that the hammer may press the sear down to firing position, this shoulder or projection N⁴ being also the releasing-shoulder for engagement by the sear, so the latter may hold and release the hammer.

The hammer-spring N⁵ is arranged at its upper end to operate the hammer in the usual manner and has at its lower end an upturned portion N⁶, which fits and is held in the lug or boxing p' of the safety-lever, such upturned portion N⁶ being provided at its free end with the catch projection N⁷, which engages with the seat p² on the boxing p' and may be removed easily after the hammer has been removed and the tension of the spring thereby released, so the spring N⁵ may be conveniently secured and released from the safety-lever whenever desired without the use of any separate instrument.

The sear O operates to hold and release the hammer and also acts as an escapement for the trigger. To this end the sear is pivoted so it may rock into and out of engagement with the hammer and is movable longitudinally along its pivot, so it may move down into firing position and also to permit the passage of the trigger in the movement of same to its retracted or firing position. To this end the sear is pivoted on a pin O' and is slotted at O² for the passage of said pin, the slot O² being elongated in the direction of length of the sear, so the sear can move longitudinally and also rock in the operation of the device. At its front end the sear is adapted to hold and release the hammer by engagement with the shoulder or projection N⁴ thereof, has its upper arm notched at O³

for the passage of the pin on the side lock, which pin holds the hammer when in cocked position, and at its lower end the sear is provided with the projecting fingers or portions 5 O⁴ for engagement by the trigger. These fingers are preferably spaced apart to permit the operation between them of the sear-spring R', which operates upon the sear, as shown in the drawings. These fingers O⁴ operate 10 adjacent to stop-shoulders P⁴ on the front side of the safety-lever, said shoulders P⁴ forming a stop for engagement by the trigger when the safety-lever is pressed out or in normal position and the sear being pressed up 15 by the action of its spring to a point in line with these shoulders when the hammer is released. When the hammer is in firing position, its shoulder or projection N⁴, pressing upon the upper end of the sear, will force the 20 latter downward, bringing its fingers or projections O⁴ below the stop-shoulders P⁴ and into position to be engaged by the cross-bar S' of the trigger S when the latter is pulled. After the trigger is pulled and the hammer is 25 fired the sear will be forced upward by the action of its spring and will permit the cross-bar S' of the trigger S to escape in the forward or readjusting movement of the trigger, the trigger having a limited up-and-down 30 movement at its rear end to facilitate this escapement action in the readjustment of the trigger in the operation of the invention. In further describing this operation it will be noticed that in Fig. 1 the sear is pressed down 35 by the pressure of the mainspring, acting through the hammer, so the points or fingers O⁴ at the lower end of the sear project below the shoulders P⁴ and in position to be operated by the trigger if the latter is pulled. As 40 soon as the hammer is released by the sear the latter will be forced up by the sear-spring, which exerts an upward tendency on the lower end of the sear and sets the same to the position shown in Fig. 2, in which position 45 the trigger can pass the fingers at the lower end of the sear if the trigger should be pulled when the parts are in such position. In the position of parts shown in Fig. 1 the trigger if pulled would strike the shoulders 50 P⁴ on the head of the safety-lever and would not operate the sear until the safety-lever is pressed in in gripping the handle of the firearm. It will be noticed that the trigger-spring operates to force the trigger forward 55 and also to press the rear end of such trigger upwardly with a yielding action.

The pivot Q of the safety-lever is preferably effected by means of the combined pivot and latch shown in Fig. 23. This consists of 60 the pivot-pin Q, which is inserted through the frame and through the pivot-opening in the safety-lever and is provided at one end with the lateral arm Q', having the tongue Q² and the thumb-piece Q³, the tongue Q² being arranged to engage with a seat Q⁴ in the

frame, as best shown in Fig. 4 of the drawings.

The side lock T is arranged to engage with the safety-lever and also with the hammer, as well as with the rear extension of the barrel, 70 in order to lock the safety-lever and the hammer and the barrel and the breech-block when the said side lock is moved from the position shown in full lines in Fig. 4 to the dotted-line position shown in the same figure. 75 This side lock is shown in detail in Fig. 10 and consists of the outer or gripping plate T', the inwardly-projecting plate or wing T², which operates in the slot A¹¹ in the frame A, and the depending wing T³, which operates 80 along the inner face of the side plate of the frame and carries the inwardly-projecting pin T⁴, which moves into the slot t⁴ in the safety-lever and the slot N² in the hammer when the side lock is moved rearwardly to 85 the dotted-line position shown in Fig. 4, and so operates to lock the safety-lever and the hammer from movement. When moved to such dotted-line position, the side lock also operates upon a pin t, which is movable in 90 the frame into and out of engagement with the barrel, and presses such pin upwardly into engagement with the barrel, a spring acting upon the pin to force the same normally downward and release the barrel. In 95 this operation an inclined surface T¹⁰ on the side lock, Fig. 10, engages the inclined lower end t¹⁰ of the pin t (see Fig. 11) and as the lock is moved longitudinally forces the pin t up, as will be understood from Fig. 8. The 100 side lock not only operates as a lock, but also acts as an indicator to show the operator both by sight and touch when the safety-lever and the hammer are locked and when such parts 105 are unlocked and ready for action, the side lock operating thus in connection with the safety-lever to indicate to the operator when the gun is ready to be fired.

If in operation the gun is fired and the barrel and breech-block travel rearwardly and 110 the operator should release the safety-lever instantly on firing the gun, the hammer would move with the safety-lever in such manner as to permit the upper end of the hammer to engage with the shoulder on the 115 under side of the breech-block and hold the breech-block in its rearmost position, thus opening the gun and exposing the same to an inspection of its interior before all the cartridges are fired. This is an important feature, 120 as it permits the operator to at any time inspect the interior of the gun through the lateral opening through which the shells are ejected.

The cartridge-magazine U fits in its recess 125 within the handle of the gun, is adapted to receive a number of cartridges, and has a spring-pressed follower U', which forces the cartridges upward to discharge the latter into the gun in the usual way. This follower 130

is of a special construction in that it is provided at its rear end with a shoulder or abutment U^2 , which when the magazine is empty moves upward into the path of the breech-block and is engaged by said breech-block on the forward movement of the latter in such manner as to stop the forward movement of the breech-block when the last cartridge has been ejected from the magazine and fired in the operation of the invention, thus indicating at once to the operator that the magazine has discharged its last cartridge.

A latch U^3 is provided for securing the magazine in the frame of the gun. The latch U^3 , as shown, is formed by cutting out a tongue from one side of the magazine U and deflecting such tongue U^3 so that it stands normally out from the side, so that its hook or shoulder U^4 will engage a shoulder at U^5 within the casing, the thumb-piece U^6 being in the form of a pin, as best shown in Fig. 3, and connected with the spring-tongue U^3 , so it may operate to release said tongue in grasping the magazine, so that the latch will be released by the act of grasping the magazine. To this end the magazine projects when in the firearm slightly below the handle and is provided on its projecting portion with a finger-hold U^7 , which receives the pin U^6 , which may be depressed to release the latch U^3 from engagement with the frame of the gun. Thus it will be noticed that by simply grasping the magazine to withdraw the same from the gun the latch is released from engagement with the frame, thus releasing the magazine, so that it can be readily withdrawn and another substituted in its place.

From the foregoing description it will be noticed that my gun is so constructed that its several parts are secured in place without the necessity of separate fastenings, which would necessitate the use of a tool in taking the firearm apart or in putting it together.

In operation by grasping the breech-block by means of the wings H and h , which project through slots in the sides of the frame, the operator may force the breech-block rearwardly as far as it will go, the hammer N will be cocked, and in case the safety-lever P is not pressed in the hammer will arrest the breech-block by engagement with the shoulder I^3 thereon. In case the loaded magazine is not already in place it may now be inserted or a single cartridge may be placed in the firing-chamber. By now gripping the handle of the gun tightly the safety-lever will be pressed in and such lever, swinging on its pivot Q , will release the hammer from engagement with the breech-block, and such breech-block will snap shut by the pressure of the spring E . This movement will also lock the breech-block to the barrel by turning the cam or latch M down in rear of the breech-block. The parts are now in firing position. If the trigger should be pulled without keep-

ing the safety-lever pressed tightly forward, the cross-arm of the trigger will come in contact with the shoulders P^4 and the trigger will not operate upon the sear to release the hammer; but if the safety-lever P is pressed tightly forward and the trigger is pulled the trigger will act upon the projecting fingers O^4 at the lower end of the sear and will operate the sear to release the hammer as desired. The cartridge being exploded, the bullet will advance in the barrel-bore until it passes the gas port or vent d' , and during the time the bullet moves between the said gas-vent and the muzzle of the barrel a portion of the gases evolved by the explosion will go through the vent or port d' into the gas-chamber and in expanding will press forward against the flange a' of the frame and rearwardly against the piston D^3 , easing the shock of the recoil by its action on the flange a' and operating against the piston D^3 to force the piston, the barrel, the extension of the barrel, and the breech-block rearwardly until the muzzle of the barrel clears the opening a in the front end of the frame, when the gas in the gas-chamber can escape through such opening a . At this instant, or rather immediately before the bullet leaves the barrel, the breech-locking cam M will clear the shoulder at the front end of the groove A^{10} and will swing upward, unlocking the breech-block, which by its momentum will continue moving rearwardly to its rearmost position, operating meanwhile to extract the shell and eject the same laterally through the opening a^3 in the side of the frame. As the gases escape at the muzzle, the barrel will be arrested the moment the cam M swings upward into the groove A^{10} to unlock the breech-block by the striking of the barrel against the lug J^2 of the barrel-stop, and the barrel will be held in such position, the rearward movement of the breech-block compressing the spring E in cocking the hammer and permitting the magazine to feed a new cartridge up into the path of the breech-block, which as it moves forward will force the cartridge into the breech of the barrel. The spring J^3 of the barrel-stop operates to cushion the stopping of the barrel in its rearmost position and aids in reducing the shock of the recoil to a minimum. At the moment the breech-block reaches its rear position the uppermost cartridge in the magazine will advance in front of the breech-block, and if the safety-lever is still held pressed in the breech-block will be pressed forward by the spring E , force the upper cartridge home into the firing-chamber, and again lock the breech by the turning of the cam M down in rear of the breech-block. The longitudinal or up-and-down movement of the sear relatively to its pivot operates to secure the firing of only one shot for every pull of the trigger. In this operation when the hammer is cocked and resting upon the

sear the latter will be pressed downwardly against the tension of its spring, and the lower end of the sear will project below the shoulders P^4 of the safety-lever and in the path of the cross-bar of the trigger. As soon, however, as the hammer is released by the sear the sear will be forced upwardly by its spring and will pass out of the path of the cross-bar of the trigger, so that even if the trigger is held retracted the sear is free to arrest the hammer in its cocked position. The springs which actuate the trigger press said trigger forwardly and upwardly, and such trigger has at its rear end also a slight up-and-down play to allow escapement of the trigger in its forward movement only. The side lock T operates to lock the entire firing mechanism in a cocked position by a simple movement to the rear. Such movement of the side lock locks the safety-lever and hammer and also the breech-block by means of the upwardly-projecting pin, which moves into engagement with the breech-block, as before described, if the latter is in its rearmost position. This side lock is so located that the thumb of the right hand when holding the pistol for firing purposes rests on such side lock, and a pressure forward or back by the thumb will lock or unlock the entire gun mechanism. This side lock, as will be understood, may be operated to lock practically every movable part of the gun from movement.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The improvement in automatic firearms herein described comprising a casing, having a barrel portion provided at its front end with an opening for the front end of the barrel and an inwardly-projecting flange surrounding the said opening such casing being also provided near its rear end with lateral openings for the gripping-wings, the barrel movable at its front end in said opening and rearwardly to a point clear of such opening in the flange whereby to permit gases evolved by the explosion to escape through such opening, the barrel being provided near its front end with a port for the passage of gas into the barrel portion of the casing and in rear of said port with a piston operating in the casing, the extension or receiver at the rear end of the barrel proper provided with guides for the breech-block and with openings in its sides for the passage of devices connecting with such breech-block, the abutment-ring on the barrel proper in advance of the receiver, the spring on the barrel proper in advance of said abutment-ring, the ring encircling the barrel and forming a bearing for the front end of the barrel-spring, the gripping-plates at the opposite sides of the receiver, one of said gripping-plates being connected with the ring forming the front

bearing for the barrel-spring, the breech-block operating in the receiver and connected with the gripping-wings, and a barrel-stop carried by the casing and engaging the abutment-ring for the rear end of the barrel-spring, and firing mechanism, substantially as set forth. 70

2. In an automatic firearm the combination with the casing, having at its front end an inwardly-projecting flange provided with an opening for the front end of the barrel, the barrel operating in said opening and movable in its rearmost position to a point rearwardly clear of such opening and having a piston for the gases to operate on whereby the gases supplied to the casing to operate the barrel may escape through such opening when the barrel is in its rearmost position, means being provided whereby the gas will pass to the casing in rear of such flange and will operate the barrel rearwardly, means for readjusting the barrel to normal position, and firing mechanism. 85

3. In an automatic firearm the combination with the casing having a cylinder for the operation of the gases evolved from the explosion, and the barrel reciprocating in said casing and having a port for the passage of the gases to the cylinder and provided with a piston adjustable to control such port. 95

4. The combination in an automatic firearm substantially as described, of the casing having a cylinder, the barrel reciprocating in said casing and having a port for the passage of gas to the cylinder, and a piston on said barrel having a tubular extension provided with an opening to register with the port in the barrel, the piston being rotatable on the barrel whereby to regulate the port therein. 100

5. The combination of the casing having a cylinder and provided at the front end thereof with an inwardly-projecting flange having an opening for the barrel, the barrel tenoned at its front end and operating in said opening and provided in said tenon with a port for the gas and at the rear end of said tenon with a forwardly-facing shoulder, and the piston fitting on the tenon against said shoulder. 110

6. The combination with the barrel, the casing, a spring on the barrel for readjusting the latter, a ring forming the front bearing for said spring, the breech-block operating in the barrel, connections between the breech-block and said front-bearing ring for the spring, a rear bearing for the spring and a stop abutment for said rear bearing for the spring. 120

7. The combination of the barrel, the casing, the breech-block movable in the barrel, the barrel-spring, the front bearing for said spring, connections between said front bearing and the breech-block, the collar forming a rear bearing for the spring, and an abutment carried by the casing and forming a stop for said rear bearing. 130

8. The combination of the barrel, the casing, the spring for readjusting the barrel, a front bearing for said spring, a ring forming a rear bearing for the spring, a barrel-stop supported in the casing and having a bolt provided with means engaging the barrel and also with a lug forming an abutment for said rear bearing-ring, and a spring actuating the barrel-stop, substantially as set forth.

9. The combination of the casing, the barrel having a rear extension or receiver, the magazine in the casing discharging to the barrel the breech-block operating in the rear extension of the barrel, the rocking latch pivoted to the barrel, in rear of the discharge of the magazine and arranged to lock the breech-block from rearward movement independent of the barrel, the casing being arranged to hold the latch in position to lock the breech-block and to release said latch to permit the movement of the breech-block independent of the barrel.

10. The combination of the barrel the breech-block movable with and independently of the same, the rocking latch pivoted above the breech-block whereby it may swing back and forth having a shoulder to engage with the breech-block to hold the same to the barrel and a shoulder approximately at a right angle to such first shoulder, and the casing having a rearwardly-facing shoulder for engagement by the latter shoulder of the latch and a recess in rear thereof to receive the latch whereby the latch when in rear of said shoulder may turn to release the breech-block and when in advance of said shoulder will lock the breech-block to the barrel, the casing having an overhanging portion extending back beyond the rearwardly-facing shoulder.

11. The combination of the barrel, the breech-block, the latch having its adjoining faces approximately at a right angle to each other and pivoted within the angle of said faces, means for moving said latch bodily into the path of the breech-block in one position by which to lock the breech-block to the barrel, and means whereby said latch is released as the barrel moves longitudinally, the latch being pivoted to and movable with the barrel.

12. The combination of the barrel, the casing, the barrel-spring, a front bearing for said spring, the breech-block, the gripping-plates connected with the breech-block, a bar connecting one of said gripping-plates with the front bearing for the spring, the rear bearing for the barrel-spring, and the barrel-stop carried by the casing and having means for limiting the longitudinal movements of the barrel and for forming an abutment or stop for the rear bearing of the barrel-spring.

13. The combination of the barrel-casing, the barrel having a rear extension provided in its opposite sides with slots and in one side

with a groove in line with the slot in such side and extending to the front end of the extension or receiver, the barrel-spring, the front bearing for the barrel-spring, the gripping-plates, a bar connecting one of said gripping-plates with the front bearing for the barrel-spring, said bar seating in the side groove of the barrel extension, and the breech-block operating in the barrel extension and connected with the gripping-plates.

14. The combination of the casing, the barrel having a rear extension or receiver and a slot therein for the barrel-stop, the barrel-spring, the front bearing for said spring, the ring forming a rear bearing for the spring, and the barrel-stop inserted in the casing and having lugs one of which operates in the slot of the barrel extension and the other of which forms an abutment for the rear bearing-ring for the barrel-spring.

15. The combination of the casing, the barrel having a rear extension provided with a slot for the lug on the barrel-stop, the barrel-spring, the ring forming a front bearing for the barrel-spring, the breech-block, means connecting the breech-block with said front bearing-ring, the rear bearing-ring for the barrel-spring, and the barrel-stop supported in the casing and having a lug operating in the slot of the barrel extension, and a lug forming an abutment for the rear bearing-ring of the barrel-spring.

16. The combination of the casing the barrel movable longitudinally therein, and the barrel-stop supported in the casing and having a bolt provided with a lateral lug for engagement with the barrel whereby to limit the movement thereof, and a spring actuating the barrel-stop whereby to cushion the movement of the barrel.

17. The combination of the barrel having a rear extension or receiver slotted in its opposite sides, the breech-block operating in said receiver, the gripping-plates connected with the opposite sides of the breech-block, and spring devices operating in connection with one of said gripping-plates to normally press the breech-block forward.

18. The combination of the casing, the barrel therein, the back plug having a bayonet-like joint with the casing, the firing mechanism, and the support for the firing mechanism engaging when connected with the casing with the back plug whereby to prevent the displacement thereof.

19. The combination of the casing, the barrel, the breech-block movable with and independent of the barrel, and firing mechanism having a hammer movable into position to engage with the breech-block when the latter is in its rearmost position to lock the breech-block in such position, and a safety-lever arranged for operation to set the hammer in position to engage with the breech-block when the latter is moved to its rearmost position.

sition and to release said hammer from such engagement.

20. In an automatic firearm the combination of the casing, having a cylinder for the operation of gases and a vent for said cylinder, the barrel sliding in the casing and controlling the cylinder-vent and being ported for the passage of the gases to the cylinder, and the piston in said cylinder forming an abutment for said gases, substantially as set forth.

21. The combination of the casing, the barrel, the breech-block, the firing mechanism, including a hammer, and a safety-lever carrying the hammer and movable into and out of position in which to set the hammer in position to engage with the breech-block when the latter is moved to its rearmost position.

22. The combination of the casing, the barrel movable longitudinally in the casing, the breech-block movable with and independently of the barrel, the gripping-plates detachably connected with the breech-block and arranged at the opposite sides thereof, the barrel-spring and means whereby the barrel-spring exerts through one of the gripping-plates a tension upon the breech-block.

23. In a firearm the combination of the hammer, the trigger, the sear pivoted whereby it may rock into and out of engagement with the hammer and movable longitudinally across its pivotal line whereby it may be moved into and out of firing position, the sear being provided at its upper end with means for holding and releasing the hammer and at its lower end with fingers or portions for engagement by the trigger, the latter being movable longitudinally in a direction approximately at a right angle to the direction of movement of the sear, means being provided whereby the sear will be held by the hammer when the latter is in firing position, in position for engagement by the trigger, and means for adjusting the sear after firing to permit the trigger to escape and pass the sear in readjusting to normal position.

24. The combination of the casing provided at its front end with a cylinder for the operation of the gas to actuate the barrel, the barrel movable in said casing, and having a piston, and ported for the passage of gas to the cylinder, the breech-block movable in the barrel, and a latch for holding the breech-block to the barrel until the barrel has moved rearwardly to such position as to release the pressure from the cylinder in the casing whereby the pressure cannot escape at the breech of the arm.

25. The combination of the casing having a handle portion, a barrel, firing mechanism including a hammer, a sear, and devices for operating the same, and a support to which said hammer, sear and their actuating devices are secured, said support being fitted to the casing and forming with the handle por-

tion of the latter the hand grip portion of the firearm, and means for securing the support to the casing.

26. The combination of the casing, the barrel, the breech-block, the hammer, the safety-lever to which said hammer is pivoted, said safety-lever being pivoted to the casing, a spring for pressing said safety-lever outward, and stop devices for preventing the hammer from striking the firing-pin when the safety-lever is in its outermost position.

27. The combination of the casing, the safety-lever, the firing devices carried by the safety-lever, and a side lock movable into and out of position to lock the safety-lever from movement to firing position.

28. The combination of the casing, the safety-lever having a slot for the side lock, the firing devices supported by the safety-lever and including a hammer having a slot which registers in the locked position of the hammer with the slot in the safety-lever, and the side lock movable on the casing and having a portion entering the slots of the safety-lever and hammer in the locked position of said side lock.

29. The combination of the hammer, the trigger movable longitudinally and also having an up-and-down movement at its rear end, the sear movable pivotally and longitudinally, the latter movement being in a direction at approximately a right angle to the direction of longitudinal movement of the trigger, the said sear being provided at its lower end with projecting fingers for engagement by the trigger and adapted at its upper end to secure and release the hammer, and the combined sear-spring and trigger-spring having at its upper end an intermediate tongue constituting a sear-spring and side tongues engaging with the trigger, all substantially as and for the purpose set forth.

30. The combination of the casing, the safety-lever pivoted to the casing, a spring for pressing the safety-lever away from the casing, and the hammer pivoted to the safety-lever in such position that when the safety-lever is in its outermost position it will adjust the hammer out of position for firing the charge.

31. The combination in a firearm, of the hammer, the sear arranged to hold and release the hammer, said sear being movable pivotally and also movable bodily along its pivot, and the trigger to operate on said sear and movable longitudinally in a direction at approximately a right angle to the direction of longitudinal movement of the sear.

32. The combination in a firearm of the hammer, the sear movable pivotally and also movable longitudinally relative to its pivot, a spring for actuating said sear, and arranged to give same a longitudinal tendency, and the trigger for operating the sear and movable longitudinally in a direction at approxi-

mately a right angle to the lengthwise movement of the sear, the trigger being also movable up and down at its rear end.

33. The combination of the safety-lever 5 having stop-shoulders for engagement by the trigger in one position of the lever, the lever being movable to adjust said shoulders out of the path of the trigger, the hammer carried by the safety-lever, the sear also carried 10 by the safety-lever and movable pivotally and longitudinally and having finger portions movable adjacent to and clear of the stop-shoulders of the safety-lever, and the trigger.

34. The combination of the safety-lever 15 having a boxing on its inner side, the hammer and the hammer-spring engaged at its upper end with the hammer and fitting at its lower end within the boxing and having a returned portion at such end held within the boxing on the inner side of the safety-lever. 20

35. The combination of the spring-actuated safety-lever, the sear, and the combined sear-spring and trigger-spring held at its 25 lower end to the safety-lever having its upper end divided to form the side tongues for actuating the trigger and the intermediate tongue for adjusting the sear, said tongues being deflected at their upper ends to exert a forward lifting tendency on the parts they 30 operate.

36. The combination of the casing, the back plug having a bayonet-joint with the casing, the safety-lever pivoted to the casing 35 and having upwardly-projecting tongues engaging with the back plug, the firing mechanism carried by the safety-lever, and the barrel and breech-block.

37. The combination with the casing, and 40 the safety-lever pivoted thereto, of the barrel sliding in the casing, and the side lock movable in the casing and arranged to lock the safety-lever and means operated by the side lock for locking the barrel from move- 45 ment in the casing.

38. The combination of the casing, the barrel and breech-block, the safety-lever pivoted to the casing, the hammer pivoted to the safety-lever and provided with stop lugs or 50 studs to engage with the barrel and prevent the passage of the hammer to firing position when the safety-lever is out of firing position.

39. A firearm having its grip provided at one side with a safety device spring-pressed 55 normally to an outer position and arranged to be depressed in grasping the grip of the arm, and the firing devices carried by the safety device for operation, substantially as set forth.

40. A firearm having a casing, a grip portion, a barrel, a safety-lever and a lock arranged adjacent to the grip, and movable 60 into and out of position to lock the safety-lever and means operated by said lock for locking the barrel, said lock being so ar-

ranged that its position can be readily determined by sight or touch, substantially as set forth.

41. The combination of the hammer, the sear arranged to hold and release the hammer, and having a pivotal and a longitudinal 70 movement, a spring for actuating the sear and a trigger for operating the sear to release the hammer, the trigger being movable longitudinally in a direction approximately at a 75 right angle to the longitudinal direction of the sear.

42. The combination of the casing, the barrel movable therein, the barrel-spring, the back ring for the barrel-spring, the barrel-stop fitting in the casing and having means 80 for limiting the movement of the barrel and a lug to engage with the back ring of the barrel-spring, and a latch for holding said barrel-stop in position for use. 85

43. The combination of the casing, the barrel, the side lock movable on the casing into and out of engagement with the safety-lever, and a pin arranged for engagement by the side lock and movable thereby into and out 90 of engagement with the barrel, and arranged to be moved into engagement with the barrel whereby the barrel will be locked by said pin when the side lock is adjusted to engage with the safety-lever. 95

44. The combination of the casing having a cylinder for the operation of the gas evolved by the explosion, the barrel, movable longitudinally in said casing, the breech-block movable in the barrel, a latch carried by the 100 barrel and arranged to be held by the casing in position to lock the breech-block to the barrel, until the barrel has adjusted to such position as to release the pressure of the gas, and a spring for readjusting the barrel. 105

45. The combination of the casing, the barrel longitudinally movable in the casing and having a port for the passage of the gas to the casing and a piston to be acted on by the gas whereby the gas may push forward on 110 the frame thereby counteracting the recoil, a spring for readjusting the barrel, a breech-block movable with and independently of the barrel and given tension by the barrel-spring, and the latch for locking the breech-block to 115 the barrel in certain positions of the parts.

46. The combination of the casing, the barrel having a rear extension, the barrel-spring, the front bearing for said spring consisting of a ring encircling and sliding along the barrel, 120 a rear bearing for the spring through which bearing the barrel may move longitudinally, the breech-block movable in the rear extension of the barrel, a connection between said breech-block and the front bearing for the 125 spring, and an abutment carried by the casing for the rear bearing for the spring.

47. The combination of the casing having an inwardly-projecting flange and a cylinder in rear thereof, the barrel movable in said 130

casing and provided with a port inclining forwardly toward the flange of the casing whereby to cause the gas to act directly against the said flange, and a piston on the
5 barrel in rear of said port, substantially as set forth.

48. The combination of the casing provided in its opposite sides with openings for exposing the gripping-plates, and in rear of
10 said openings with laterally-bulging portions, the breech-block operating in the casing, and the gripping-plates operating in the casing opposite the side openings therein and within

the laterally-bulging portions of the casing in rear of said openings, substantially as set
15 forth.

49. An automatic pistol having a casing, a longitudinally-movable barrel within the casing and the longitudinally-movable gripping-plates at the opposite sides of the casing, sub-
20 stantially as set forth.

JOSEPH JOACHIM REIFGRABER.

Witnesses:

H. S. ALBRECHT,
AUG. SCHOELLHORN.