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F. K. YOUNG.  
FIREARM.  
APPLICATION FILED AUG. 9, 1909.

Patented July 25, 1911.

3 SHEETS—SHEET 1.

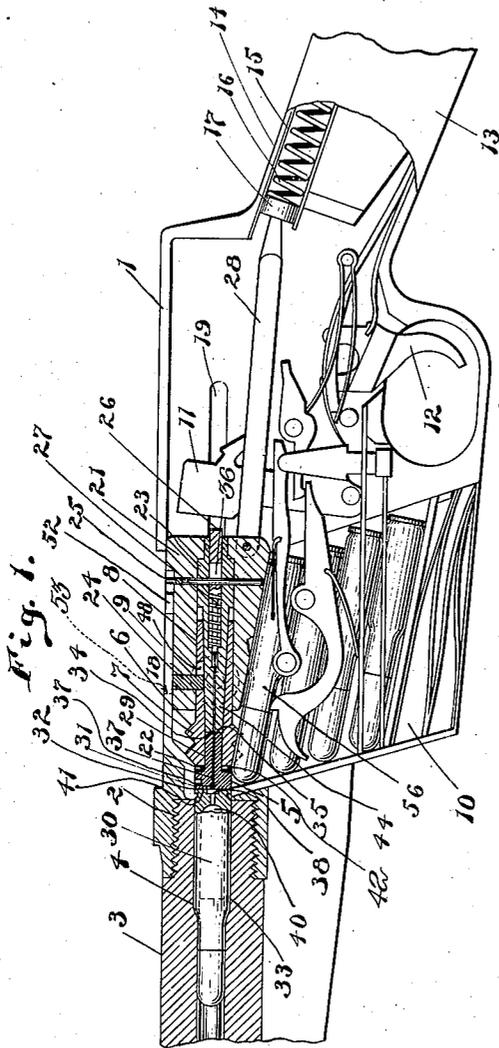


Fig. 16.

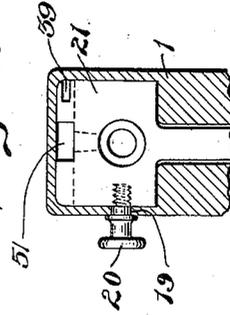
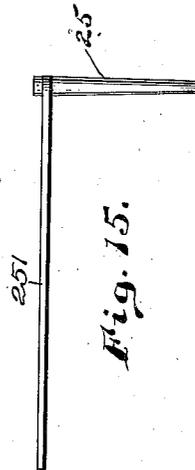


Fig. 14.



Fig. 15.



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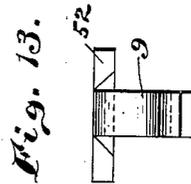
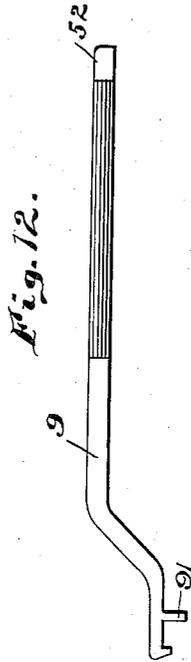
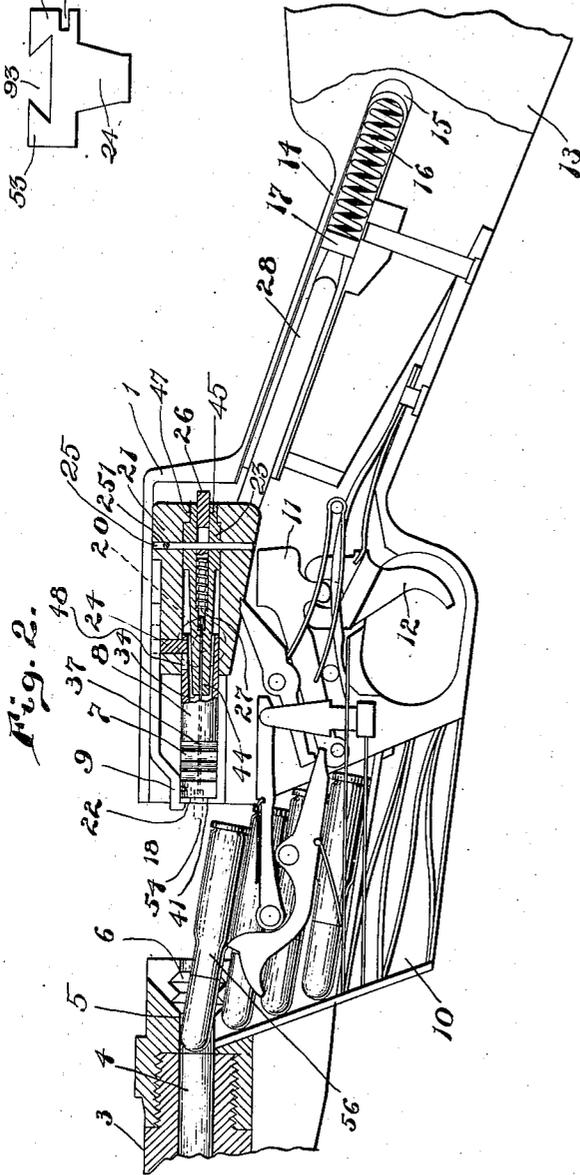
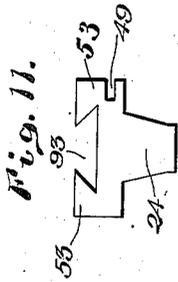
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

998,867.

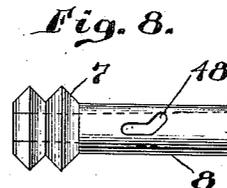
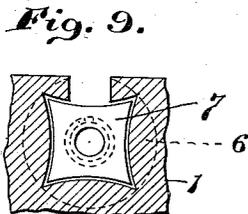
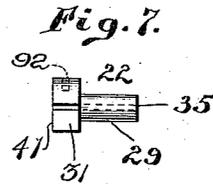
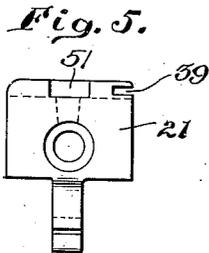
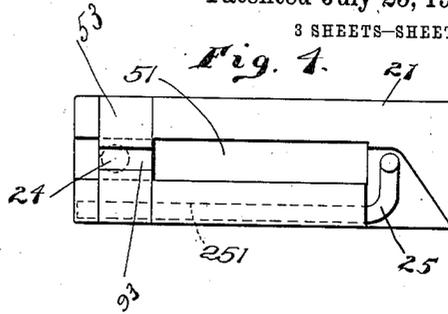
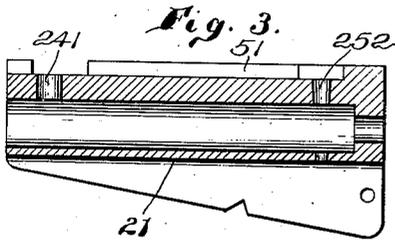


Fig. 10.

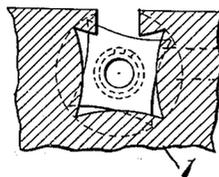


Fig. 18.

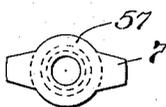
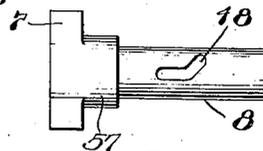


Fig. 17.



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# UNITED STATES PATENT OFFICE.

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FIREARM.

998,867.

Specification of Letters Patent. Patented July 25, 1911.

Application filed August 9, 1909. Serial No. 511,851.

*To all whom it may concern:*

Be it known that I, FRANKLIN K. YOUNG, a citizen of the United States, residing at Winthrop, county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Firearms, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in firearms and relates more especially to that class of automatic self-loading firearms in which the barrel is fixed and immovable.

The primary object of my invention is to provide a breech-mechanism for self-loading firearms, which shall be of few parts, simple to manipulate, durable and inexpensive to manufacture and which may be automatically operated by the cartridges in common use; and which breech-mechanism shall not depend for its automatic reloading operation upon a recoiling barrel, or upon a vent through the barrel in combination with a gas operated piston or lever, or upon a rearwardly movable plug or piston situated and movable within the base or head of a cartridge case or shell, or upon a rearwardly movable primer situated and movable within the base or head of a cartridge case or shell.

One object of my invention is to utilize the elongation of the case or shell of a metallic cartridge which takes place upon explosion of the powder charge contained therein, for the purpose of automatically operating a self-loading breech-mechanism combined with or attached to or contained within the receiver or frame or breech of a firearm; said cartridge being properly seated and fired within the chamber of the barrel of said firearm.

Another object of my invention is to utilize the recession or rearward movement of a cartridge case or shell made of any material upon explosion of the powder charge contained therein, for the purpose of automatically operating a self-loading breech-mechanism combined with or attached to or contained within the receiver or frame or breech of a firearm; said cartridge being properly seated and fired within the chamber of the barrel of said firearm.

Another object of my invention is to limit

the elongation of a metal cartridge case or shell and also to limit the recession or rearward movement of a cartridge case or shell made of any material upon explosion of the powder charge contained in said case or shell to the extent necessary for automatically operating a self-loading breech-mechanism combined with or attached to or contained within the receiver or frame or breech of a firearm; said cartridge being properly seated and fired within the chamber of the barrel of said firearm.

It is another object of my invention that a cartridge being properly seated and fired within the chamber of the barrel of a firearm and energy generated by the explosion of the powder charge contained in said cartridge being sufficient to cause the case or shell of said cartridge, if made of metal, to elongate, or to cause said case or shell, if made of any material, to recede or move rearwardly to the extent necessary to automatically operate a self-loading breech-mechanism combined with or attached to or contained within the receiver or frame or breech of said firearm; then the case of the said cartridge shall be prevented from further elongating rearwardly or from further recession or movement rearwardly and shall be positively and mechanically held immovable rearwardly and utilized to prevent the escape of the gases of explosion through the rear end of the barrel of said firearm and that said cartridge case or shell shall be so held immovable rearwardly until the projectile contained in said cartridge has passed out of and beyond the muzzle of the barrel of said firearm.

The purpose of the device by which I mechanically interpret my idea or ideas, and by which I attain my objects before mentioned, and which device later will be fully described, is: 1. To automatically operate a self-loading breech-mechanism combined with, attached to, or contained within the receiver or frame or breech of a firearm by means of the momentum derived from the aggregate weight times the velocity of certain pieces of metal or parts, to which parts motion is imparted by the thrust or movement of another part which I term the bolt head, which latter is actuated and put in motion by rearward movement or

by the elongation of, or by both the elongation and the rearward movement of the case or shell of a cartridge properly seated and fired in the chamber of the barrel of said firearm. 2. To limit the rearward elongation of a metal cartridge case or shell, or to limit the recession or rearward movement of a cartridge case or shell made of any material, by means of a part which I term a locking-sleeve whose lugs, when engaged in their corresponding recesses in the walls of the receiver, or in the rear extension of the barrel, or in both, positively and mechanically prevent further rearward movement of the bolt head; the area of recession or elongation possible to the cartridge case or shell never exceeding the distance between the forward face of the locking sleeve and the posterior surface of the bolt head.

My present invention differs in essential points from my prior inventions and from the inventions of others, such for instance as shown in United States Letters Patent to me No. 624,145, No. 691,040, and No. 764,513; or to Young and Sheriff, No. 783,770.

My present invention herein described differs from each and all of the foregoing in the essential point that my device is intended to be automatically operated by means of the cartridges in common use and is so operative, while each and all of the foregoing firearms are not intended to be automatically operated by the cartridges in common use, and are capable of automatic operation only when used with a specially designed and constructed cartridge not in common use, said cartridge having either a plug or a piston or a primer situated and movable within its head or base, such plug or piston or primer being of such construction and having such a movement as to allow force from the gases of explosion produced by the burning of the powder charge within said cartridge case to be transmitted by the rearward movement of said plug or piston or primer to the breech-mechanism of said firearm in such a manner and in such a quantity as to automatically operate the breech-mechanism of said firearms. Furthermore, while the devices shown in the foregoing United States Letters Patent No. 783,770 and certain other patents are somewhat similar to the device which embodies my present invention, said prior devices are in no way adapted to the same purpose as the device described herein as appertaining to my present invention, the purpose of which latter is distinctly set forth in the statement contained in the herein specification. My present invention herein described furthermore differs from each and all of the foregoing in the essential points that the face of the bolt head, in which rests the

base or head of the cartridge, is not held rigidly and immovably against the base or head of said cartridge, when the latter is properly seated in the chamber of the barrel of a firearm, as it is an essential point in my invention herein described to permit said bolt head to be freely driven a limited distance rearwardly when thus actuated by the rearward movement of the cartridge case or shell when the latter either is elongated or elongated rearwardly or moved rearwardly by the pressure of the gases of explosion produced by the burning of the powder charge contained within said cartridge case or shell; whereas in each and all of the firearms shown in the said prior patents it is an essential point not to permit the cartridge case or shell either to elongate rearwardly or to move rearwardly when the cartridge is fired, but it is the intention in said firearms to prevent such elongation rearwardly and such movement rearwardly of the said cartridge case or shell, and for the purpose of preventing such elongation and such movement rearwardly of the said cartridge case or shell, the face of the breech bolt or breech block in said firearms is rigidly held in rearwardly immovable contact with the base or head of the said cartridge case or shell. In other words, in the device which embodies my invention herein described, that part termed the bolt head and which seats the cartridge in the chamber of the barrel of a firearm, is free to move rearwardly for a limited distance and is so constructed as to be readily driven rearward for said limited distance by the elongation or by the rearward elongation, or by the rearward movement, of the cartridge case or shell, whenever the latter is acted upon by the pressure of the gases of explosion produced by the burning of the powder charge contained within said cartridge case or shell; while in each and all of the foregoing firearms, that part termed the bolt, and which seats the cartridge into the chamber of the barrel of said firearms, is intended to prevent rearward elongation, or rearward movement, or both, of the cartridge case or shell when acted upon by the gases of explosion, and for this purpose said bolt is so constructed as to be incapable of such rearward movement for any distance whatsoever by any elongation or movement rearwardly of the said cartridge case or shell, but said bolt remains fixed and immovable until set in motion by other parts of the breech-mechanism thereto appertaining.

As will be observed, the device herein described and which embodies my present invention involves a change in the general construction of firearms which change constitutes a new and skilful adaptation of one or more well-known implements for the

special purpose of producing in a new and useful manner the automatic operation of the breech mechanism in self-loading firearms. It also will be observed that while one or more of the devices contained in my herein described invention are somewhat similar to devices used in the foregoing firearms, that none of the said devices used in the said foregoing firearms are in any way adapted to the purpose of my present invention and that none of the before mentioned devices are capable of being automatically operated either by the elongation, or by the rearward elongation, or by the rearward movement of the cartridge case or shell whenever the latter is acted upon by the pressure of the gases of explosion produced by the burning of the powder charge contained within the said cartridge case or shell.

The practicability of the idea or ideas embodied in my invention herein described has been demonstrated by an actual mechanism, which latter is capable of operation and has been operated and which is operative upon the principle alleged and by the method herein set forth and described. It will also be observed that whenever in my invention herein described I make use of any well-known implement, I do so for the purpose of accomplishing a special purpose and do accomplish a special purpose by such use; also that my adaptation of said implement for said purpose is new and also that my said adaptation of said implement for said special purpose involves a change in the general construction of said implement or implements.

Heretofore, so far as known to me, it has been customary for that part in a firearm termed the breech-bolt to have locking lugs formed therein to engage with recesses in the receiver or barrel, whereby the bolt, after seating the cartridge in the chamber of the barrel, is held rigidly in contact with the base or head of said cartridge and whereby the bolt is prevented from an immediate movement rearwardly after the explosion of the charge in said cartridge, thereby preventing rearward movement of said cartridge.

One feature of the present invention relates to a construction in which said breech bolt is replaced by and its functions are performed by two parts, one of which is termed by me the bolt head and the other the locking sleeve, the adaptation of said two parts being for the special purpose of permitting the cartridge in common use to automatically operate the breech-mechanism of a self-loading firearm, said adaptation being new and involving a general change in the construction of firearms.

Another feature of the invention relates to a construction in which a bolt head hav-

ing a face fitted to contain the head or base of the cartridge and the upper side of the said bolt head being fitted to engage and retain the extractor and having on its posterior side a neck fitted to slide within but non-rotatable with regard to the locking sleeve, said bolt head having an aperture throughout its entire length fitted to receive and contain the firing-pin and to permit the free movement backward and forward therein of the said firing-pin; is provided with a locking sleeve which may contain all or part of the neck of said bolt head, the said neck being at all times free to move a limited distance within said locking sleeve.

Another feature of the invention relates to the combination of a bolt head slidable within the locking sleeve, the latter being slidable and rotatable within an exterior jacket and riding upon a hollow part which I term the breech bolt, which bolt is set horizontally into the back wall of the jacket, the firing-pin being partially, and the spring being wholly contained in said bolt.

Another feature of the invention relates to the manner of uniting the jacket, breech bolt, locking sleeve, bolt head and firing-pin and spring by such form of construction that the parts may be assembled or disassembled by means of the hands and without the use of any other instrument.

Another feature of the invention relates to a construction embodying in the particular form and arrangement a slidable bolt head, the enlarged part of which is always anteriorly exterior to the locking sleeve and the neck of which bolt head is contained and movable within the locking sleeve in such a manner that when a cartridge is properly seated in the chamber of the barrel of the firearm the face of the said bolt head is in contact with the base of said cartridge, while the rear of the neck of said bolt head is in contact with the bolt, so that when the cartridge case is elongated, or rearwardly elongated, or is moved rearwardly by the pressure of the gases of explosion produced by the burning of the powder charge contained within said cartridge case, motion is imparted by the said cartridge case to the said bolt head and by the bolt head to said bolt and by said bolt to said exterior jacket.

Another feature of my invention relates to a bolt head devoid of lugs and so constructed and arranged that it may be moved rearwardly by the cartridge case whenever the latter is elongated, or elongated rearwardly, or actuated rearwardly by the pressure of the gases of explosion, said rearward movement of said bolt head being limited by and ending upon contact with the locking sleeve whenever the lugs upon the locking sleeve are engaged in corresponding recesses contained in the receiver, or in the barrel, or in both.

Another feature of the invention relates to a bolt fixed horizontally into the rear end of the interior of the jacket and protruding into the locking sleeve in such a manner as to push forward the bolt head into contact with the base or head of a cartridge properly seated in the chamber of the barrel of a firearm.

Another feature of the invention relates to a hollow jacket and a hollow bolt which is fixed into the front of the rear wall of said jacket and extends horizontally and forwardly and contains a firing-pin and firing-pin spring, all of these parts, except the firing-pin spring, being pierced by apertures which latter, when brought into line, permit of the securing together of the parts mentioned by a single pin, either alone, or in combination with some other part.

Other features of the invention will be set forth in the specification and claims.

The invention will be fully understood from the following description taken in connection with the accompanying drawings, and the novel features thereof are pointed out and clearly defined in the claims at the close of the specification.

In the drawings,—Figure 1 is a vertical longitudinal section showing the automatic self-loading mechanism at the end of its forward movement and with a cartridge in position and the gun ready for firing. Fig. 2 is a vertical longitudinal section showing the automatic self-loading mechanism at the beginning of its forward movement with the bolt head fully retracted and a cartridge in position ready to be shoved into the chamber of the gun. Fig. 3 is a vertical longitudinal section of the jacket. Fig. 4 is a plan view of the jacket. Fig. 5 is a front elevation of the jacket. Fig. 6 is a front elevation of the bolt head. Fig. 7 is a side elevation of the bolt head. Fig. 8 is a plan of the locking sleeve. Fig. 9 is a front elevation of the locking sleeve as it enters into the receiver. Fig. 10 is a front elevation of the locking sleeve showing the locking sleeve lugs engaged in the locking sleeve lug recesses in the receiver. Fig. 11 is a front elevation of the locking sleeve cam stud. Fig. 12 is a side elevation of the extractor. Fig. 13 is a front elevation of the extractor. Fig. 14 is a plan of the clamping pin. Fig. 15 is a front elevation of the clamping pin. Fig. 16 is a cross section of the receiver in front of the jacket, showing the handle for hand operation. Fig. 17 is a side elevation and Fig. 18 an end elevation of a locking sleeve showing a modified form of locking lug.

Referring to the drawings, 1 designates the receiver or frame which contains and supports the breech-mechanism of the firearm. In the forward portion of this frame is the barrel-socket 2, into which latter is

secured the barrel 3. In the rear of the barrel is the cartridge chamber 4, and abutting upon and behind the cartridge chamber is the bolt-head recess 5 formed either by the walls of the receiver or by the rear elongation of the barrel. Behind this recess 5 are locking-lug recesses 6 formed to receive and contain the locking-lugs 7 of the locking sleeve 8. The top and sides of the forward part of the receiver and the rear portion of the barrel are cut into as much as may be necessary to permit the free passage back and forth of said locking lugs, and of the extractor 9.

Underneath and partially within the forward portion of the receiver is the magazine 10, and underneath and partially or wholly within the rear portion of the receiver is the hammer 11, the trigger 12 and the mechanism appertaining thereto.

Attached to the rear portion of the receiver and extending diagonally downward in line with the neck 13 of the stock of the gun and so situated that its top side is flush with the top of said neck is the main spring cylinder-holder 14, which latter may be a hollow cylinder, or may be composed of two or more parallel tail-pieces, or may be of any other construction capable of properly containing the main-spring-cylinder 15.

Within the main-spring cylinder-holder is situated the main-spring cylinder 15, which latter consists of an elongated thin metal case of equal diameters and is fitted to contain the main spring 16, and the main-spring compressor-head 17.

An opening 18 upon the top side of the receiver is formed in such a manner as to permit the quick and easy filling of the magazine either by means of a clip, or by hand, and also to facilitate the egress of the fired cartridge-case when the latter is in process of ejection from the gun. Also a slot 19 is formed in the right-hand side of the receiver to permit the necessary movements of a handle 20 attached to the jacket 21, whereby the gun at any time may be operated or manipulated as a hand-arm.

The breech mechanism includes a bolt head 22 and a collection of parts which will be termed the weight, which weight actuates the locking-sleeve and thus controls the opening and the closing of the gun. Such weight comprises the jacket 21, Figs. 3, 4 and 5, the breech bolt 23, the locking-sleeve cam stud 24, the clamping-pin 25, the firing-pin 26, the firing-pin spring 27, the compressor-rod 28, and the compressor-rod head 17.

The bolt head 22 is formed with a boss or enlarged portion 31 and with a neck 29 said neck extending into the forward end of sleeve 8 which I term the locking sleeve. A hollow cylindrical breech bolt 23 of different diameters having a central aperture therethrough is formed with a neck 44 which

extends into the rear end of said locking sleeve 8, the rear end 35 of the neck of the bolt head being adapted to engage with the front end 34 of said breech bolt 23. The said breech bolt 23 is formed with an intermediate thick portion, and a rearwardly extending reduced portion 45 which latter is seated in an aperture 47 in the rear wall of the jacket 21. The firing pin 26 passes through the breech bolt and bolt head, the aperture through the breech bolt being of different diameters to accommodate the different diameters of the firing pin and permit longitudinal movement thereof, the aperture through the bolt head being small to fit the small diameter of the forward portion of the firing pin. The firing pin is normally retained in its rearward position by the firing pin spring 27.

The locking sleeve 8 has a cylindrical rear portion which is both rotatable and slidable within the bore of the jacket 21, said locking sleeve being formed with lugs 7 which are adapted to engage with locking lug recesses 6 formed in the wall of the receiver 1, said locking recesses being so formed that the locking lugs may be engaged therewith when the locking sleeve is in its most forward position and when so engaged the locking sleeve cannot be moved longitudinally. The said locking sleeve is rotatable however, when the lugs are in said recesses, and said lugs may be disengaged from the locking recesses by a partial turn of the locking sleeve and when so disengaged the locking sleeve may be moved rearwardly.

The locking sleeve 8 is formed on its outer face with a cam path 48 having its forward portion parallel with the axis of the locking sleeve and its rear portion turned at an angle to the forward portion as shown in Fig. 8. A removable cam stud 24 passes transversely through a hole 241 in the wall of the jacket 21 and engages with said cam path 48 in the locking sleeve. During the longitudinal movement of the jacket while the cam stud 24 is engaged with the longitudinal portion of the cam path the locking sleeve will remain stationary but while the said stud is traveling through the diagonal portion of the cam path the locking sleeve will be rotated. A pin 25 passes transversely through a hole 252 in the jacket 21, through the breech bolt 23 and through an elongated slot 36 in the firing pin, thus fastening together the jacket, breech bolt and firing pin so that the jacket, breech bolt and firing pin move as one piece except that the firing pin has a short longitudinal movement relative to the breech bolt on account of the longitudinal slot 36 in the firing pin through which the clamping pin passes. The pin 25 has a finger lever 251 (see Figs. 4, 14, 15,) which lies in a longitudinal slot 39 in the side of the jacket 21 and in slot

49 in the cam stud (see Fig. 11) as shown in Fig. 4. In removing the pin the lever arm 251 is swung outward toward the pin 25 which clamps the parts together on its axis and then the pin can be lifted out. The cam stud 24 is formed with shoulders 53 (see Fig. 11) against which the extractor stop 52 is adapted to strike when the jacket moves rearwardly with the connected parts. (See Figs. 12 and 13).

The extractor 9 passes through a longitudinal groove 51 in the upper side of the jacket (see Figs. 4, 5 and 16,) and through a groove 93 in the top of the cam stud (see Fig. 11) and is formed with a flange 91 (see Fig. 12) which engages with a slot 92 in the bolt head (see Figs. 6 and 7) so that the extractor is held by the bolt head and must move with it. The groove 93 in the cam stud is beveled to fit the corresponding beveled portion of the extractor. See Fig. 11.

When the parts are in the position ready for firing, the locking sleeve being locked by the engagement of its lugs with the locking lug recesses and the bolt head being in its most forward position as in Fig. 1, there is a space 42 between the rear of the enlarged portion of the bolt head and the forward end of the locking sleeve.

Although I have herein shown and described a bolt head having an enlarged portion or boss slightly shorter than the distance between the front face of the locking sleeve and the base of the cartridge when the locking sleeve is locked and the cartridge is properly seated in the cartridge chamber, I would have it distinctly understood that I do not limit myself to such construction of said bolt head, but hold myself at liberty to construct said bolt head with an enlarged portion either of lesser or of greater length than as herein described.

In the modified form of locking sleeve shown in Figs. 17 and 18 there is shown only one pair of locking lugs instead of two as in Fig. 8 and the head 57 of the locking sleeve is cylindrical.

Referring to Fig. 1—herein is shown a firearm ready to be fired. A cartridge 30 is seated in the cartridge-chamber, the face 41 of the bolt head 22 is in contact with the base 32 of the cartridge-case 33; the locking sleeve lugs 7 are engaged in their corresponding locking-lug recesses 6; the front face 34 of the breech bolt 23 is in contact with the rear 35 of the neck 29 of the bolt head 22, the jacket 21 is closed over the locking sleeve 8, leaving the rear end of the firing pin 26 exposed to the blow of the hammer, which latter is cocked. The trigger being pulled, the hammer is released and falling forward strikes the rear end of the firing pin, driving the point 37 of the latter against the primer 38 detonating the fulminate and

thus igniting the powder-charge 40 which explodes. The face 41 of the bolt-head being in contact with the base 32 of the fired cartridge-case at the time of the explosion, force from said explosion is communicated through the base of said cartridge-case to the face of said bolt-head. The effect of the transmission of force from said cartridge case to said bolt-head is to put the latter in motion rearwardly; and the rear of the neck of said bolt head being at the time in contact with the face 34 of the breech bolt 23, which protrudes horizontally forward into the interior of the locking sleeve, force from the explosion is communicated through said bolt head to said breech bolt; the contracted rear end 45 of said breech bolt being fixed to the rear wall of the jacket 21 force from the explosion is communicated through said breech bolt to said jacket; the effect of such transmission of force through said cartridge-head, through said bolt head and through said breech bolt to said jacket being to put into motion rearwardly all those parts of the breech-mechanism which constitute the weight so called, and before mentioned. The weight set in motion rearwardly, has a preliminary movement, due to the anterior portion of the path of the locking sleeve cam 48 being coincident with the course of the locking-sleeve-cam-stud. The effects of this preliminary movement of the weight are to partially compress the main spring and to give time for the bullet to pass out of the barrel and for the pressure of the gases of explosion to become removed from the face of the bolt head and from the lugs of the locking sleeve. During this preliminary movement of the weight the locking-sleeve remains locked by the engagement of the locking-lugs in the locking lug recesses, and forms a stop for the rearward movement of the bolt head until the locking sleeve is unlocked. But this preliminary movement of the weight being completed, the continued rearward movement of the jacket 21 engages the locking-sleeve-cam-stud 24 in the diagonal portion of the locking-sleeve cam-path 48 causing the locking-sleeve to partially turn and thus to disengage the locking lugs 7 from the locking-sleeve recesses 6, as shown in Fig. 2. The locking-sleeve cam-stud 24 now is engaged with the rear end of the locking-sleeve cam path 48 and the extractor stop 52 is in contact with a shoulder 53 formed on the rear portion of the locking-sleeve cam-stud 24 and from this time on, all the parts of the breech-mechanism complete the rearward movement as one piece. The parts of the breech mechanism in this final rearward movement extract the case of the fired cartridge, and pull it against the ejector 54 which latter throws the said cartridge case outward through the opening in the receiver in the usual manner. Mean-

while, the rearward movement of the weight, supplemented by the rearward movement of other parts of the breech-mechanism, has thrown back the hammer, set the trigger and forced the compressor-head 17 downward into the main-spring cylinder 15, thus correspondingly compressing the main-spring 16, the effect of which compression is the gradually bringing of the parts of the breech-mechanism to rest in the position as shown in Fig. 2.

Referring to Fig. 2,—herein is shown a firearm in the act of re-loading. The entire breech-mechanism is retracted beyond the rear wall of the magazine 10, the main spring 16 is fully compressed and the top cartridge 56 in the magazine has risen into easy engagement with the face of the bolt head. The main spring having only the weight and inertia of the breech mechanism to contend against now proceeds to propel the breech-mechanism forward as one piece. The bolt head actuated by the momentum of the other parts thus propelled forward by the main spring engages the base of the topmost cartridge 56 in the magazine, secures it in the extractor hook and pushes it into the cartridge-chamber as shown in Fig. 1; the locking-lugs 7 are opposite the locking-lug recesses and the locking-sleeve and the bolt head have come to rest. Whereupon the weight continuing its forward movement forces the locking-sleeve cam-stud 24 through the angle of the locking-sleeve cam-path 48, thus rotating the locking-sleeve and causing the locking-sleeve lugs 7 to engage the corresponding locking-lug recesses 6 as in Fig. 1. At the final forward movement of the weight, the cam stud passes through the straight portion of the cam-path 48 causing the face of the breech bolt 23 to encounter the rear 35 of the neck 29 of the bolt head and advance the bolt-head until the cartridge is properly seated within the cartridge-chamber, thus completing the position shown in Fig. 1.

By the arrangement and employment of parts thus shown, I do away with the movable plug or piston or primer in the base or head of a specially constructed cartridge-case, which I heretofore have used to unlock a bolt or breech-block locked into a receiver behind a fixed and non-recoiling barrel; and by the arrangement and employment of parts thus shown I unlock a bolt or breech-block behind a fixed and non-recoiling barrel by means of the cartridge-case in common use.

It is to be understood that an equivalent embodiment in firearms other than of automatic features of my invention capable of such embodiment will be held by me to fall within the scope of such of my herein claims as are drawn to such features, and that, therefore, I do not restrict such claims to

automatic and self-loading arms. Also, in view of the modifications which obviously may be made, I would have it understood that I do not limit myself to the precise construction shown, but hold myself at liberty to make such departures therefrom as fairly fall within the spirit and scope of my invention.

What I claim is;

1. In a firearm, a movable locking sleeve, a jacket movable with and independently of the movement of the said sleeve, a bolt head movable both with and independently of the movement of said locking sleeve and jacket, a breech bolt which is connected with said jacket and moves therewith and whose forward end projects into the rear end of the locking sleeve and is adapted to engage said bolt head, a firing pin which extends through said breech bolt and bolt head and is movable therewith and with relation thereto, means for holding said sleeve stationary during the initial rearward movement of the bolt head and during the final forward movement of the bolt head, and means actuated by the movement of the said jacket to render said retaining means operative.
2. In a fire arm a movable locking sleeve, a jacket movable with relation to said locking sleeve, a bolt head movable with relation to said locking sleeve and with relation to said jacket, a hollow breech bolt within said jacket and detachably connected therewith and whose forward end projects into the rear end of the locking sleeve and is adapted to engage said bolt head, a firing pin which extends through said breech bolt and bolt head and is movable with relation thereto, means for locking said sleeve during the initial rearward movement of the bolt head and during the final forward movement of the bolt head.
3. In a fire arm a movable locking sleeve, a jacket movable with relation to said locking sleeve, a bolt head movable with relation to said locking sleeve and with relation to said jacket, a hollow breech bolt within said jacket and detachably connected therewith and whose forward end projects into the rear end of the locking sleeve and is adapted to engage said bolt head, a firing pin which extends through said breech bolt and bolt head and is movable with relation thereto, means for locking said sleeve during the initial rearward movement of the bolt head and during the final forward movement of the bolt head, said locking means being actuated by the movement of the jacket.
4. In a firearm a movable locking sleeve, a jacket movable with and independently of said locking sleeve, a bolt head which projects into the forward end of said sleeve and is movable independently of said sleeve, a hollow breech bolt within said jacket and detachably connected therewith and project-

ing into the rear end of said sleeve and adapted to engage the rear end of said bolt head, a firing pin which passes through said breech bolt and bolt head and is slidable therein, means for locking said sleeve against movement during the initial rearward movement of the bolt head and jacket and during the final forward movement of the bolt head and jacket.

5. In a fire arm, a receiver, having locking-lug recesses, a slidable and rotatable locking sleeve having locking lugs adapted to engage with said recesses, a bolt head having a neck which projects into the forward end of said sleeve and is slidable with relation thereto and has a head which projects forwardly beyond the forward end of said sleeve, a jacket which encircles the rear portion of said sleeve and is slidable with relation thereto, a hollow breech bolt within said jacket and detachably connected therewith, said breech bolt extending into the rear end of the locking sleeve and adapted to engage the rear end of the bolt head, a firing pin which passes through the breech bolt and bolt head, the rearward movement of the bolt head actuating the rearward movement of the breech bolt, jacket and firing pin while the locking sleeve is locked, means actuated by the rearward movement of the jacket after its initial movement to unlock the said sleeve from the receiver, the bolt head being actuated by the breech bolt in the final forward movement to move the bolt head forward into the operative position and to hold it in engagement with the base of a cartridge properly seated in the chamber of the barrel.

6. In a fire arm, a slidable and rotatable locking sleeve, a slidable jacket encircling said sleeve, a bolt head having a neck which extends into the forward end of the sleeve and is slidable with relation thereto and having an enlarged portion on its outer end, a hollow breech bolt which is detachably connected with the said jacket and whose forward end extends into said sleeve and is adapted to engage the rear end of said bolt head, a firing pin which passes through said breech bolt and bolt head and is slidable therein, means for locking said sleeve against rearward movement during the initial rearward movement of the bolt head and jacket after firing, means actuated by further rearward movement of the jacket to unlock the sleeve before the jacket has completed its rearward movement, means whereby after the sleeve is unlocked further rearward movement of the jacket will move the said sleeve rearwardly and on the initial forward movement of the jacket the said sleeve will move therewith, said locking means being actuated by the further forward movement of the jacket to lock the said sleeve, whereby the said sleeve is held

against further forward movement while the said jacket and bolt head complete their forward movement.

7. In a firearm, a slidable but non-rotatable jacket, a locking sleeve slidable and rotatable with relation to said jacket and a bolt head having a neck slidable within said locking sleeve.

8. In a firearm, a breech bolt fixed in a slidable jacket and non-slidable and non-rotatable with relation to said jacket, and having an aperture longitudinally therethrough, a slidable but non-rotatable bolt head whose rear end is adapted to be engaged by the forward end of said breech bolt, said bolt head having an aperture longitudinally therethrough in alinement with the aperture in the breech bolt, and a firing pin carried by said breech bolt and slidable within the aperture of said breech bolt and bolt head.

9. In a firearm, a jacket, a movable locking sleeve extending into the forward end of said jacket, and formed with a cam path in the side thereof, a removable stud passing transversely through the wall of the jacket and engaging said cam path, a bolt head whose rear end extends into the forward end of the locking sleeve, said jacket being formed with a groove longitudinally thereof in its outer periphery, said cam stud having a head formed with a beveled groove in alinement with the groove in the jacket, and an extractor held in the said groove in the jacket and stud, the bevel of the groove holding the extractor against lateral displacement.

10. In a firearm, a jacket, a breech bolt located within and carried by said jacket and having an aperture longitudinally therethrough, a firing pin carried by said breech bolt within said aperture, and slidable therein, said firing pin having an elongated slot therethrough, and a removable clamping pin which passes transversely through said jacket and breech bolt and slot in the firing pin.

11. In a firearm, a jacket, a movable locking sleeve extending into the forward end of said jacket and movable with relation thereto and formed with a cam path in the side thereof, a removable cam stud passing transversely through the wall of the jacket and engaging with said cam path, a breech bolt located within and carried by said jacket and having an aperture longitudinally therethrough, a firing pin carried by said breech bolt within said aperture and slidable therein, said firing pin having an elongated slot therethrough, and a removable clamping pin which passes transversely through said jacket, breech bolt and firing pin slot.

12. In a firearm, a jacket, a movable locking sleeve extending into the forward end

of said jacket, and formed with a cam path in the side thereof, a removable cam stud passing transversely through the wall of the jacket and engaging with said cam path, a breech bolt located within and carried by said jacket and having an aperture longitudinally therethrough, a firing pin carried by said breech bolt within said aperture and slidable therein, said firing pin having an elongated slot therethrough a removable clamping pin which passes transversely through said jacket, breech bolt and slot in the firing pin, said clamping pin having a lever arm whereby said clamping pin may be rotated and said jacket being formed with a longitudinal groove in the side thereof and said cam stud having a head formed with a groove in the side thereof in alinement with the said groove in the jacket adapted to receive the said lever arm of the clamping-pin.

13. In a fire arm a hollow receiver, a slidable locking sleeve, a jacket encircling said locking sleeve and slidable in said receiver and with relation to said locking sleeve, a bolt head having a neck which extends into the forward end of said locking sleeve and which has a sliding fit therein and has a forwardly projecting enlarged portion, a hollow breech bolt within the jacket and detachably connected therewith, and whose forward end extends into said sleeve and is adapted to engage the rear end of the neck of the bolt head, a firing pin which extends through the rear wall of the jacket and through the said breech bolt and bolt head and is slidable therein, means for locking said sleeve against rearward movement during the initial rearward movement of the bolt head and jacket after firing, means actuated by the further rearward movement of the jacket after a certain initial movement to unlock said sleeve before the jacket has completed its rearward movement, means whereby when the said sleeve is unlocked further rearward movement of the jacket will move the said sleeve rearwardly.

14. In a fire arm a hollow receiver, a slidable locking sleeve, a jacket encircling said locking sleeve and slidable in said receiver and with relation to said locking sleeve, a bolt head having a neck which extends into the forward end of said locking sleeve and which has a sliding fit therein and has a forwardly projecting enlarged portion, a hollow breech bolt within the jacket and detachably connected therewith, and whose forward end extends into said sleeve and is adapted to engage the rear end of the neck of the bolt head, a firing pin which extends through the rear wall of the jacket and through the said breech bolt and bolt head and is slidable therein, means for locking said sleeve against rearward move-

ment during the initial rearward movement of the bolt head and jacket after firing, means actuated by the further rearward movement of the jacket after a certain initial movement to unlock said sleeve before the jacket has completed its rearward movement, means whereby when the said sleeve is unlocked rearward movement of the jacket will move the said sleeve rearwardly, and on the initial forward movement of the jacket the said sleeve will move therewith, said locking means being actuated by the further forward movement of the jacket to lock the said sleeve whereby the said sleeve is held against further forward movement while the said jacket and bolt head complete the forward movement.

15. In a fire arm a receiver, a jacket slidable within said receiver, a locking sleeve formed with laterally projecting lugs, said receiver being formed with a longitudinal passage in which said locking sleeve and projecting lugs are adapted to move longitudinally, said receiver having lateral recesses in the inner side walls which when the lugs are opposite the said recesses and the locking sleeve is partially rotated receive said lugs and lock the sleeve against longitudinal movement, a bolt head having a neck which extends into and has a sliding fit in the forward end of said locking sleeve, and has an enlarged portion or boss which is of larger diameter than the bore of the locking sleeve.

16. In a fire arm, a receiver, a jacket slidable within said receiver, a locking sleeve formed with laterally projecting lugs, said receiver being formed with a longitudinal passage in which said locking sleeve and projecting lugs are adapted to move longitudinally, said receiver having lateral recesses in the inner side walls which when the lugs are opposite the said recesses and the locking sleeve is partially rotated receive said lugs and lock the sleeve against longitudinal movement, a bolt head having a neck which extends into and has a sliding fit in the forward end of said locking sleeve, and has an enlarged portion or boss which is of larger diameter than the bore of the locking sleeve, a hollow breech bolt within the jacket and detachably connected therewith and having an enlarged portion which has a sliding fit in the rear chamber of the jacket and has a forward portion which extends into the rear end of said locking sleeve, and normally engages the rear end of the said bolt head, said breech bolt and bolt head being formed with apertures in longitudinal alignment with each other for the firing pin.

17. In a fire arm, a receiver, a jacket slidable within said receiver, a locking sleeve formed with laterally projecting lugs, said receiver being formed with a longitudinal

passage in which said locking sleeve and projecting lugs are adapted to move longitudinally, said receiver having lateral recesses in the inner side walls which when the lugs are opposite the said recesses and the locking sleeve is partially rotated receive said lugs and lock the sleeve against longitudinal movement, a bolt head having a neck which extends into and has a sliding fit in the forward end of said locking sleeve, and has an enlarged portion or boss which is of larger diameter than the bore of the locking sleeve, a hollow breech bolt within the jacket and detachably connected therewith and having an enlarged portion which has a sliding fit in the rear chamber of the jacket and has a forward portion which extends into the rear end of said locking sleeve, and normally engages the rear end of the said bolt head, said breech bolt and bolt head being formed with apertures in longitudinal alignment with each other to contain the firing pin, a firing pin having three diameters the rear portion being the largest and the forward extension the smallest, the aperture in the breech bolt being of three diameters, to accommodate the three diameters of the firing pin, the aperture in the bolt head being of a diameter to fit the forward extension of the firing pin.

18. In a fire arm, a receiver, a jacket slidable within said receiver, a locking sleeve formed with laterally projecting lugs, said receiver being formed with a longitudinal passage in which said locking sleeve and projecting lugs are adapted to move longitudinally said receiver having lateral recesses in the inner side walls which when the lugs are opposite the said recesses and the locking sleeve is partially rotated receive said lugs and lock the sleeve against longitudinal movement, a bolt head having a neck which extends into and has a sliding fit in the forward end of said locking sleeve, and has an enlarged portion or boss which is of larger diameter than the bore of the locking sleeve, a hollow breech bolt within the jacket and detachably connected therewith and having an enlarged portion which has a sliding fit in the rear chamber of the jacket and has a forward portion which extends into the rear end of the said locking sleeve, and normally engages the rear end of the said bolt head, said breech bolt and bolt head being formed with apertures in longitudinal alignment with each other for the firing pin, a firing pin having three diameters the rear portion being the largest and the forward extension the smallest, the aperture in the breech bolt being of three diameters to accommodate the three diameters of the firing pin, the aperture in the bolt head being of a diameter to fit the forward extension of the firing pin, the locking sleeve being formed with a cam path in the

side thereof having a portion which is parallel with the axis and a portion which is diagonal thereto, a cam stud which passes through the wall of the jacket and engages with said cam path in the locking sleeve whereby during the first portion of the movement of the jacket after firing the cam stud will move in the longitudinal portion of the cam path without moving the locking sleeve and then the stud will engage the diagonal portion of the cam path and partially rotate the locking sleeve, and disengage the locking lugs from the locking recesses whereby the parts may then move rearwardly together, and on the forward movement of the jacket when the cam stud moves through the diagonal portion of the cam path the locking sleeve will be again locked, and while the cam stud passes through the longitudinal portion of the cam the jacket will move farther forward and the locking sleeve will remain stationary.

19. In a fire arm, a receiver, a jacket slidable within said receiver, a locking sleeve formed with laterally projecting lugs, said receiver being formed with a longitudinal passage in which said locking sleeve and projecting lugs are adapted to move longitudinally, said receiver having lateral recesses in the inner side walls which when the lugs are opposite the said recesses and the locking sleeve is partially rotated receive said lugs and lock the sleeve against longitudinal movement, a bolt head having a neck which extends into and has a sliding fit in the forward end of said locking sleeve, and has an enlarged portion which is of larger diameter than the bore of the locking sleeve, a hollow breech bolt within the jacket and detachably connected therewith and having an enlarged portion which has a sliding fit in the rear chamber of the jacket and has a forward portion which extends into the rear end of said locking sleeve and normally engages the rear end of the said bolt head, said breech bolt and bolt head being formed with apertures in longitudinal alinement with each other for the firing pin, a firing pin having three diameters the rear portion being the largest and the forward extension the smallest, the aperture in the breech bolt being of three diameters to accommodate the three diameters of the firing pin, the aperture in the bolt head being of a diameter to fit the forward extension of the firing pin, the locking sleeve being formed with a cam path in the side thereof having a portion which is parallel with the axis and a portion which is diagonal thereto, a cam stud which passes through the wall of the jacket and engages with said cam path in the locking sleeve whereby during the first portion of the movement of the jacket after firing the cam stud will move in the longitudinal portion of the cam path without moving the

locking sleeve and then the stud will engage the diagonal portion of the cam path and partially rotate the locking sleeve, and disengage the locking lugs from the locking recesses whereby the parts may then move rearwardly together, and on the forward movement of the jacket when the cam stud moves through the diagonal portion of the cam path the locking sleeve will be again locked, and while the cam stud passes through the longitudinal portion of the cam the jacket will move farther forward and the locking sleeve will remain stationary, said jacket, breech bolt and firing pin being formed with transverse pin holes in alinement with each other, and a removable clamping pin adapted to pass through said apertures and detachably secure said parts together, said clamping pin being formed with a lever whereby the clamping pin may be removed, said jacket and cam stud being formed with a groove to receive said lever.

20. In a firearm, a slidable but non-rotatable jacket, a slidable and rotatable locking sleeve partially contained in said jacket, a bolt head having a neck which has a sliding movement within the forward end of the locking sleeve.

21. In a firearm, a slidable but non-rotatable jacket, a non-slidable and non-rotatable bolt fixed horizontally into the rear wall of said jacket, a locking sleeve slidable and rotatable in said jacket and riding upon said bolt, a bolt head, said locking sleeve and said bolt head being so fitted with relation to each other that the rear portion of the bolt head has a free sliding movement within the forward end of the locking sleeve and means for limiting such rearward movement.

22. In a firearm, a slidable, non-rotatable jacket, a locking sleeve contained in said jacket and slidable and rotatable with relation to said jacket, and means whereby said jacket may rotate said locking sleeve, and means for preventing the front end of the locking sleeve from coming in contact with the base or head of a cartridge case or shell properly seated in the chamber or barrel of said firearm.

23. In a firearm, a slidable but non-rotatable jacket, a non-slidable and non-rotatable bolt fixed horizontally into the rear wall of said jacket, a locking sleeve slidable and rotatable with relation to said jacket and riding upon said bolt, and means for preventing the front end of the locking sleeve from coming in contact with the base or head of a cartridge case or shell properly seated in the chamber or barrel of said firearm.

24. In a firearm, a slidable but non-rotatable jacket, a non-slidable and non-rotatable bolt fixed horizontally into the rear wall of said jacket, a locking sleeve slidable and rotatable with relation to said jacket and riding upon said bolt, a bolt head slidable but

non-rotatable relative to said locking sleeve, and means for preventing the front end of the locking sleeve from coming in contact with the base or head of a cartridge case or shell properly seated in the chamber or barrel of said fire arm.

25. Means for transmitting force from the pressure of the gases of explosion produced by the burning of the powder charge contained in a cartridge or in a cartridge case or shell properly seated in the chamber of the barrel of the firearm for the purpose of automatically operating the breech mechanism of said firearm, said means consisting of a slidable but non-rotatable jacket, a non-slidable and non-rotatable bolt fixed horizontally into the rear wall of said jacket, a locking sleeve slidable and rotatable with relation to said jacket and riding upon said bolt and a bolt head having a neck slidable within said locking sleeve, said bolt head being formed with an enlarged forward portion, the said enlarged forward portion being situated between the forward end of said locking sleeve and the base of said cartridge or cartridge case or shell and in contact with said cartridge case, and retained out of engagement with said locking sleeve by the engagement of said neck with said bolt when the bolt is in its full forward position.

26. In a firearm, a slidable but non-rotatable hollow jacket, a hollow locking sleeve partially contained within said jacket and rotatable and slidable therein, a hollow bolt fixed in the rear end of said jacket and projecting forwardly into said locking sleeve, a bolt head formed with a neck adapted to enter the forward end of said locking sleeve, the rear end of said neck being adapted to engage the front end of said bolt so that when the bolt is in its full forward position the posterior or rear surface of the bolt head is not in contact with the anterior or forward surface or end of said locking sleeve.

27. In a firearm, a slidable but non-rotatable hollow jacket, a hollow locking sleeve partially contained within said jacket and rotatable and slidable therein, a hollow bolt fixed in the rear end of said jacket and projecting forwardly into said locking sleeve, a bolt head formed with a boss and a neck, said boss being fitted on its anterior face to receive and contain the base of a cartridge case or shell and to admit an ejector and to retain an extractor, said neck being adapted to enter the forward end of the said locking sleeve, the rear end of said neck being adapted to engage the front end of said bolt so that when the bolt is in its full forward position the posterior or rear surface of the bolt head is not in contact with the anterior or forward surface or end of said locking sleeve, and a firing pin contained

in and passing through said jacket, bolt and bolt head.

28. In a fire-arm, a slidable locking sleeve, means for locking said sleeve in its extreme forward position, a bolt head chamber between the cartridge chamber and the locking sleeve in its forward position, a bolt head located in said chamber adapted to be seated upon a cartridge case or shell properly seated in the cartridge chamber, said bolt head chamber being of sufficient depth so that there is a space between the said bolt head and said locking sleeve when both are in their most forward positions, said bolt head having a neck which enters and is slidable in said locking sleeve, said bolt head chamber being of sufficient diameter to permit the cartridge case or shell to follow the bolt head in its rearward movement into the chamber until the bolt head engages the locking sleeve.

29. In a fire-arm, a slidable locking sleeve, a bolt head chamber in front of said locking sleeve, a bolt head located in said chamber and adapted to be seated upon a cartridge case or shell properly seated in the cartridge chamber, said bolt head being formed with a neck slidable within said locking sleeve, said bolt head chamber being of greater depth than the bolt head whereby when the bolt head is in its forward position it is out of engagement with the locking sleeve.

30. In a fire-arm, a locking sleeve which is both rotatable and slidable, a chamber in front of said locking sleeve, a bolt head located in said chamber, said chamber being of greater depth than the bolt head, said bolt head being formed with a neck slidable in said locking sleeve, and a bolt separate from said bolt head which in its forward position engages the neck of said bolt head and retains said bolt head out of engagement with said locking sleeve.

31. In a fire-arm, a rotatable and slidable locking sleeve, a bolt head which in its forward position is in contact with a cartridge case or shell properly seated in the cartridge chamber and having a neck which is slidable within said locking sleeve, the front face of said locking sleeve in its most forward position being at some distance in the rear of the rear face of said bolt head in its forward position whereby the bolt head is permitted a rearward movement before it engages with said locking sleeve.

32. In a fire-arm, a rotatable and slidable locking sleeve, means for locking said sleeve in its forward position, a bolt head in front of said locking sleeve and adapted to be seated upon the base of the cartridge case or shell properly seated in the cartridge chamber, a chamber in front of said locking sleeve in its forward position in which said bolt head is slidable while the locking sleeve is locked, said bolt head having a neck slid-

able within said locking sleeve, and means actuated by the rearward movement of said bolt head to unlock said sleeve.

5 33. In a fire-arm, a locking sleeve which is both rotatable and slidable, means where-  
by said locking sleeve is locked by its rotary  
movement at the end of its forward stroke  
and unlocked by its rotary movement during  
10 the initial part of its backward stroke, a bolt  
head located in front of said locking sleeve,  
and having a neck which enters said locking  
sleeve, said bolt head and neck being slid-  
able with relation to said locking-sleeve  
15 while the locking sleeve is in its locked position,  
a bolt separate from said bolt head and  
which in its forward position enters said  
locking sleeve and engages the rear end of  
said bolt head neck and is slidable with rela-  
20 tion to said bolt head and locking sleeve, a  
jacket which incloses the rear portion of

said bolt and is in contact therewith, the  
parts being so connected that the bolt has an  
initial rearward movement while the locking  
sleeve remains locked and during said initial  
movement it actuates the said bolt and is 25  
stopped by contact with the locking sleeve,  
the rearward movement of said bolt actu-  
ating the jacket rearwardly, connection be-  
tween said jacket and said locking sleeve 30  
whereby the rearward movement of the  
jacket rotates and unlocks the locking sleeve  
and when unlocked the locking sleeve, bolt  
head, bolt and jacket are free to move rear-  
wardly as one piece.

In testimony whereof I affix my signature, 35  
in presence of two witnesses.

FRANKLIN K. YOUNG.

Witnesses:

WILLIAM A. COPELAND,  
ALICE H. MORRISON.