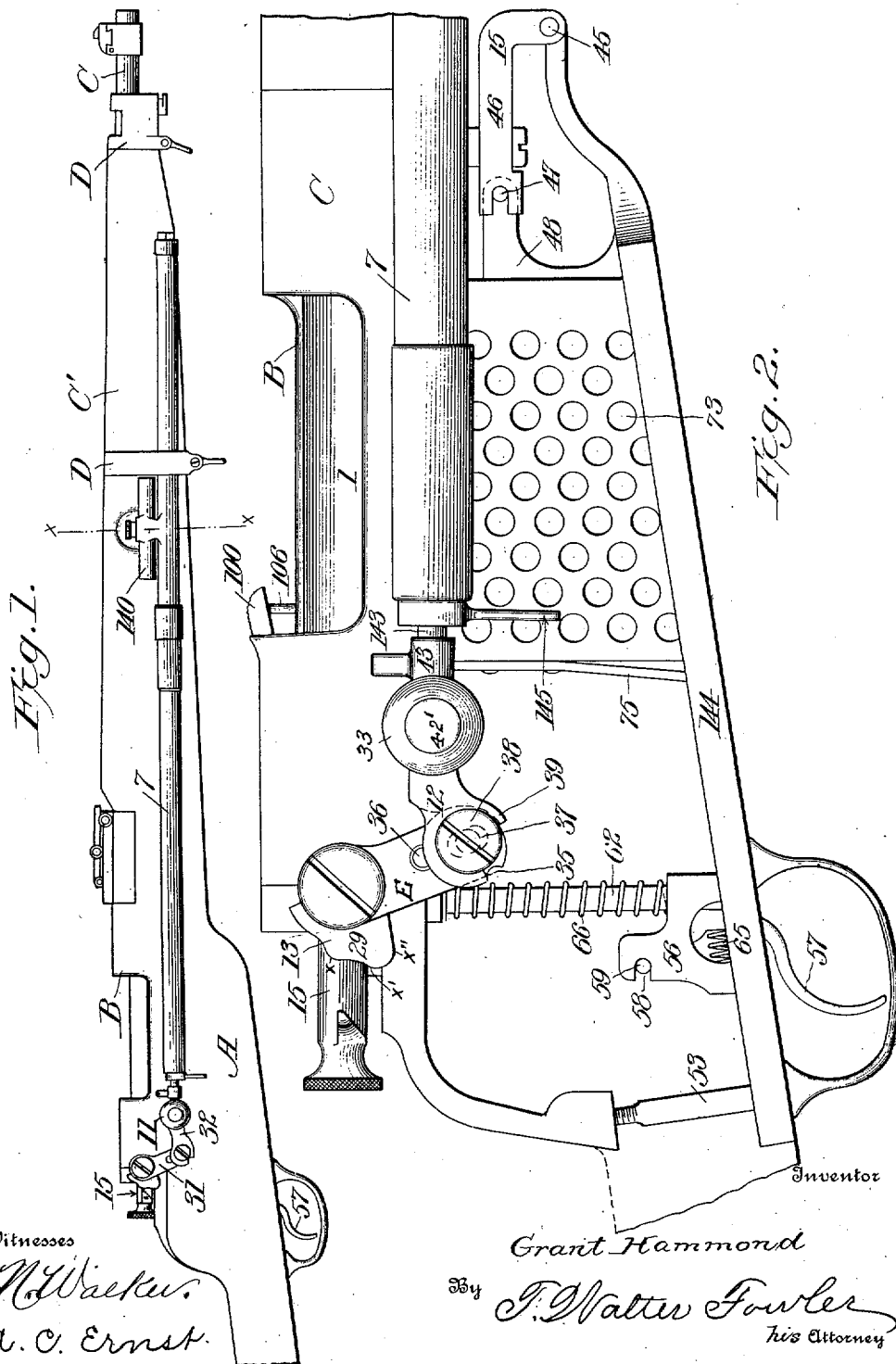


954,797.

Patented Apr. 12, 1910.

6 SHEETS—SHEET 1.



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AUTOMATIC GUN.

APPLICATION FILED NOV. 4, 1907.

Patented Apr. 12, 1910.

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Fig. 3.

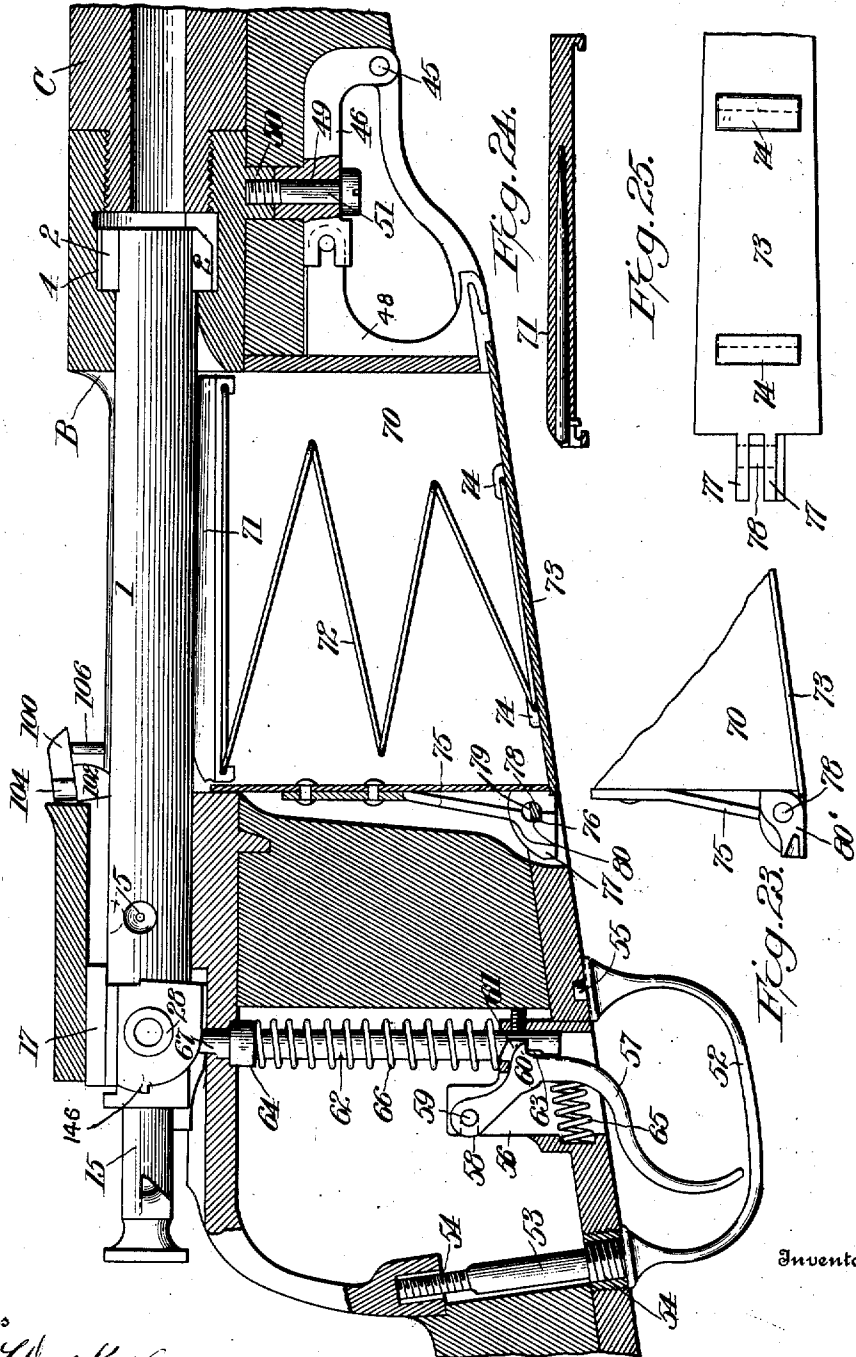


Fig. 25.

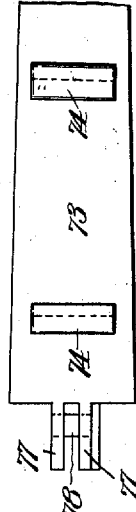
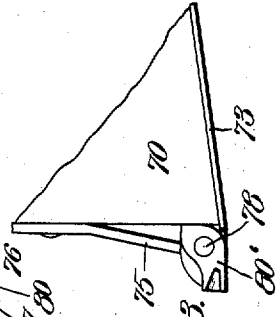


Fig. 23.



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8 SHEETS—SHEET 3.

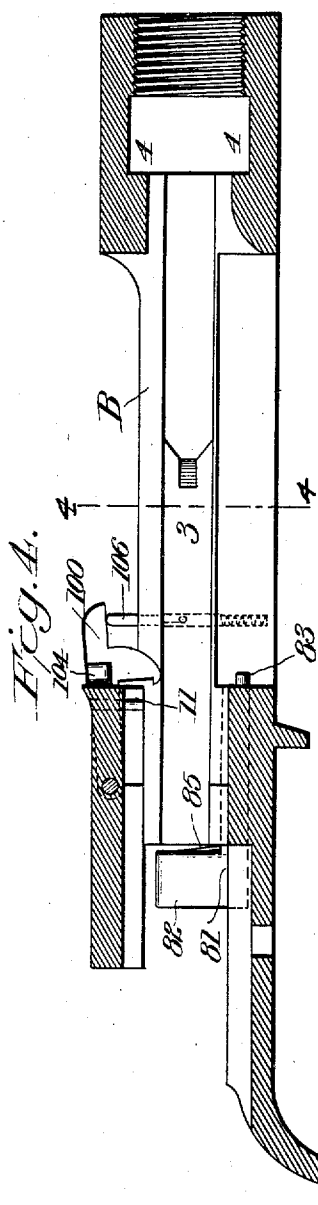


Fig. 4.

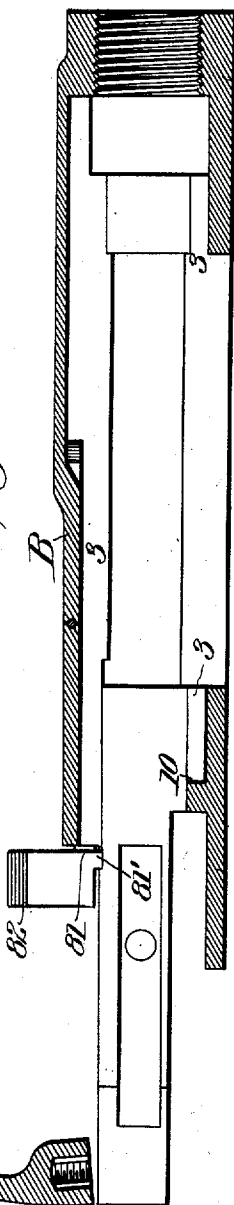
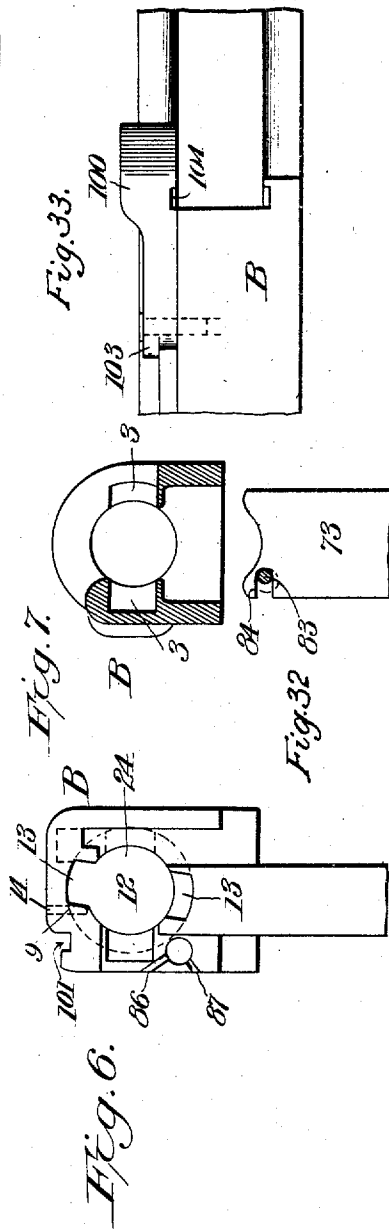
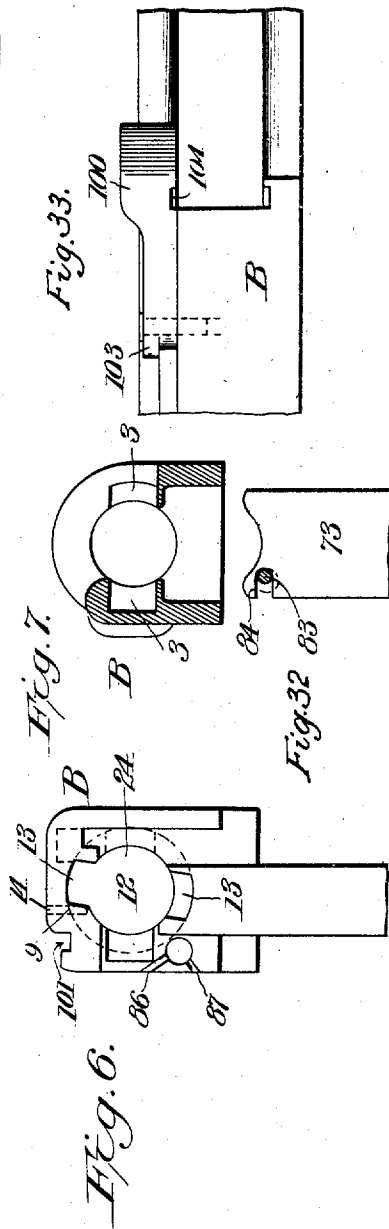
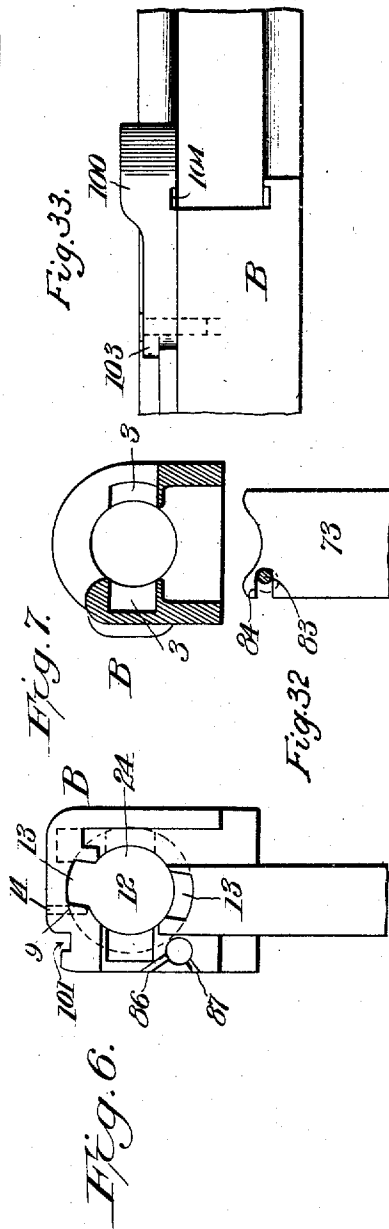
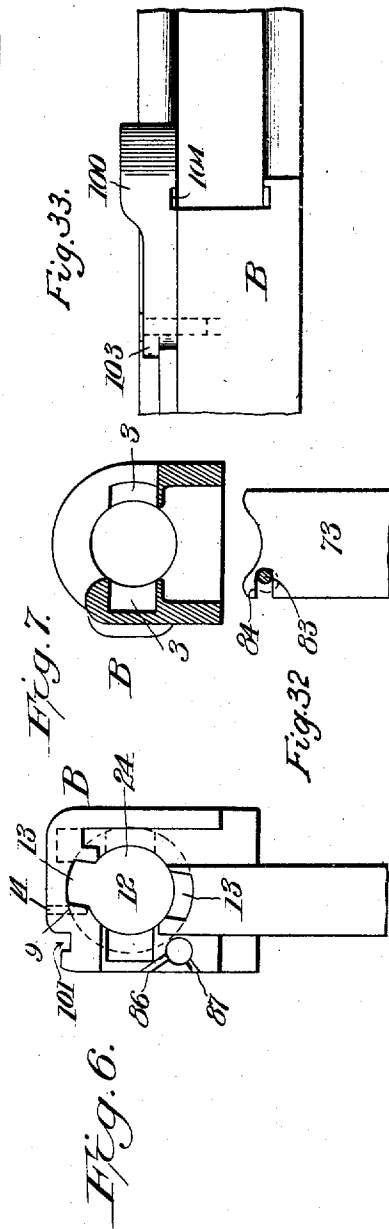


Fig. 5.



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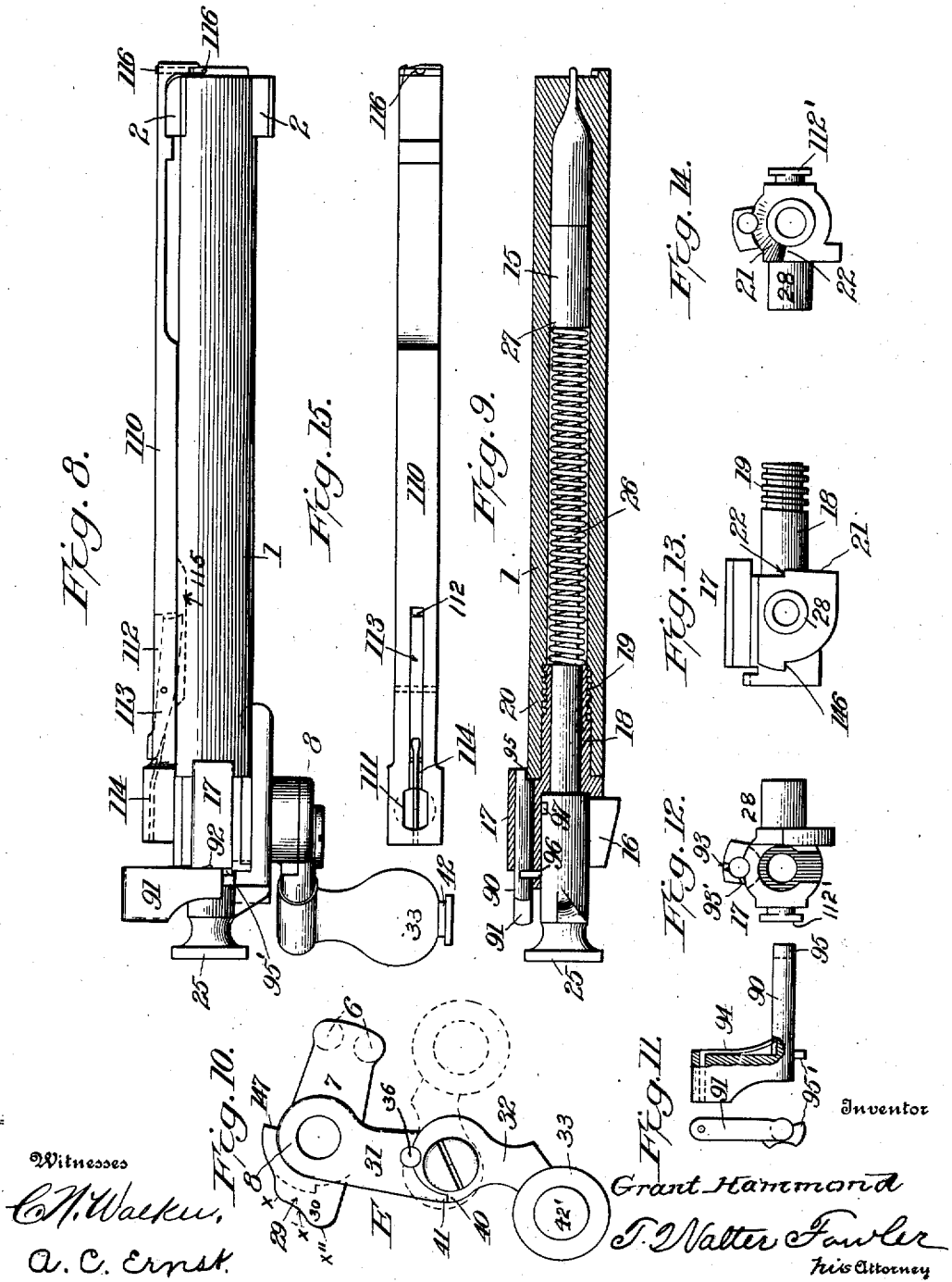
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Patented Apr. 12, 1910.

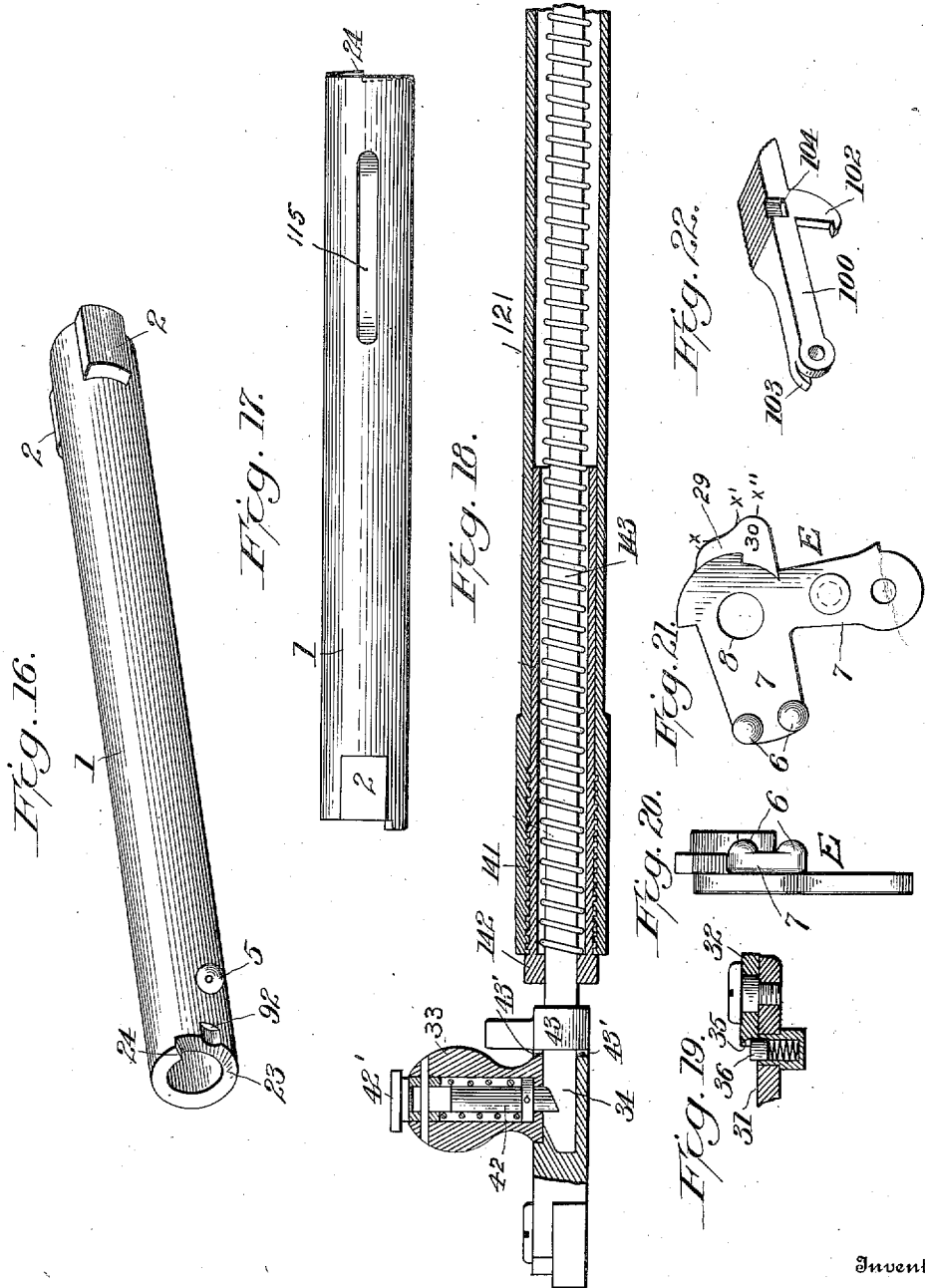
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6 SHEETS—SHEET 5.



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Fig. 26.

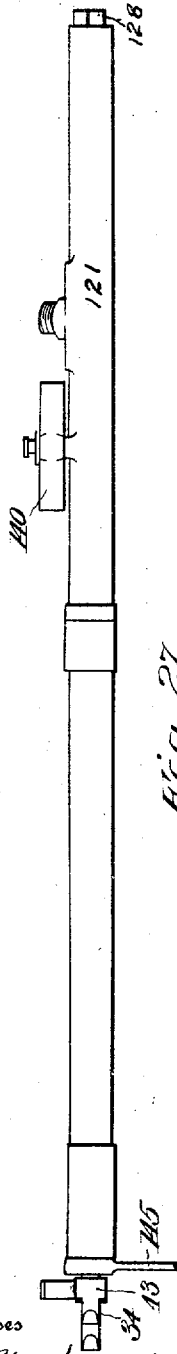


Fig. 27.

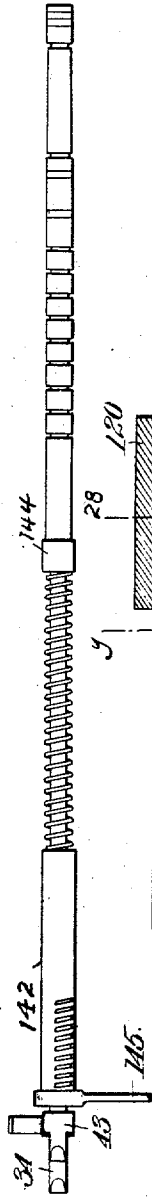


Fig. 28.

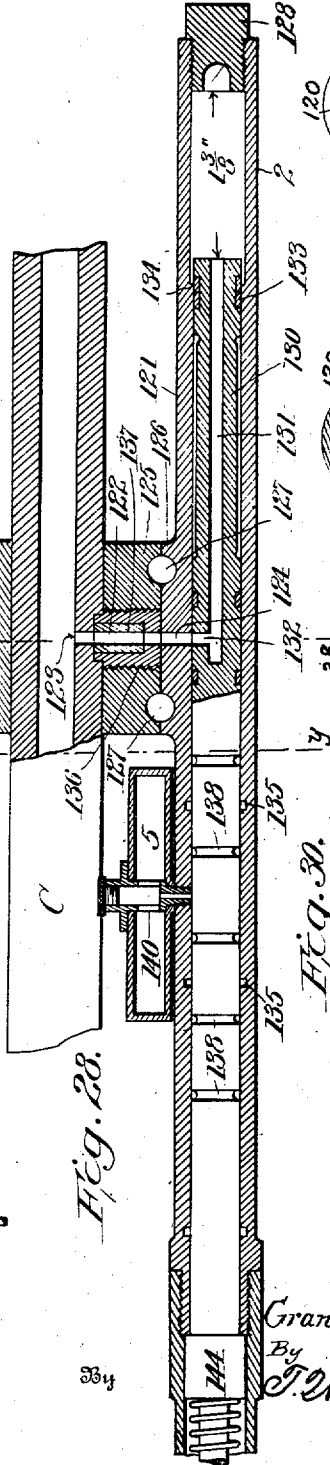
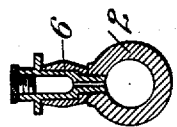
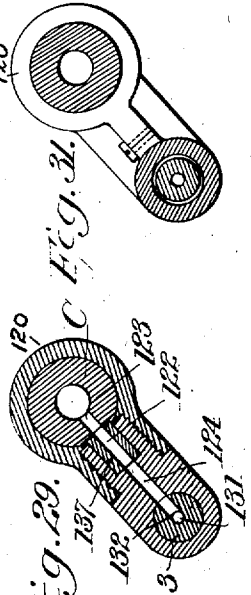


Fig. 29.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC GUN.

954,797.

Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed November 4, 1907. Serial No. 400,527.

To all whom it may concern:

Be it known that I, GRANT HAMMOND, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Automatic Guns, of which the following is a specification.

My invention relates to certain new and useful improvements in automatic guns and to guns which are convertible for automatic and repeating purposes, and my invention consists of the parts and the constructions, arrangements and combinations of parts which I will hereinafter describe and claim.

15 In the accompanying drawings forming a part of this specification in which similar reference characters indicate like parts in the several views:—Figure 1 represents a side elevation of an automatic gun embodying my invention. Fig. 2 is an enlarged side elevation of the gun action removed from the stock. Fig. 3 is an enlarged longitudinal sectional view of the gun action in place in the stock. Fig. 4 is a longitudinal vertical section of the receiver. Fig. 5 is a longitudinal horizontal section of the receiver. Fig. 6 is an end view of the receiver. Fig. 7 is a cross sectional view on the line 4—4 of Fig. 4. Fig. 8 is a top plan view of the breech-bolt and connected parts. Fig. 9 is a longitudinal sectional view of the breech-bolt and its cap, showing the firing-bolt in elevation. Fig. 10 is a side elevation of the bolt-operating lever. Fig. 11 is a side elevation and end view of the dog, 91. Figs. 12, 13 and 14 are views of the breech bolt cap. Fig. 15 is a plan view of the extractor. Fig. 16 is a perspective view of the breech-bolt detached. Fig. 17 is a side elevation of the breech-bolt. Fig. 18 is a longitudinal sectional view of the rear end of the gas cylinder showing a part of the piston rod and the means for locking it to the main-operating lever. Fig. 19 is a sectional view of the detent for locking the jointed parts of the bolt-operating lever. Fig. 20 is an edge view of one of the members of the bolt-operating lever. Fig. 21 is a view from the inner side of the same. Fig. 22 is a perspective view of the dog, 100. Figs. 23, 24 and 25 are details of the magazine. Fig. 26 is a plan view of the gas cylinder and connected parts. Fig. 27 is a plan view of the piston removed from the cylinder. Fig. 28 is a sectional view of the automatic devices

and part of the breech bolt. Fig. 29 is a cross sectional view on the line 28—28 of Fig. 28. Fig. 30 is a sectional view of the lubricator. Fig. 31 is a sectional view on the line *y—y* of Fig. 28. Fig. 32 is a detail of the upper portion of the magazine. Fig. 33 is a plan view of the rear part of the magazine, showing the dog, 100.

In the accompanying drawings I illustrate the salient features of the present invention in connection with a gun which employs a longitudinally reciprocating breech-bolt said gun being adapted for either single or magazine firing, the purpose being to convert such a gun into what is known as an automatic gun wherein the expansive force of the gases from the exploded charge of powder is utilized to retract the breech-bolt and automatically cock the firing-bolt and place the trigger mechanism so that the gun may be successively fired by the simple pulling of the trigger as the cartridges are fitted into the breech and into the range of action of the breech-bolt and its contained firing-bolt.

The gun herein employed for illustrative purposes is an improvement on and follows more or less closely the construction of the automatic gun described in my former application Serial Number 356,996 filed Feb'y. 12, 1907 and the magazine shown, described, and claimed in my former application, Serial Number 348,057, filed December 15, 1906; my purpose in illustrating this latter gun is to show how readily the present improvements may be applied thereto to convert said gun into one of the automatic type. I desire to state, however, that the present invention is not restricted to the style of gun shown or to any particular type of gun or style of operating breech-bolt, and its adjuncts, but is to be considered largely as an automatic attachment, for in the case of any of the well known repeating rifles or magazine guns, I can readily supply said guns with the present invention and thus convert them into automatic guns.

Referring now to the gun shown in Figs. 1, 2 and 3 wherein sufficient of the gun mechanism is disclosed to make the present invention understood, A indicates a stock such as is suitable for a gun of the character indicated, which gun has a metal main-frame or receiver B into the forward end of which the barrel C of the gun is appropriately secured. For military or other purposes the stock may

be extended beneath the barrel to approximately the front end thereof; and to protect the hands of the operator from undue heat by reason of rapid or continuous firing, the wooden cap piece C' may be fitted upon the top of the rear portion of the barrel, the whole being held together by appropriate split-bands D or equivalent devices.

The breech-bolt, 1, is slidably mounted in the receiver and at its forward end it is provided with lugs 2 which slidably fit the longitudinal grooves 3 which are usually formed along the inner sides of the receiver to accurately guide the breech-bolt in its sliding movement after said bolt has been partially turned—say about a quarter of a circle—to unlock it, said longitudinal grooves connecting at their forward ends with the transverse or cam-grooves 4 behind the shoulders of which the lugs 2 engage when said lugs are brought into register with the cam-grooves and the bolt is turned, as in my aforesaid prior application, 348,057. The breech bolt is shown in Figs. 3, 8, 16 and 17 as having its rear portion provided with semi-spherical cavities or depressions 5 adapted to receive corresponding semi-spherical or like projections 6 formed on or otherwise made rigid with the short arm 7 projecting from the hub or sleeve 8 on the main operating lever E whereby when this lever is turned on its fulcrum in one direction the projections 6 successively engage the cavities 5 and thereby cause the breech-bolt to be accurately turned to bring the lugs 2 into register with the longitudinal grooves 3 on the inner sides of the receiver to allow said bolt to be now retracted by a straight rearward pull on the lever E; when the lever is moved in the other direction, after the bolt has been pushed to substantially the limit of its forward movement in the receiver, and said lever is turned upon its axis in a direction the reverse of that first above mentioned, its projections 6 successively engage the cavities 5 in the breech-bolt and thereby cause the bolt to rotate to bring the lugs 2 into engagement behind the shoulders of the transverse grooves 4 which operation is well known in this art and is fully disclosed in my former application, 348,057.

The rear portion of the receiver is milled out or otherwise provided with a chamber 9 the righthand wall of which is made with a lug 10 while the upper wall is provided with a lug or stop 11. The rear face of the receiver has a circular opening 12 to receive the breech-bolt, from which opening are radial extensions 13 to receive the lugs 2 on the breech-bolt. Thus in removing the breech-bolt from the receiver said bolt is pulled back until the lug 2 on the right-hand side thereof strikes the lug or stop 10, when the bolt is given a quarter-turn or until

stopped by a pin or stop 14 to bring the lugs 65 into register with the radial openings 13 when the bolt may be pulled out of the receiver. In replacing the breech-bolt, the lugs 2 thereof are brought into register with the radial openings 13 and the bolt is shoved forward until the upper lug 2 strikes the lug 11 when the bolt is given a quarter turn to bring its lugs in line with the longitudinal grooves in the sides of the receiver after which the bolt is seated and locked, as before described, the extractor hereinafter described, at all times sliding in its channel or groove in the left side of the receiver.

Within the breech-bolt is slidably mounted the firing bolt, 15, having projecting vertically from its under side a fin, 16, which is adapted to slidably operate in a channel formed in the breech-bolt cap 17, said cap being adapted to have a sliding movement upon the rear end of the receiver and to have the rear end of the breech-bolt detachably secured to it. In the present case the connection consists in forming the cap, 17, with a tubular forward extension 18, the outer portion of which is formed with left-hand threads, 19; the rear end of the breech-bolt fits over the tubular extension 18 of the cap, and is provided with left-hand threads 20 on its interior forward of the rear end whereby the bolt may be screwed into the tubular extension of the cap piece, to operate as I will presently describe. As shown in Figs. 13 and 14, the front end of the cap piece 17, is formed with a single spiral thread or surface 21 corresponding with the pitch of the threads 19 and terminating in a shoulder 22, at its highest point; the rear end of the breech-bolt is likewise formed into a single spiral thread or surface 23, (Fig. 16) terminating in a shoulder 24, at its highest point, which is designed to come in contact or locking engagement with the said shoulder 22, on the cap to prevent the breech-bolt being turned too far. From this description it will be apparent that when the breech-bolt is screwed upon the threaded end of the tubular extension, 18, the spiral or inclined rear end of the breech bolt is in loose contact with the corresponding front end of the cap-piece, the shoulders 22 and 24 being separated, but when the breech-bolt is axially turned, by the lever E and the lugs 6 and sockets 5, to unlock it from the cam lugs 4 at the forward end of the receiver, the said bolt screws slightly upon the tubular extension and the cam or spiral surface 23 on the rear end of the bolt rides in contact with the corresponding surface 21 on the front end of the cap-piece to allow for the slight rearward movement of the breech bolt on the tubular extension, thereby drawing the rear end of the breech bolt into close and intimate contact with the front end of the cap-

piece to make a tight joint at this point, and prevent sand, grit or foreign matter entering the bolt and possibly clogging the action.

The firing bolt 15 is provided with the usual knurled head 25 and surrounding a reduced portion of said bolt is the usual main spring 26 one end of which bears against a shoulder 27 near the forward end of the bolt while the other end bears against the front end of the tubular extension 18 of the cap piece. The cap piece is also formed rigid with a post or stud 28 projecting from one of its sides and forming the journal for the hub of the operating lever, E, on which pin or stud the lever turns as an axis, the hub of the lever being formed or provided with a rearwardly extending flange 29, a portion of which between the points $x-x'$ being substantially concentric with the axis of the lever to allow said lever a partial axial movement rearwardly before the portion of said flange, that between the points $x'-x''$ and which forms the cocking cam 30 of the lever operates to pull the firing pin rearwardly so that the front end of the pin cannot contact with the primer in forming the shell into the breech of the gun.

The operating lever E is, in the present instance, formed of two parts pivotally joined by a bolt, one of said parts 31, carrying the cocking cam, before mentioned, and the other part 32 carrying the knob or handle, 33 by which the operation of the lever is facilitated. The part 32 of said lever has a socket lengthwise of it adapted to receive the rear end of the piston rod 34, of the automatic attachment which I will presently describe, when the said attachment is in use and the part, 32, of the lever E is in the position shown in Figs. 1 and 2, said part, 32, of the lever having a notch 35, in the periphery of its head portion adapted to be engaged by a spring-pressed pin 36 in the part 31 of the lever when the two parts of said lever are brought substantially into line, as in Fig. 10, which is the position of the lever when the automatic features are thrown out of action and the gun is used as a repeater.

One of the parts, 32, of the lever E is formed with an elongated hole 37 in which the pivot pin 38 operates loosely to prevent strain on the piston rod of the hereinafter described automatic attachment, and to preserve the alinement of said rod, said part, 32, having an inwardly extending flange 39 on its rear face adapted to work in contact with an arc-face on the lower end of the other part, 31, of said lever when the lever is bent into the position shown in Fig. 2. The end of the flange, 39, also forms a shoulder 40 which coacts with a similar shoulder 41 on the other arm of the lever to insure the proper alinement of the parts of the lever when the lever is in the condition

shown in Fig. 10. This insures, also, the automatic engagement of the spring-pressed pin 36, with the lever arm 32.

Mounted axially in the knob 33, of the bolt-operating lever E, is a spring pressed pin 42, the inner end of which is shown beveled to adapt it to be engaged by the beveled rear end of the piston rod 34, of the automatic attachment, said piston rod having a notch into engagement with which the spring-pressed pin 42 engages, the construction forming a releasable detent mechanism between the bolt-operating lever and the piston rod of the automatic attachment. To release this mechanism, the finger is made to engage the projecting head 42', of the pin 42, when the said pin may be withdrawn out of locking engagement with the piston rod, before mentioned, and a suitable spring, hereinafter mentioned, projects the piston rod forwardly so that its end is removed out of the range of action of the bolt operating lever when the gun is being used as a single firer or repeater. This forward movement of the spring-pressed piston is limited by the collar 43, coming against the end of the cylinder as in Fig. 26, the gas passages of the automatic attachment, hereinafter mentioned, being in this case normally in register. If the piston is in its normal position when this uncoupling is effected, the spring does not operate to further move the piston forward.

The trigger-guard plate 144 is clearly shown in Fig. 2. It has its front end curved upwardly and forward with the forward extremity lying in a plane somewhat higher than that of the balance of the guard plate. This forward extremity of the trigger guard plate pivots upon a drive pin 45 which extends transversely across the lower end of a vertical or down-turned end or arm of a yoke 46 the major portion of which is horizontally disposed below the breech and forward end of the receiver B, and has its rear end forked to form an open bearing for the reception of the journal ends of a transverse pin 47 carried at the end of a horizontal forward extension of the web or flange 48 on the front face of the magazine. The yoke 46 is therefore connected at its opposite ends to the front end of the trigger guard plate and front end of the magazine. At its intermediate point the yoke is formed with a hollow stud or boss 49 which enters a socket in the stock, A, and abuts vertically against a stud 50 on the underside of the front end of the receiver, as shown in Fig. 3, a threaded bolt or screw 51 being passed through the yoke and hollow stud thereof from below and screwing into the stud on the receiver whereby the yoke serves to secure the front end of the trigger guard and front end of the magazine to the receiver.

The trigger guard plate carries the trigger guard 52 which latter is much like the trigger guard shown and described in my aforesaid prior application, Serial Number 348,057, in that it has fixed to its rear end a post 53 which passes through a sleeve 54 adjustably fitted to the rear or tail end of the trigger guard plate. The sleeve has internal threads, and the base of the post 53 is threaded to engage the sleeve, said post having its upper portion flattened on two opposite sides, the remaining sides being threaded to screw into engagement with a suitable hole or socket 54' in the underside of a rearwardly and downwardly curved extension of the bottom wall of the rear end of the metal receiver, B.

The trigger guard is provided at its front end with a stud 55 adapted to spring into locking engagement with a suitable recess or hole in the guard plate whereby when it is desired to open or detach the guard plate and afford access to the parts which it carries, the trigger guard is first pulled down to detach its stud from its hole after which the trigger guard is turned to the right in its bearing in the sleeve 54. This action at the same time removes the threaded upper portion of the post 53 from its engagement with the threaded portion of the socket or recess in the tail end of the receiver and turns the flattened sides of the post into parallelism with the long sides of the recess thereby enabling the post to be pulled out of the recess and the trigger guard plate with the attached trigger guard to be lowered about the pivotal connection at the front downturned end of the yoke 46. The reverse operation of these parts results in the trigger guard being swung into position beneath the guard plate and the stud 55 snapped into engagement with its hole in said guard plate, and the post 53 being turned into locking engagement with the threaded walls of the recess in the tail end extension of the receiver. The purpose of the externally threaded sleeve in which the post is turnable is to enable the sleeve to be adjusted to cause it to shorten or lengthen the seat or bearing for the post, and thereby compensate for shrinkage of the stock, as more fully explained in my aforesaid application 348,057.

The trigger guard plate is made rigid with a trigger holder 56 which comprises a forging forked to form two spaced vertically standing walls between which the trigger 57 is pivotally mounted. The walls of the trigger holder have horizontal slots 58 near their upper ends said slots opening rearwardly through the rear edges of said walls to admit the trunnion ends of a drive pin 59 fixed transversely in the upper end of the trigger as shown in Fig. 3 said trigger having its intermediate portion extending forwardly and downwardly from said pivot. In other

words, the trigger is of more or less angular form with the two opposite portions extending rearwardly from the intermediate part in substantially divergent planes, said intermediate portion having a forwardly projecting spur 60 adapted to engage a square-faced notch 61 in the vertically disposed sear-post 62 said post having in its rear side just below the horizontal or square face of said notch, a longitudinally extending groove or channel 63. In its normal position, the square face of the trigger spur 60 engages the square face of the notch in the sear-post. When the trigger is pulled rearward the spur 60 on its front face forces the spring pressed sear-post down until the spur rides out of contact with the square-faced notch 61 of the sear-post, thereby releasing the post. The post is instantly returned to its normal position with the collar 64 in contact with the underside of the tail of the receiver. When the finger is removed from the trigger, the trigger spring 65 which lies back of the trigger, and which was compressed when the trigger was pulled backward, forces the trigger forward thereby causing the spur or point 60 to fulcrum and ride upwardly on the sear post and causing the upper part of the trigger carrying the pivot pin 59 to be forced backward in its slots 58 until the spur on the front of the trigger body is lifted in register with the square-faced slot 61 in the sear-post 62, when the whole upper part of the trigger is forced forward, the spur resting in the slot in the spring-pressed sear-post.

The trigger is acted on by the spring 65 which bears against its intermediate portion, the rear end of the spring seating in a recess in a vertical wall of the trigger-guard plate at the base of the trigger holder.

The sear-post is spring-pressed it being encircled by the spring 66 which is confined between a horizontal top wall of the trigger-holder and the collar or flange 64 at the upper end of said post. The post extends above this collar and through the bottom of the tail extension of the receiver, said collar abutting the underside of the tail extension of the receiver, and said upwardly extending part of the sear-post being constructed as a sear 67 to engage the lug 16 on the underside of the firing-bolt in the usual well known manner.

The magazine 70 may be of any usual type suitable for a gun of this character. The magazine shown for illustrative purposes is provided with a suitable form of hollow ribbed spring support 71 upon which support the cartridges are placed and by which the said cartridges are fed into the receiver to be subsequently pushed into the breech end of the barrel by the breech bolt, in the manner well known in this art.

The magazine is supplied with the spring 72 and the bottom plate 73 which fits in a

suitable recess in the trigger-guard plate, as more fully disclosed in my aforesaid former applications, this plate having under-cut lugs 74 on its upper surface to engage the ends of the bottom plate of the spring 72 as shown in Figs. 3 and 25.

To the rear vertical wall of the magazine is secured a spring-plate 75 the lower portion of which is slightly bent rearwardly and provided with a forwardly facing square or other notch 76. The rear end of the bottom plate of the magazine is also provided with a pair of spaced lugs 77 between which the lower notched end of the spring-plate 75 is received when the magazine is closed, as in Fig. 3. For the sake of lightness and to allow dirt to sift out, the magazine may be supplied with numerous holes, as shown.

Turnably mounted between the spaced lugs 77 is a pin or shaft 78 which is flattened or squared on one of its sides as at 79 said shaft or pin having a square face or surface 80 arranged at right angles to the first-named surface. On the outer end of the shaft or pin 78 is fixed a finger piece or lever 80' by means of which the pin or shaft may be turned to lock and unlock the magazine as I will hereinafter explain. In connection with these features, I use a shifting lever 81 which is horizontally disposed and fits a bore in the bottom of the receiver, Fig. 4, the said lever having a thumb piece 82 on its rear end and having an eccentric pin or portion 83 on its front end adapted to turn in and out of a slot or recess 84 in the upper left-hand corner of the rear wall of the magazine, as shown in Fig. 32 and as fully described in my former application, Serial Number 348,057. When the shifting lever is turned so that its thumb piece stands upwardly, the eccentric pin or end thereof operates against the bottom wall of the slot 84 and the said magazine is slightly lowered to project its bottom plate sufficiently below the trigger guard plate to give ready access to the lever or thumb piece 80 of the turnable shaft or pin 78 which locks the bottom plate 73 to the magazine, and allows the finger or the butt of a cartridge to be inserted under the free end of the lever 80 to rock the shaft or pin 78 and turn its locking square-portion out of the square-faced notch in the spring plate 75. This permits of the removal of the bottom plate of the magazine and the emptying of said magazine, when converting the gun into a single firer, and without necessitating the removal of the breech-bolt from the receiver. The thumb piece 82 of the locking lever 81 is also provided with a spring 85, and the rear end of the receiver is provided with notches 86, 87, into engagement with which the spring snaps when said thumb piece is turned into its two positions, before mentioned, to insure the proper securing of the parts.

Journalled in the breech bolt cap 17 is a locking lever 90 having an operating thumb piece 91 and an eccentric front end adapted to interlock with an appropriate notch 92 in the side of the rear end of the breech bolt 1 (Fig. 16) the rear wall of the cap piece having two notches 93, 93' into engagement with one of which a spring 94 fixed to the thumb piece of the lever is adapted to enter when the said piece is turned into either of its positions. The upper notch 93 in the rear of the cap piece has one side square so that the locking lever will not go past a vertical position but by pressing the locking lever spring back into the recess which is formed in the thumb piece or lever end the locking lever may be forced over to the left, when it may be removed from the cap. The shifting lever 81 of the magazine is similar, the upper notch is square faced, preventing the removal of the shifting lever unless the spring is forced into its channel.

When the thumb piece is turned in one position, the eccentric 95 at the front end of the bolt extension of the said piece is turned into locking engagement with the notch 92 in the breech bolt and the spring interlocks with the notch 93 in the end of the cap piece. This locks the entire gun action and prevents the actuation of the main lever, E, and locks the firing bolt out of contact with the sear. When the finger piece 91 is turned in the opposite direction the eccentric or pin is turned out of the notch 92 in the breech bolt and the spring 94 is turned into engagement with the other notch 93' in the end of the cap piece. The bolt is now unlocked from the cap-piece and can be turned in the usual manner by the main lever E. The locking lever 90 is also formed with a lug or flange 95' on the underside of its rear end adapted to operate in a slot or recess 96 in the upper wall of the cap piece 17 said lug or flange, or the wall of the notch 97 in the firing bolt which it engages, being preferably cam-shaped to allow the turning of the lever to an upright position to lock the gun action, to also cam-back the firing bolt enough to release the sear. One side of the lug or flange 95' is curved to conform to the curvature of the bore of the cap piece so that when the locking lever is turned down, this curved portion fills the slot or recess 96 and excludes sand or grit therefrom. The flange or lug 95' by entering the recess, also prevents the endwise removal of the lever, which movement can only be effected upon turning the lever from the vertical position to a horizontal position to the right thereof. The locking lever 81 for the magazine also has a flange 81' fitting a recess in the receiver, Fig. 5, to lock this lever against end displacement when it is in a horizontal position.

In Fig. 22, I illustrate detached the auto-

matic clip dog 100 which is pivoted to the side of the rear end of the receiver and fits a channel 101 in said receiver (Fig. 6). This dog has a milled or roughened front end, and a downwardly projecting spur 102 which is designed to be forced into the range of action of the front end of the breech bolt when the said bolt is retracted. The dog 100 also has a spur 103 at its rear end adapted to engage with the top surface of the receiver to limit the upward movement of the free end of the dog. In the side of the dog 100 is made a notch 104 a corresponding notch being made in the receiver opposite to the notch, as shown in Fig. 33.

When it is desired to load the empty magazine, the breech bolt is pulled rearwardly until its front end passes the rear end of the upper plate or floor 71 of the magazine when the latter because of being spring-pressed, projects in front of the front end of the breech bolt and forms a stop therefor to prevent the forward return of said bolt. The usual and well known cartridge clip with its assembled cartridges is now pushed into the usual opening in the receiver, the usual lugs on the clip fitting the notches 104, in the clip-dog 100 and receiver. The pack of cartridges is now pushed down at the front end and this rocks the clip and causes the lower end of said clip to move backwardly in contact with the front end of the now retracted breech-bolt and push this bolt farther rearwardly and out of engagement with the magazine, and until the front end of said bolt and the end of the extractor which the bolt carries is moved past the end of the spur 102 on the automatic clip dog 100 when said dog is pressed down to bring its spur 102 into the range of action of the breech bolt to thereby form a stop to prevent the return of the bolt. The spring plate 71 of the magazine feed being now unlocked from its former engagement with the retracted breech bolt, the pack of cartridges may be readily pushed into the magazine, the spring plate constantly yielding for this purpose, and other cartridges may be likewise added until the magazine is full. When the loading of the magazine is completed, the automatic clip dog 100 is lifted out of its locking engagement with the end of the extractor when the breech bolt is permitted to return to its normal position. In thus lifting the clip dog, the lower wall of the notch 104 in the side thereof comes up under the usual lug on the clip and thus lifts the clip out of its seat.

The lifting of the clip dog is made automatic by a spring-pressed pin 106 mounted in the receiver and acting upwardly under the free end of the dog, as in Fig. 4, whereby as soon as the breech bolt is again pulled rearwardly, by the lever E, the spur 102 of the dog is released to allow the spring-

pressed pin 106 to act to lift said spur out of the range of action of the bolt; when the breech bolt is now shoved forward, by the lever E, the elevated clip is ejected thereby and falls out of the gun. The clip dog also permits the breech bolt to be retracted and instantly locked by the said spur 102, in a position rearward of the magazine at any time to refill a partially empty magazine.

The extractor 110 lies alongside of the breech bolt and its rear end is provided with an elongated slot 111; the cap-piece 17 of the breech bolt is also formed with a stud 112' having flattened sides. In assembling the extractor, the latter is turned crosswise of the breech bolt and cap-piece and until the elongated slot is in register with the stud when the latter enters the slot, after which the extractor is turned a quarter-turn and until it is parallel with the breech bolt, the front end of the extractor fitting over the front end of the bolt as in my former application Serial Number 348,057.

The extractor has a longitudinal slot 112 in which is pivotally mounted a bar 113 backed by a spring 114 which is fixed in the rear end of the extractor above the plane of the stud 112' and has its free end engaging the bar 113 back of its pivot. The front end of the bar 113 is designed to be held in a groove or channel 115 in the side of the breech bolt to lock the extractor to the bolt, and to form a longitudinal guide which will prevent the breech bolt rocking about its axis.

The ejector in the present case consists of a pin 116 slidably mounted in and parallel with the inturned front end of the extractor. By making this pin short or long the force with which the shell is ejected may be controlled owing to the projecting length of the inner end of the pin.

Referring now to the automatic attachment of Figs. 26 to 30, inclusive, and Fig. 1, where the attachment is shown in its position on the side of the gun, it will be seen that the attachment is fitted to the gun barrel by means of a bracket or forging 120 which is bored to receive the cylinder 121 of said attachment. A hole 122 is made vertically through the forging in a plane at right angles to the axis of the barrel and cylinder, said hole at one end intersecting the bore of the barrel through the gas intake 123 and at the other end connecting with a hole 124 made transversely through the cylinder.

The cylinder and forging are provided with abutting lugs or webs 125, 126, the meeting faces of which are each provided with matching grooves which form the holes 127 for screws or bolts which by passing across the line of joint or division between the forging and cylinder, hold the cylinder truly in line with the barrel and prevent

any tendency of one part turning relative to the other and thereby moving the hole in the cylinder out of alinement with the hole or port in the forging. These holes serve as the gas passage through which the products of combustion escape from the barrel into the automatic attachment and subsequently expand in the latter and by their expansive force or energy act through suitable connections upon the breech bolt to force it rearwardly to again automatically set the gun mechanism for the next operation of firing, as I will now explain.

The cylinder 121 is closed at its outer end, as by the screw plug 128. Within the cylinder operates the long piston 130 having a gas passage 131 made longitudinally through it from the front end to a point slightly back of the vertical plane of the gas passage leading from the barrel and forging, said longitudinal passage in the piston normally connecting with the gas passage formed in the barrel and forging by means of a right-angled passage 132. The piston may also be provided with a packing ring 133 near its front end which operates in conjunction with a shoulder 134 on the interior of the cylinder to scrape the inner wall of the cylinder of any foul deposits, and said cylinder may have annular grooves or channels 135 in its inner surface into which deposits of foul material scraped off by the piston in its reciprocations may be deposited.

The cylinder is made rigid with a threaded nipple 136 which screws into the forging, as in Fig. 28, this nipple containing a part of the aforesaid gas-passage and the upper end of the nipple being reduced and the adjacent under side of the barrel being cut out to form a square faced seat for the end of the reduced top of the nipple. Within the nipple and forming a lining for the gas passage thereof is a nickel or other hard metal sleeve 137 the purpose of which is to protect the passage from the destructive effects of erosion or enlargement of the passage due to the gas and the pressure under which it is driven through the passage on its way to the cylinder.

The piston 130 may have annular grooves 138 the edges of which serve as scrapers for removing deposits on the inside of the cylinder, said piston having the piston rod 34 which detachably connects with the main operating lever E, of the gun, as before pointed out. A lubricator 140, is fixed to the cylinder and connects with the interior of the cylinder to supply the piston with sufficient lubricant to make its operations easy. The piston closely fits the cylinder and said cylinder extends sufficiently beyond the front end of the piston when the latter is in its normal position, to form a chamber in which the gases of the exploded charge will be trapped

and allowed to expand, as I will hereinafter explain.

As shown in Figs. 18 and 27, the rear end of the cylinder is provided on its inside with mutilated threads 141 and the corresponding end of a casing 142 in which the spring 143 is partially housed is provided with similar threads adapted to interlock with the threads of the cylinder to form a strong and quick-fitting fastening between the two parts. The front end of the spring casing also serves as a stop against which a hardened collar 144 on the piston rod strikes to limit the rearward movement of said piston. The spring casing 142 also has fixed to its outer end a handle or piece 145 by which the casing may be turned to lock and unlock it and to allow it to be removed and stored.

The piston rod 34 extends through the closed end of the spring casing and its outer end is notched to engage the spring-pressed pin 42 in the knob of the operating lever E, as before explained. Fixed to the outer end of the piston rod is a lever 43 by which when the connection of the automatic attachment with the lever E is broken, the piston may be turned axially to turn its gas passage laterally out of register with the gas passage in the barrel and forging. This lever carries lugs 43' which interlock with grooves in the socket end of the lever arm 32 to thereby hold the piston with its gas passage in proper register with the gas intake port of the barrel, when the parts are coupled.

In connection with these features I mention the fact that the cap-piece of the breech bolt is formed with a shoulder 146 and the operating lever, E, is formed with a shoulder 147 these two shoulders being adapted to contact to prevent the lever being forced backwardly by the piston when the bolt has reached the end of its stroke.

Practical experiments with the gun have shown that the best results are only obtainable when observing a certain relation in the length and diameter of the piston, the length and diameter of the gas chamber of the cylinder, the diameter of the intake port, the length of the lever arm from the center of the hub to the center of the semispherical projections, and the length of the lever arm from center of the hub to the center of the arc-face.

The dimensions which I prefer to use for the above parts is as follows: Interior of the cartridge shell at the butt, $13/32$ of an inch. Diameter of piston $12/32$ of an inch. Length of gas-chamber $1-3/8$ inches. Diameter of gas-chamber $14/32$ of an inch. Diameter of intake gas-port, $.090$ of an inch. Length of lever arm from center of hub to center of semispherical projections, $7/8$ of an inch. Length of lever arm from center of hub to center of arc-face $1-1/8$ inches, but this lat-

ter length can be shortened to equal the length of the lever arm but cannot well be any longer than as stated above, namely, 1- $\frac{1}{8}$ inches, as if it be longer the breech bolt will be turned and unlocked before the bullet has left muzzle of the gun, and the breech bolt will receive the full breech pressure, and the salient feature of my gun will be lost as the gun would, in the case mentioned, become what is technically called a "blow-out" gun, which means a gun wherein the breech bolt is actuated by the gases of the breech, causing enormous breech pressure. In addition to the above stated action the piston would also receive the usual pressure which would also add force to the rearwardly forced bolt causing it to wreck the mechanism when it arrived at the end of its stroke. I have made the lever $\frac{1}{4}$ of an inch longer than the arm so that the piston mechanism will not need an excessively strong spring to close and lock the action, but any additional length would alter the general action of the whole invention, unless the piston was made smaller in diameter or the gas chamber was made much larger, or the intake port made much smaller. The interior of cartridge shell at the base being $\frac{13}{32}$ of an inch in diameter and the piston $\frac{1}{32}$ of an inch smaller, $\frac{12}{32}$, it may readily be seen that the pressure exerted against the lugs of the breech bolt must at all times more than equal the piston pressure. This being the case, the lever and its arm should be nearly evenly balanced, the piston diameter should be slightly smaller than the interior diameter of the shell at base, and the gas chamber should be of a given length and diameter in relation to the intake port. When all bear a given relation as regards diameters and lengths (the length of lever and arm) the action will never be operated until the bullet has left the muzzle of the barrel and the breech pressure is released.

A main operating lever arm made of the above described diameters and lengths is very nicely balanced and sensitive yet will remain locked until the breech pressure is removed by the bullet leaving the muzzle of the barrel. The length of the lever being slightly greater than its arm, as in my present invention, the gas chamber and intake-port cannot vary but very slightly from the sizes given. For instance, if the gas chamber is shortened to any appreciable extent, the intake-port remaining constant, the pressure in the cylinder becomes so great that the piston is forced backward causing the bolt to be turned by the lever before the bullet has reached the muzzle of the barrel. The same will be the case if the intake port is enlarged, the gas chamber remaining constant. On the other hand, if the gas chamber is enlarged, the intake-port remaining constant, there will not be enough pressure

to operate the mechanism, and the hole in the piston will remain in register with the intake port allowing the gas to escape. The only case in which the gas chamber and intake port may vary is when the lever and arm are balanced, that is, are of equal length.

The piston could in no case have its diameter increased unless the length of the lever from its hub to arc-face were made shorter than the arm from center of hub to center of semi-spherical projections. The general rule is, that the diameter of the piston should at all times be of a diameter smaller than the interior diameter of the cartridge shell at the butt, or at its largest interior diameter; and that the gas-chamber and intake port should remain very closely the sizes stated, otherwise the lever must be shortened, thus necessitating a very strong return spring, which would be very inconvenient in opening the action by hand, and which would, when the piston and cylinder became foul from firing, cause the piston to remain with its hole in register with the intake port and allow the gas to escape; this I have found by actual experiment to be the case. I have also discovered by experiment that the initial movement of the lever in turning the bolt should be free in order to allow the piston to move backward with slight resistance so that its hole is brought out of register with the intake-port instantaneously as the bullet leaves the muzzle of the barrel and the breech pressure is released, thus trapping the greater portion of the gas in the cylinder.

From a cursory reading of the above statement it would seem that I must be mistaken, as the statement appears, at first glance, to be in conflict with the previous statement in regard to the actuation of the mechanism before the bullet has left the muzzle of the barrel when certain conditions and sizes, etc., are varied. The statements are, however, not in conflict as the conditions existing when the bullet is in the barrel between the intake-port and muzzle are entirely different to those existing after it has cleared the muzzle. After the bullet has left the muzzle there is no interior pressure in the barrel, and if the initial movement is not free the confined gases in the gas chamber rush out of the intake port into the barrel that being the line of least resistance, and without moving the piston; whereas, if the initial movement is free the pressure of the gases instantaneously exerted move the piston and its contained hole backward, thus trapping the greater part, although a considerable portion of the gas does escape out the intake-port, still there remains enough to operate the piston backward to the end of its stroke, and still having plenty of reserve force left. In fact, whereas in my invention the piston is forced backward five

inches that is not the limit of the stroke as it could very easily be operated ten inches if necessary by making the cylinder and piston longer. When the bullet is in the barrel between the muzzle and intake-port the pressure exerted is precisely the same as that exerted on a steam engine piston, the barrel being the boiler; and consequently if pressure enough is exerted on the piston it must overbalance the pressure exerted on the bolt lugs by the breech pressure, by the conditions as hereinbefore stated, consequently the bolt will be turned under pressure and unlocked when it will be blown backward by the gases from the breech.

The magazine being charged with loaded cartridges and one placed in the breech, the general operation of my automatic gun is as follows: The trigger being pulled backward the firing pin shoots forward striking the primer and igniting the powder charge and starting the bullet on its flight through the barrel. After the bullet has passed the intake-port leading from the bore of the barrel to the gas chamber at the forward end of the cylinder, the gas begins passing through said port and continues to force its way in until the bullet has reached the muzzle of the barrel when the gas in the chamber is approximately of the same pressure as is the gas in the barrel. The bullet then leaving the muzzle of the barrel all breech pressure is removed and the bolt is freely turnable on its axis. The gas in the gas chamber at the head of the piston exerting its pressure instantaneously forces the piston and its contained lateral hole or port backward bringing this hole or port out of register with the intake-port leading from the bore of the barrel, and trapping the greater part of the compressed gas which was in the chamber when the bullet left the muzzle of the barrel. The gas now being trapped, the piston is pushed backward and forces the bolt which has been already turned to an unlocked position by the initial movement of the piston, and bolt mechanism rearward until the hardened collar, 144, of the piston impacts against the end of the spring casing, 142, and the bolt lug has at the same instant come in contact with its stop in the receiver. By this operation the piston-return spring has been compressed and the gas having escaped through the intake-port, the empty shell having been ejected and a loaded one forced up in front of the head of the bolt by the magazine spring, the piston spring forces the bolt and accompanying mechanism forward closing and locking the action, seating the loaded shell, cocking the firing bolt, and leaving the piece again in condition for firing by pulling the trigger backward. When all of the cartridges have been fired from the magazine the rib, 71, of the magazine-floor holds

the bolt retracted until a clip of loaded cartridges is inserted through the top of the receiver, when the automatic clip-dog, 100, pivoted to the left side of the receiver, is forced down by the clip, and the clip at the same time forcing back the bolt, the bolt is caught and held by the spur or projection, 102, of the clip-dog being forced into a small channel or cut in the head of the extractor. The loaded cartridges may now be pushed into the magazine by the thumb of the right hand. If the clip contains only five cartridges, it is removed by the hand and another one inserted, the bolt now being held by the clip-dog. After pushing the cartridges out of the second clip into the magazine the clip is left in position in the receiver. By taking hold of the bolt lever knob 33 and giving a slight pull backward the clip-dog releases the bolt and at the same time slightly raises the clip from its position in the receiver. Now by releasing the knob the bolt shoots forward, ejects the clip, forces a shell home in the breech, and turns to its locked position, leaving the firing bolt retracted in firing position.

If at any time during the firing of the gun it is necessary to stop the bolt in its retracted position at the end of its stroke, it may be accomplished by putting pressure on the top of the clip-dog so that when the bolt reaches its most rearward position it will be caught and held by the spur of the dog, as when the bolt has passed under the clip-dog the pressure exerted will cause it to move downward thus intercepting the bolt as it starts to return, an important feature as the magazine may be filled when partially empty without having to pull a loaded shell from the breech.

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

1. In an automatic gun, the barrel thereof, a cylinder supported relative to the barrel and normally in open connection with the bore thereof, said cylinder having a closed front end forming a tight gas-chamber, in front of the piston, and a piston operable in the cylinder and normally establishing communication between the barrel and gas chamber and operable as an automatic cut-off to trap the gases in the chamber whereby said gases operate expansively upon the piston to actuate the gun mechanism.

2. In an automatic gun, the barrel thereof, a cylinder connected thereto and in open connection with the bore thereof, and a piston operable in the cylinder having a longitudinal gas-passage one end of which connects directly with the portion of the cylinder in front of the piston and the other end is in normal register with the open connection between the barrel and cylinder, said

piston being operable by the expansion of the gases in the cylinder to interrupt said connection substantially coördinately with the bullet leaving the muzzle of the gun.

5 3. An automatic attachment for fire-arms, said attachment having a cylinder with a gas intake for receiving the gases of the exploded charge, and a piston having a longitudinally-extending gas-conducting passage the opposite ends of which are normally in open connection with said cylinder and the gas intake of the cylinder, said piston being operable by the gases conducted to the cylinder to first cut-off the gas intake thereof and then trap the said gases and retard their expansive force until the projectile has substantially left the muzzle of the gun, when the gases are permitted to act upon the piston to cause the latter to actuate the gun mechanism.

4. In an automatic gun, the combination with the barrel thereof, and complementary firing mechanism, of a cylinder having a gas intake in open connection with the bore of the barrel, said cylinder having a gas chamber, and a piston operable in the cylinder having a longitudinally-extending gas-passage the opposite ends of which are normally in register with the gas intake and gas chamber, said piston operable across the gas intake to cut-off the same and trap the conducted gases in the gas chamber of the cylinder and to be actuated by the expansive energy of said trapped gases to in turn actuate the firing mechanism of the gun.

5. An automatic attachment for fire-arms said attachment comprising a cylinder having a gas-intake, a piston operable in the cylinder and having a greater length than diameter said piston having an axial gas-passage with a lateral intake, and said cylinder extending forward of the front end of the piston in its normal position, to form a closed gas chamber into which one end of the gas passage of the piston directly leads, the lateral intake of the said gas passage being normally in register with the gas intake of the cylinder and being moved out of register with the gas intake of the cylinder to trap the gases in the gas chamber of said cylinder substantially coördinately with the flight of the projectile from the muzzle of the gun barrel.

6. In an automatic gun, the combination with the barrel thereof, having a gas-port, of a cylinder having a gas-chamber normally in open connection with the bore of the barrel and receiving gases from the exploded charge, a piston controlling said port and having a longitudinal gas-conducting passage with a lateral intake normally in register with said gas-port, and means connecting the piston with the gun action said piston trapping the gases in said chamber to allow

them to act expansively upon the piston to automatically actuate the gun-action.

7. In an automatic gun, the combination of the barrel having a gas-port, complementary cocking and firing mechanism, a cylinder secured to the gun and having a gas-chamber and a gas intake normally in open connection with the gas-port of the barrel, and a piston having a longitudinal gas-conducting passage with a ported-portion serving as an automatic cut-off to trap the gases in the gas-chamber whereby they act expansively upon the piston to automatically actuate the firing-mechanism.

8. An automatic attachment for fire arms, said attachment having means including a cylinder and a piston with axial gas-passage and lateral gas-intake for receiving and trapping the gases of the exploded charge, and retarding the expansive action of said gases until the projectile has substantially left the muzzle of the gun and then permitting the gases to act expansively upon the gun mechanism, said piston having portions extending fore-and-aft of the gas-intake.

9. The combination with a gun having a barrel and complementary firing mechanism, said barrel having a gas-port, of an automatic attachment for said gun, said attachment having a cylinder with a gas-intake normally in open connection with the bore of the barrel, a piston having a gas-intake normally in register with the gas-port of the barrel and having portions extending fore-and-aft of said gas-intake, said piston having a longitudinal passage connecting with the gas-intake for receiving the gases of the exploded charge and conducting the same to said cylinder, said piston serving as a means for trapping the gases while under compression and then allowing the gases to act expansively upon the firing mechanism, and detachable means for rendering the automatic attachment inactive relative to the firing mechanism without disturbing the latter.

10. The combination with a gun having a barrel and complementary firing mechanism, of an automatic attachment for said gun, said attachment comprising a cylinder having a gas-intake normally in open connection with the bore of the barrel and a gas-chamber receiving the gases of the exploded charge, means including a piston extending fore-and-aft of the gas intake and having a longitudinal passage with a gas-intake normally in register with the gas-intake of the cylinder, said piston having a packing ring each side of its gas intake, and first trapping the gases under compression in said chamber and then allowing them to act expansively upon the firing mechanism, and detachable means between the automatic attachment and the firing mechanism to render the au-

automatic attachment operative and inoperative at pleasure whereby the gun is readily convertible into an automatic gun or repeater.

11. The combination of a gun having a barrel and complementary firing mechanism, of a cylinder secured to the barrel said barrel and cylinder having registering openings forming a gas-intake, said cylinder having a gas receiving chamber, a piston operable in the cylinder having a longitudinally extending passage connecting at one end with said gas chamber, and having a lateral branch normally in register with the said gas intake, said piston extending forward and aft of its gas-intake adapted to be moved to carry its lateral branch out of register with the gas-passage by the pressure of the gases in the gas chamber of the cylinder, and to trap the gases in said cylinder while still under compression, whereby said gases act expansively to operate the piston, and means connecting the piston with the firing mechanism whereby the latter is actuated automatically.

12. In an automatic gun, the combination with the barrel thereof, a cylinder fixed to said barrel, said cylinder and barrel having a lateral passage forming a gas-intake, a non-erosive bushing in said passage and protecting the same from the action of the gases, a piston slidable in the cylinder and having a lateral port and a longitudinal passage connecting therewith and delivering the gases into the front end of the cylinder, said piston adapted to be moved by the gases to carry its lateral port out of register with the gas-intake of the cylinder whereby the gases are trapped in said cylinder, and means connecting the piston with the gun-action.

13. In an automatic gun, the barrel thereof having a lateral gas-port a cylinder positioned parallel with said barrel, a forging embracing the barrel and having a web portion abutting a corresponding portion of the cylinder, the meeting faces of said portions being correspondingly bored to receive a fastening, said forging having a threaded socket and said cylinder having a threaded nipple to enter said socket and said nipple having a sleeve or bushing of non-erosive material to protect the gas passage from the erosive effects of the gases of the exploded charge, and means connecting the piston with the gun-action.

14. In an automatic gun, the barrel, the cylinder, and a piston, said cylinder having a gas-chamber and said piston having means for trapping the gases in said chamber, a piston rod connected with the piston, a spring surrounding said rod, a sleeve or casing detachably fitted to the rear end of the cylinder and entering said cylinder and receiving and housing the rear end of said

spring, a collar on the piston rod against which the opposite end of said spring seats, said collar adapted to contact with the inner end of said sleeve or casing when the piston is moved rearwardly by the expansive energy of the trapped gases, said sleeve and the rear end of the cylinder having interengaging quick-threads adapted to lock the parts after they have been first fitted one within the other.

15. In an automatic gun, the combination with the barrel thereof, and a cylinder, said barrel and cylinder having a connecting gas-intake, of a longitudinal slidable piston having a lateral gas-intake which leads into the cylinder, a rod connecting with the piston, and a lever on the outer end of said rod for turning the piston axially to remove its gas-port out of register with the gas-intake from the barrel.

16. In an automatic gun, the barrel thereof, the cylinder and the piston, said piston having a rearwardly extending rod, means connecting said rod with the gun-action said means comprising a breech-bolt, firing mechanism, a trigger-mechanism and a main operating lever having a knob or handle, a spring-actuated pin mounted in said handle, the outer end of the piston rod having a notch with which said pin detachably engages whereby the piston rod may be connected and disconnected with the gun action.

17. In an automatic gun, the combination with the barrel, the cylinder, the piston having a rearwardly extending rod, the main bolt-operating lever of the gun having a knob or handle with self-contained spring-pressed detent adapted to interlock with the outer end of said rod, and a lever fixed to the rod and adapted to turn the same axially said lever and adjacent portion of the bolt-operating lever having interengaging lugs and notches to preserve the alinement of the piston rod.

18. In a gun, the combination with the breech-bolt, the cap-piece fitted thereto and a bolt-operating lever, said lever being fulcrumed on the cap-piece and having means for turning the bolt about its axis, and being formed of jointed sections turnable one relative to the other to enable the sections to be arranged substantially in line or one substantially at right-angles to the other, and means for locking the sections rigidly together when they are brought substantially in line.

19. In a gun, the combination with the breech-bolt, the cap-piece fitted thereto and a bolt-operating lever, said lever being fulcrumed on the cap piece and having means for turning the bolt about its axis, and being formed of jointed sections turnable one relative to the other to enable the sections to be arranged substantially in line or one substantially at right-angles to the other, and

means for locking the sections rigidly together when they are brought substantially in line, said means comprising a spring-pressed member mounted in one of the sections and adapted to engage a notch or recess in the other section.

20. In a gun, the combination with the breech-bolt, the cap-piece fitted thereto and a bolt-operating lever, said lever being fulcrumed on the cap-piece and having means for turning the bolt about its axis, and being formed of jointed sections turnable one relative to the other to enable the sections to be arranged substantially in line or one substantially at right-angles to the other, and means for locking the sections rigidly together when they are brought substantially in line, said means comprising a spring-pressed pin mounted in one of the sections and adapted to engage a notch or recess in the other section, the two sections having co-acting shoulders adapted to abut when the sections are brought substantially in line.

21. In a gun of the character described, the combination with the barrel, the cylinder, and the piston having a rearwardly extending rod, the breech-bolt, and complementary firing-mechanism, of the main operating bolt-lever formed of two sections one jointed to the other, one of said sections having bolt-operating means and the other section having a socket to receive the rear end of the piston rod when said section is turned substantially at right angles to its companion section, detachable connection between the outer section of the lever and the piston rod, a flange or shoulder on the inner face of the outer section and an arc-face on the companion section against which said shoulder abuts substantially in line with the piston rod, limiting-stops between the two sections adapted to contact when the sections are brought substantially in line, and the spring detent on one of the sections adapted to engage the other section to lock the sections in line.

22. In a gun, the combination with the breech-bolt the receiver, and the cap-piece fitted to the rear end thereof, the rear end of the bolt and the front end of the cap-piece having spirally-formed faces adapted to ride in contact and approach each other as the bolt is axially turned whereby a sand-proof joint is formed between the two, and means for turning the bolt and reciprocating the same in the receiver.

23. In a gun the combination with the receiver, the breech-bolt having a longitudinal groove or channel in its side, and a cap-piece fitted to the rear end of the bolt, of an extractor detachably fixed to the cap-piece and having a longitudinally extending slot, and a spring-pressed bar pivotally mounted in said slot having a forward end entering the groove or channel in the breech-bolt.

24. In a gun, the receiver, the breech-bolt operable therein, and the extractor, said extractor having a slidably mounted ejector pin operable in its front end in a plane substantially transverse to the axis of the breech-bolt.

25. In a gun, the combination of the receiver and the axially turnable breech-bolt operable therein and having locking lugs, said receiver having a rear chamber provided with stops for the rearward and forward movements of the breech-bolt when removing the bolt from the receiver and inserting it into said receiver, said receiver having also in its rear end, radial extensions of its bore adapted to admit the lugs of the breech-bolt.

26. In a gun, the combination of the receiver, and the breech-bolt operable therein, of a clip-dog pivotally mounted on the receiver and having a member to project into the range of action of the bolt and serve as a stop for the front end thereof when the bolt is retracted.

27. In a gun, the combination of the receiver, and the breech-bolt operable therein, of a clip-dog pivotally mounted on the receiver and having a member to project into the range of action of the bolt and serve as a stop for the front end thereof when the bolt is retracted, spring-pressed member for moving the dog out of the range of action of the breech bolt and the front end thereof, coordinately with a rearward pull upon the retracted bolt.

28. In a gun, the combination of the receiver, the breech-bolt operable therein, and the extractor, of a clip-dog pivoted on the receiver and having a part to project into the range of action of the retracted bolt and to contact with the front end of the extractor, and means for automatically moving the said member out of the range of action of the breech-bolt to release the front end thereof, said dog having a groove or recess forming a seat for the clip of a cartridge-pack.

29. In a gun, the combination with the receiver, and a magazine having a channel or slot in the upper rear portion, of a dog turnably mounted in the receiver and having an eccentric end operable in said slot or channel to raise and lower the magazine, a removable bottom plate for the magazine, a spring-plate having one end fixed to the magazine and having a notched lower end, said magazine having spaced lugs for the lower end of the spring-plate and a bolt or pin turnable in said lugs and having a flattened face or shoulder turnable into and out of the notch of the spring-plate to lock and unlock the magazine to the removable bottom plate thereof, said bolt or pin having an actuating finger-piece.

30. In a gun, the combination with the re-

ceiver, the magazine and the trigger-guard plate, of a yoke fixed to the underside of the front end of the receiver and having a downturned front end to which the front end of the trigger guard plate is pivoted, and having a slotted rear end, said magazine having a forwardly extending flange with journal ends fitting and turnable in the slots of said yoke.

31. In a gun, the combination with the receiver, the breech-bolt and the firing bolt, of a spring-pressed trigger, a sear-post having a sear to engage the firing bolt, said sear-post having a square-faced notch in one side and said trigger having a forwardly projecting spur intermediate of its ends adapted to engage said notch, said post having, also, a cut-away portion in its side below the notch against which portion the spur of the trigger rests after it disengages the notch in the post.

32. In a gun, the combination with the re-

ceiver, the breech-bolt, the firing-bolt, and the sear-post having a square-faced notch in its side, of a trigger holder having spaced walls with rearwardly opening slots, a trigger having trunnions at its upper end fitting said slots, and having a forwardly projecting spur at its middle portion to ride into and out of the square-faced notch in the sear post, and a spring in the trigger holder acting against the trigger to press the spur thereof in a forwardly and upwardly direction to cause it to again enter the notch in the sear-post after the trigger has been pulled to release the post.

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

GRANT HAMMOND.

Witnesses:

T. W. FOWLER,
C. W. FOWLER.