

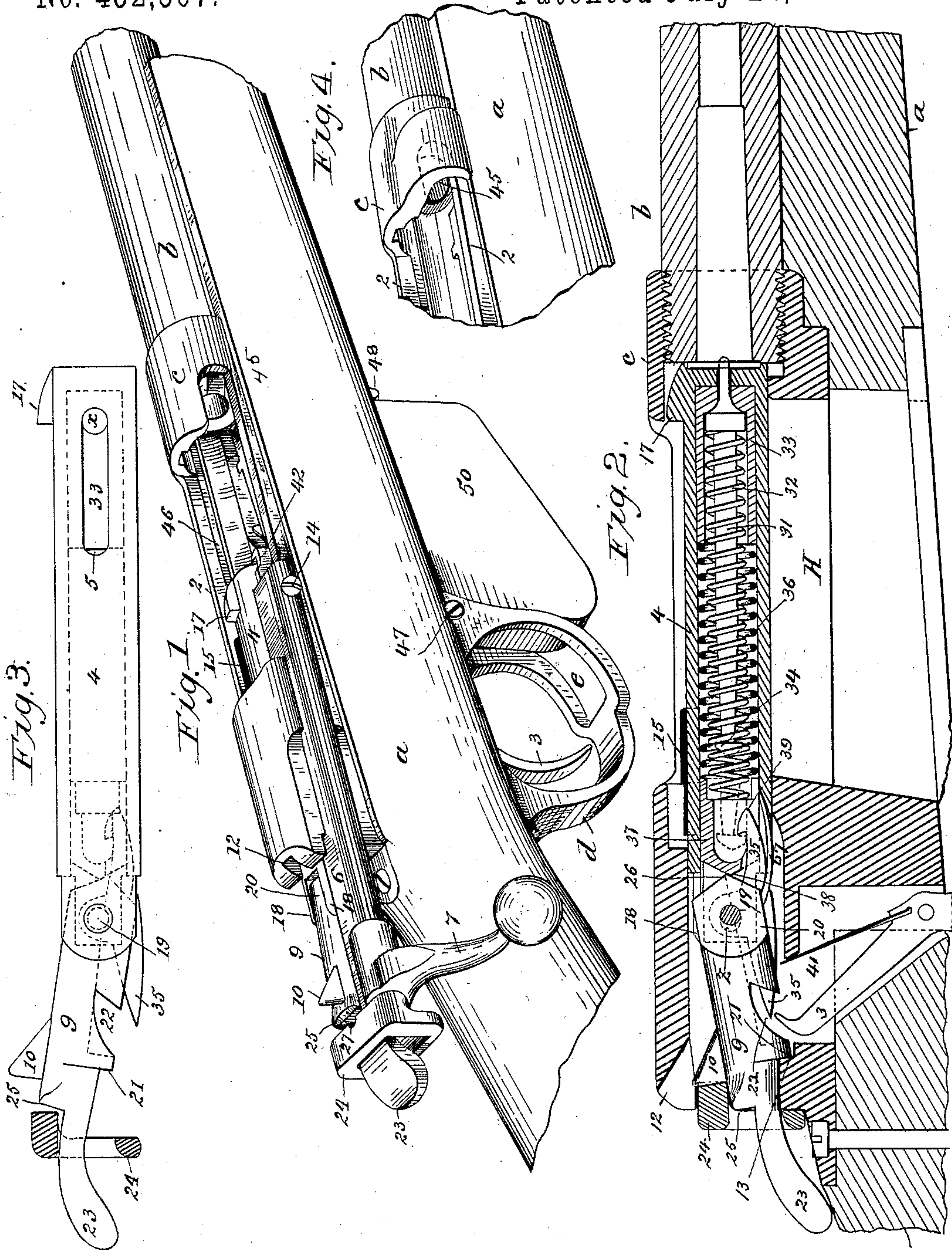
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4 Sheets—Sheet 1.

L. F. BRUCE.
BREECH LOADING MAGAZINE GUN.

No. 432,507.

Patented July 22, 1890.



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H. S. Bellamy

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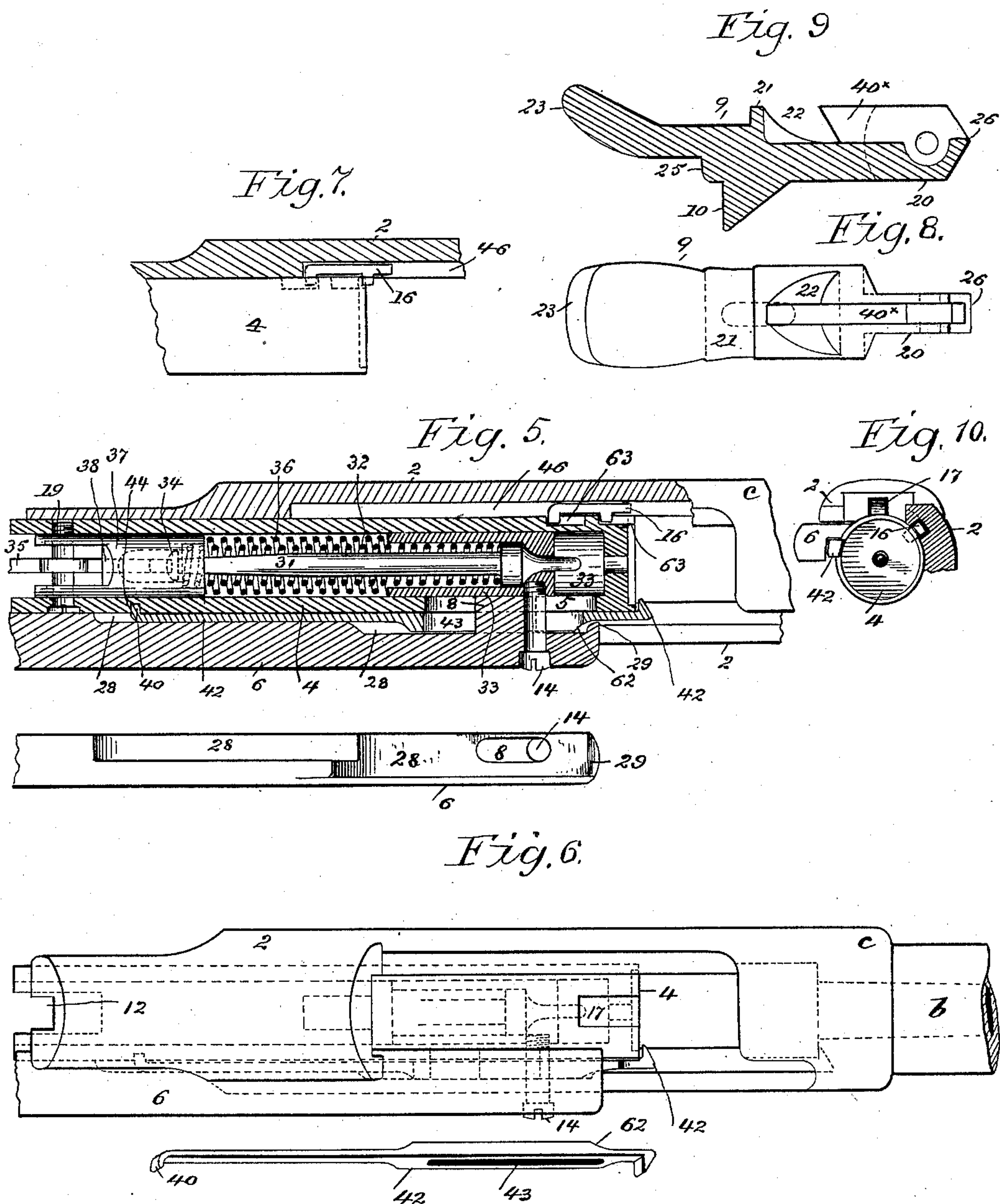
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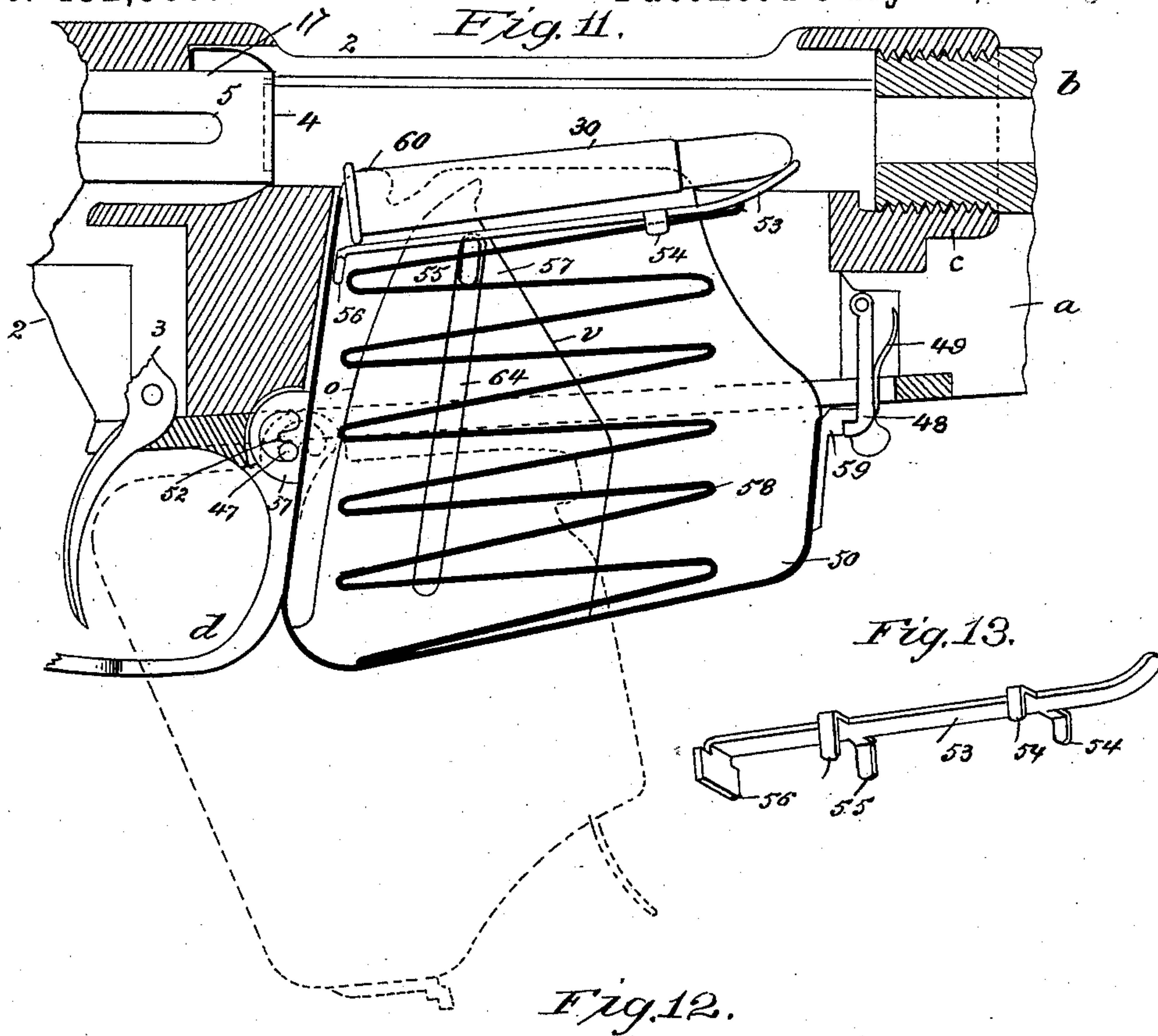
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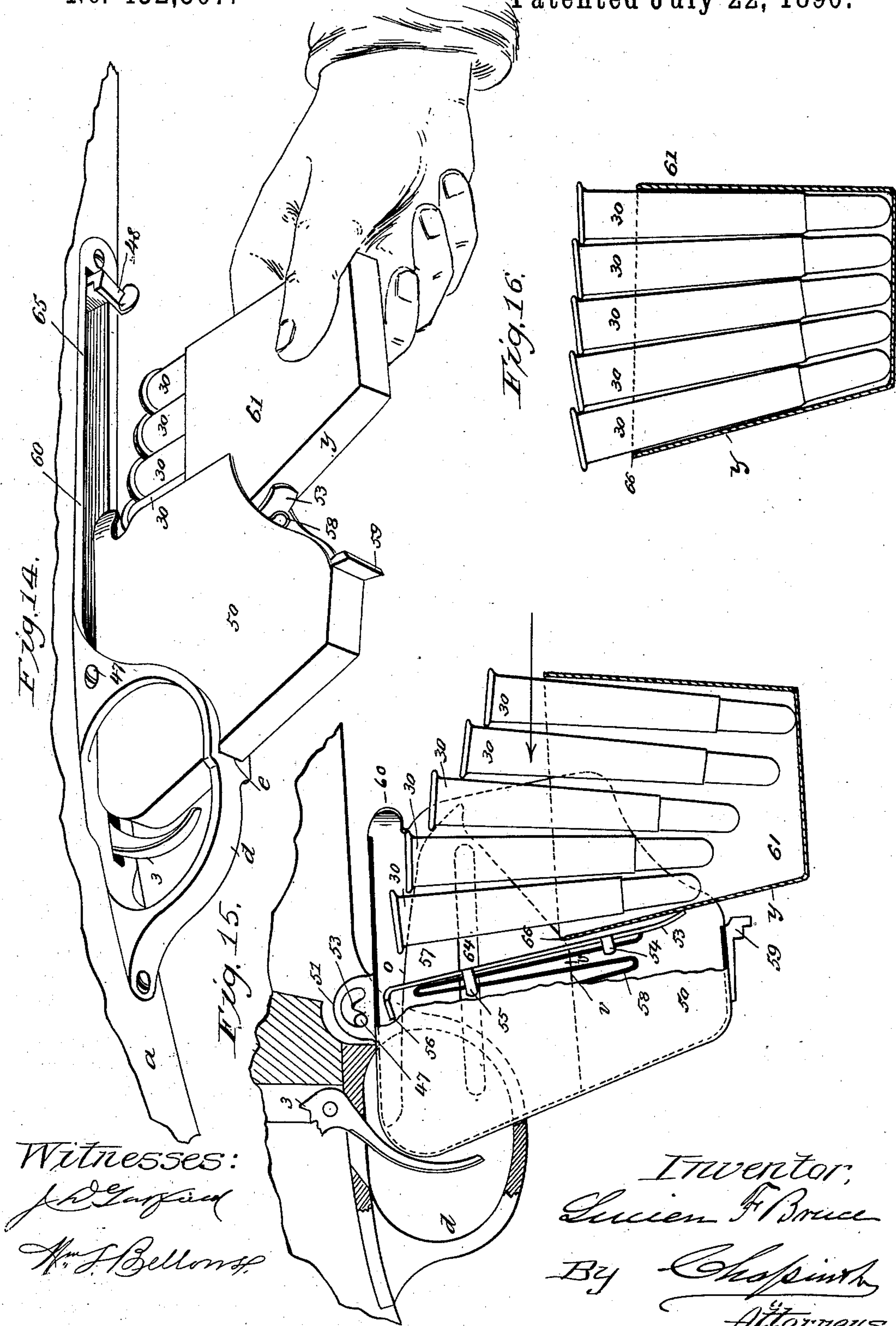
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UNITED STATES PATENT OFFICE.

LUCIEN F. BRUCE, OF SPRINGFIELD, MASSACHUSETTS.

BREECH-LOADING MAGAZINE-GUN.

SPECIFICATION forming part of Letters Patent No. 432,507, dated July 22, 1890.

Application filed March 8, 1889. Serial No. 302,550. (No model.)

To all whom it may concern:

Be it known that I, LUCIEN F. BRUCE, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Breech-Loading and Magazine Fire-Arms, of which the following is a specification.

This invention relates to breech-loading fire-arms, and particularly to that class thereof denominated "bolt-guns," the object being to provide an improved gun of this class capable of serving either as a single-loader or as a magazine-gun; and the invention consists in the improved construction of the operative parts of the arm and the magazine therefor, all as hereinafter fully described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a perspective view of that portion of a breech-loading gun containing the breech mechanism thereof, showing said mechanism drawn rearwardly from the end of the barrel and the magazine in an operative position, all constructed according to my invention. Fig. 2 is a longitudinal vertical section of the breech mechanism containing part of the arm, showing parts of said mechanism and the lock devices in section and in full lines, as hereinafter described. Fig. 3 is a side elevation of the bolt of the arm and a sectional view of another co-operating part below described. Fig. 4 is a perspective view of the forward end of the receiver and of adjoining parts, showing a modified construction of said receiver. Fig. 5 is a longitudinal horizontal section of the receiver and adjoining parts of the gun, showing certain parts of the breech, the lock, and the extractor devices, and of a portion of the bolt-operating bar, as below described. Fig. 6 is a plan view of the receiver portion of the arm and a perspective view of the extractor thereof. Figs. 7, 8, 9, and 10 illustrate detail parts of the arm below described. Fig. 11 is a longitudinal vertical section of the receiver portion of the arm, showing its magazine in position thereon, but having one side removed and showing a cartridge held thereby, this figure showing in dotted lines the position of the magazine when swung open to be loaded. Fig. 12 is a similar view to

Fig. 11, but showing the magazine fully loaded and in a depressed position to prevent the bolt from engaging with the upper cartridge. Fig. 13 is a perspective view of a part of the magazine hereinafter described. Fig. 14 is a perspective view illustrating the position of the magazine when receiving its charge of cartridges, the cartridge-box, and the manner of holding the same in the edge of the magazine. Fig. 15 is a side elevation showing a portion of the arm, the magazine in loading position with its front side partly broken away, the cartridge-box in section, and the positions of the magazine, cartridge-box, and cartridges in the act of loading. Fig. 16 is a side elevation of the cartridge-box in section and of its charge of cartridges.

The improvements in the fire-arm herein described and shown relate to the construction of the bolt of the arm and the means for locking and unlocking it, whereby in the manipulation of the bolt to retire it from the barrel to load the gun, and then to move the bolt forward against the breech of the barrel and to lock it ready for firing, the movements of the bolt and the usual operating arm or handle thereof are all in a line with the bore of the barrel and no rotary motion of the bolt or vibratory motion of said arm in any direction to lock the bolt is required.

Said improvements further relate to peculiar lock mechanism and shell-extracting devices and to an improved construction of the magazine.

In the drawings, the bolt 4, the bolt-lock 9, which is pivoted on the rear end of said bolt, the sliding bar 6, carrying on its rear end a yoke 24 and having fixed thereon the operating-arm 7, the lock devices (excepting the trigger) which are contained in and carried by said bolt, and the shell-extracting devices which are connected therewith comprise the entire portions of the gun which are movable when the gun is loaded and fired and the empty shell is thrown out preparatory to reloading, whether the arm be used as a single-loader or with the magazine, whereby it becomes a repeating-arm, and the receiver 2, which is of the usual metallic construction, is chambered cylindrically and longitudinally to receive the said bolt and bolt-lock in operative position, as shown in Fig. 1, and the rear portion of the

receiver has a longitudinal slot through its side, in which said longitudinal bar 6 operates, and the side of the head *c* of the receiver is slotted, as shown, to permit the forward end of said bar to move the requisite distance toward the rear end of the barrel *b* to permit the forward end of the bolt 4 to come compactly against the head of a cartridge placed in the barrel.

Fig. 4 illustrates a modification of the construction of the said receiver-head *c*, inasmuch as it illustrates the manner of making said head, whereby the laterally-extending recess 45 is formed, within which the extreme forward end of said bar 6 may enter when the bolt is in a locked position against a cartridge, and thereby be more securely held so as to fully resist the force of a bursting cartridge-head, thereby preventing any injury to the said bar or its connections with the bolt from such a cause.

The receiver 2 is provided with a suitable downhanging portion, in which the trigger 3 is hung, the upper portion, thereof or that within the arm being shown in side elevation in Fig. 2, and its lower portion or finger end being shown in several other figures in the usual position within the guard *d*. Said receiver has also the usual opening in its upper side to provide for loading the gun singly, as in the case of an ordinary breech-loader, and is shown in this instance with an opening or slot *H* through its under side, to which is attached a magazine, as hereinafter described; but it will be clearly understood by persons familiar with fire-arm constructions that the gun is as efficient as a single-loader whether the receiver be constructed to provide for attaching the magazine thereto, as described, or not. A tapering cut or slot 12 is made in the upper side of the rear end of the receiver, (see Fig. 2,) which receives a cam 10 on the upper side of the bolt-lock 9 when the bolt and its connected parts are being moved in the receiver preparatory to locking the same, and a shoulder 13 is formed in the lower inner side of the receiver near its rear end, with which a shoulder 25 on the bolt-lock engages when the parts are in a firing position. A longitudinal groove 46 is made in the inner left-hand side of the receiver 2, in which the shell-ejector 16 has a sliding movement controlled by the bolt 4, as hereinafter described. A recess 15, (see Figs. 1 and 2,) which communicates with said ejector-groove 46, is cut in the inner side of the receiver to provide for putting in and taking out said ejector when the bolt is drawn fully back to bring the ejector opposite said recess, the latter then permitting the bolt to be turned sufficiently in the receiver to carry the ejector from the slot 46 through said recess to the opening in the top of the receiver. The said bolt 4 is tubular, of uniform internal and external diameter, (see Figs. 2, 3, and 5,) and has a solid head with a firing-pin hole through it, as shown. The bolt has a slot 5 on one side thereof to

receive a boss 8, which projects laterally from the inner side of said operating-bar 6. (See Figs. 3 and 5.) A screw 14 passes through the bar 6 near its forward end and the forward end of said boss 8 and through said slot 5 in the bolt, and screws into the firing-pin cup 33 within and at the forward end of the bolt, as shown in Fig. 5. The rear end of the bolt 4 is made with joint-ears 18 thereon to receive a joint-web 20 on the forward end of the bolt-lock 9, as clearly shown in Fig. 1 and in detail in Figs. 2, 3, and 8, the jointed ends of said bolt and bolt-lock being attached by the pivot-pin 19. The under side of the bolt 4 is slotted longitudinally from its rear end forward to receive the hooked end of the sear 35, said sear having a boss thereon, (see Figs. 2 and 3,) as shown by dotted lines in the drawings, through which is a pivot-hole to receive the aforesaid pivot-pin 19, this construction being more clearly shown in Fig. 5, the hooked end of said sear swinging in the rear end of the bolt and through a slot 39 in the side of a spring-cup 37 in the rear end of the bolt by the action of the sear-spring 67, one end of which is rigidly secured in a slot in the under edge of the sear, and its free end extends forward and engages with the under side of the bolt at the inner end of the said slot therein, in which the end of the sear has its vibratory motion, as shown in Fig. 2, the rear end of the sear entering a slot 40^x in the bolt-lock, as shown. The body of the bolt-lock 9 is of the same cylindrical form as the breech-bolt 4, and is jointed to the rear end of the latter to permit its free end to have a vibratory motion, and during the major portion of the reciprocating movements of the bolt the bolt-lock is in alignment with the bolt. The bolt-lock is provided with the said abutment 21 at its rear end to engage with the shoulder 13 on the receiver when the gun is locked, and a curved transverse slot 22 is made in the under side of the bolt-lock, into which slot the rear end of the sear 35 projects, as shown, and in which slot 22 the upper end of the trigger 3 has a vibratory motion to engage with the rear end of the sear to disengage the latter from the firing-pin when the gun is fired.

The operative relation of the sear and the trigger when the gun is ready to be fired is shown in Fig. 2. The upwardly-projecting cam 10 on the upper side of the bolt-lock 9 enters said slot 12 in the rear end of the receiver 2 when the bolt is moved toward the rear end of the barrel, and thereby the rear end of the bolt-lock is made to swing downward toward the position shown in Fig. 2, bringing the rear end of the bolt-lock into such position relative to the yoke 24 on the rear end of the bar 6 as permits said yoke to move from the position against the abutment 25 shown in Figs. 3 and 1 to that shown in Fig. 2, whereby the bolt-lock is held in a locked position in rigid engagement with the receiver. A cam-arm 23, having a downwardly-

curved form, extends from the rear end of the bolt-lock and passes through said cam-yoke 24, and an abutment for said yoke (indicated by 25) is provided at the junction of said arm and the body of the bolt-lock. The said bolt-lock 9 has its construction illustrated in detail in Figs. 8 and 9, in which it is shown with its under side uppermost, Fig. 9 showing it in longitudinal section, and, as clearly shown in the latter figure and elsewhere in the drawings, the pivoted end thereof is constructed with a projecting point 26 opposite its pivot-hole, and the aforesaid spring-cup in the rear end of the bolt 4 is constructed with suitable joint-ears and is pivoted to the same pivot-pin 19 as is the inner end of the bolt-lock, but by a slightly-elongated pivot-hole 2, (indicated by a dotted line in Fig. 2,) whereby said spring-cup is permitted to have a slight longitudinal movement within the bolt, and the rear end of said spring-cup is constructed to have a central point of engagement with the said extreme end 26 of the bolt-lock, whereby (aided by the action of springs, as below described) the extreme rear end of said spring-cup so engages with the said end 26 of the bolt-lock as to hold the rear end of the latter in either an upward or downward position, as shown in Figs. 3 and 2, the said construction of the meeting ends of the bolt-lock and spring-cup forming a species of toggle-joint for action upon the bolt-lock, as above described. The said cam-yoke 24 engages with said abutment 25 on the bolt-lock to primarily move the breech-bolt against the barrel and until cam 10 engages with the receiver and swings the rear end of the bolt-lock downward. The said sliding bar 6 is firmly secured in the position at the side of the bolt 4 by the screw 14, which, as above described, engages with the firing-pin cup 33, said cup having a sliding motion within the bolt, which is imparted thereto by moving said bar in operating the bolt, and the rearward movement of the firing-pin cup serves to cock the gun, so to speak, or, in other words, to move the firing-pin 31 rearwardly to a position which brings the head of said pin (as indicated in dotted lines in Fig. 2, said head being indicated by 34) to such a rearward position as causes it to become engaged with the hook of the sear 35, as there shown. The longitudinal movement of the bar 6 at the side of the bolt 4 is limited by the length of the slot 5 in the side of the bolt. The said longitudinal movement of the bar 6 and of the yoke 24, rigidly attached to the rear end of said bar, performs an important function relative to the operation of the bolt-lock by the action of said yoke thereon, as below described, and said sliding bar also serves to operate upon the extractor 42 to cause it to rigidly engage with the rim of the cartridge at the first movement of the bar and bolt rearwardly after firing the gun, and this same rearward movement of the bar 6 causes the under side of the yoke 24 to be forced against the adjoining side of the curved

cam-arm 23 of the bolt-lock, thereby elevating the rear end of the latter and disengaging it from its engagement with the shoulder 13 of the receiver, and so forcing the inclined edge of the cam 10 against the base of the slot 12 of the receiver as to impart to the bolt and to said bar a positive and forcible rearward movement, which serves to infallibly extract the shell from the gun.

The extractor 42 (shown in perspective in Fig. 6 and in its position in the gun in Fig. 5) operates in a recess or slot 28 in the inner side of bar 6, the rear end of the extractor having a short arm 40 thereon, which engages in a socket 44 in the side of the bolt, whereby the extractor is compelled to move longitudinally with the latter, the opposite end of the extractor having the usual hook thereon to engage with the rim of the cartridge, the hooked end of the extractor being sufficiently elastic to permit of the said engagement when the bolt is forced against the head of the cartridge. As before described, the boss 8 on the bar 6 extends through the said slot 43 in the extractor and has a longitudinal movement therein resulting from the before-described like movement of said bar when the latter is operated, as before described.

In order to produce a positive engagement of the extractor-hook with the rim of the cartridge to extract the latter, a shoulder 62, having a curved face, as shown in Fig. 5, is formed on the side of the extractor opposite the adjoining side of bar 6, and at the end of the latter is formed a cam 29, having a similarly-shaped face, which, when the bar 6 is drawn backward to retire the bolt and extract the cartridge, is brought to bear firmly against said shoulder 62, thereby positively forcing the extractor-hook against the cartridge-head and preventing the hook from slipping off from the latter should the cartridge stick in the gun. The opposite or succeeding forward movement of the bar 6 carries the cam 29 away from the shoulder 62 on the extractor, leaving its flexible hooked end again free to engage with a cartridge head, as before. The said firing-pin 31 occupies the position within the bolt shown in Figs. 2 and 5, its forward end passing through a suitable perforation in the head of the firing-pin cup 33, and its rear end having thereon the before-mentioned head 34, with which the sear engages when the gun is cocked. The spring 32, which drives the firing-pin against the cartridge-primer, is of coiled steel wire, placed on the body of the firing-pin, as shown, having one end abutting against a shoulder near the forward end of the pin and its rear end abutting against a shoulder in the spring-cup 37 in the rear end of the bolt 4. A second coil-spring 36 incloses the said firing-pin spring, but is coiled in an opposite direction to the latter to leave each spring to act independently, and this second spring 36 has one end abutting against the rear end of the firing-

pin cup 33 and its opposite end abutting against the forward end of said spring-cup 37.

In assembling the said firing-pin cup, firing-pin, spring-cup, and two coil-springs within the bolt of the gun, whereby they are brought to the normal positions shown in Fig. 2, the spring-cup 37 is inserted last, and is so forced against the rear ends of the said two coil-springs as to cause the latter to act with a constant rearward force against said spring-cup to drive its extreme rear end 38 forcibly against the adjoining forward end of the bolt-lock for the purpose of holding the latter in different positions, as above described, and thus the firing-pin spring acts constantly against the firing-pin, and the firing-pin cup serves as an abutment for one end of the outer coil-spring 36, and the rearward movement which is imparted to said firing-pin cup when it is drawn backward to the position shown in Fig. 5 causes an increased spring force to act against the spring-cup 37, and consequently against the end of the bolt-lock, to hold its rear end in engagement with the receiver when the parts are in a firing position, and said spring force which acts against the bolt-lock, as described, is augmented by the force of the firing-pin spring when the firing-pin itself is by the movement of the firing-pin cup also carried rearwardly to a firing position.

From the above description of the construction of the parts contained within the bolt 4 it will be understood that when the rear end of the bolt-lock is lifted, as aforesaid, by the yoke 24 on bar 6 sufficiently to cause the forward end 26 of the bolt-lock to pass beneath the adjoining rear end of the spring-cup the latter must of necessity move forward slightly to let the said ends pass each other and come to the position indicated by dotted lines in Fig. 3, where the rear end of the spring-cup is uppermost, and the said two coil-springs act to hold the rear end of the bolt-lock in an elevated position. Thus it will be seen that to permit of the said action of the spring-cup 37 against the end of the bolt-lock the pivot-hole *z* in the joint-web of the spring-cup, through which the pivot-pin 19 passes, must needs be slightly elongated, as already described. The interior of the spring-cup 37 is bored out of such diameter as adapts it to freely receive the head of the firing-pin in the position shown in Fig. 2 by dotted lines, when the head of the firing-pin is forced by the hooked end of the sear 35 to engage the latter with it prior to firing, and care is taken that the diameter of the chamber within said spring-cup is such as to prevent the headed end of the firing-pin from springing away from the sear when such engagement takes place, and thus a positive engagement of sear and firing-pin is effected at this point in the operation of the parts.

The magazine 50 consists of a metallic box of the form shown in the several views, which is pivoted by one edge to the under side of

the arm by a pivot-pin or screw 47. The rear edge of said magazine has fixed thereto a pivot-pin box 51, of peculiar construction, in that the pivot-pin passage through it is of curved or segmental form in cross-section and has extending through said passage a rib 52, thereby forming a pivot-pin socket on each side of said rib, to the end that the edge of the magazine to which the said joint-box is attached may be moved upward or downward to the positions shown in Figs. 11 and 12 and be held in those positions—either one of them—by the engagement of the pivot-pin with the socket thereof on either side of said rib 52. The said change of position of one edge of the magazine is effected, for instance, by pressing the pivoted edge of the magazine downward, (referring now to Fig. 11,) thus causing the said rib 52 to slide by the pivot-pin 47 to the position shown in Fig. 12, whereby the head or rim of the uppermost cartridge 30 in the magazine is brought to a point below the under side of the bolt 4, so that said cartridge is in a position which prevents the engagement of the bolt therewith, for a purpose below described. The said downward movement of the rear edge of the magazine results in a slight forward movement of the same when the rib 52 passes by the pivot-pin 47, and said forward movement is permitted by the action of the spring-catch 48, which holds the magazine in an upward position, said spring-catch being adapted to swing during the said forward movement of the magazine with the latter and to follow the succeeding rearward motion of the magazine when the latter takes the position shown in Fig. 12. The forward edge of the magazine has a catch-block 59 thereon, with which the said spring-catch 48 engages to hold the magazine in its normal operative position under the gun, a spring 49 holding said spring-catch in engagement with said block. The disengagement of said spring-catch from the magazine permits it to swing downward to the position indicated by dotted lines in Fig. 11 and shown in full lines in Figs. 14 and 15, whereby its open edge is brought to a position substantially at right angles to its said normal one, which position is that which the magazine occupies when it is to be charged with cartridges; and to permit of such downward swinging motion of the magazine the guard *d* has a slot *e* through it, in which one corner of the magazine swings when the latter is in a pending position, as in Fig. 14. When the magazine is secured in an upward or operative position, it takes the place in the arm shown by Figs. 1, 11, and 12.

The magazine may have cartridges supplied thereto one by one when in its normal position.

The internal width or distance between the inner opposite walls of the magazine is substantially that of, or a trifle more than, the diameter of the heads of the cartridges with which the magazine is to be loaded, so that

the movement of the cartridges therein shall be free.

There are fixed on the inner opposite walls of the sides of the magazine two cam-plates 57, directly opposite each other, one of which cam-plates is clearly shown in full lines in Fig. 11 and in dotted lines in Figs. 12 and 15, each of said cam-plates having therein a slot 64. The purpose of said cam-plates is to provide efficient means for controlling and directing the movement of the cartridges when they are placed in the magazine and during their movement therefrom while the gun is being fired as a magazine or repeating arm, and also to serve as a means for separating the cartridges from the cartridge-box 61 during said loading of the magazine, as shown in Fig. 15 and as further described below. The said slots 64 in each of the cam-plates 57 provide means for the engagement with the latter of the arms 55 of the cartridge-table 53 while the table moves up and down within the magazine, said engagement of the arms 55 in said slots serving to hold the table longitudinally in place and permitting it to have such a rocking motion in the magazine as it is required to have by the different positions which it is forced to take by reason of more or less cartridges being in the magazine, said two positions being substantially illustrated in Figs. 11 and 12, and to permit the said rocking motion of the cartridge-table the said slots 64 are, in practice, made somewhat wider than are the said arms on the table. Said cartridge-table has thereon, also, the pending arms 54, similar to arms 55, and a pending end or arm 56 on its rear end. This last-named arm provides a convenient flat surface on the end of the table to bear against the inner surface at the rear edge of the magazine and obviate friction while the table moves up and down therein, and said pending arms also serve to keep the upper part of the spring 58 properly under said table. The said spring 58 consists of a series of oblong loops of spring-wire, the end of one of said loops under the table 53 being shown in Fig. 14. The lower end of said spring rests on the bottom of the magazine, as shown, and when the latter is empty the table is thereby held up to the under side of the receiver, forming a bottom therefor.

On the rear corner of the upper edge of the magazine are two inwardly-curved lips 60, (see Figs. 11, 12, 14, and 15,) which are, in practice, outward extensions of portions of the sides of the magazine under which the rear end of the upper cartridge in the magazine is held to prevent it and those below it from being thrown out by the action of the spring 58; but said lips permit the free endwise movement of the top cartridge when struck by the bolt 4 as the latter moves toward the barrel, and when one cartridge is so removed the next lower one rises and takes its place.

In the use of magazines of the class herein

shown and described it is essential that provision be made for quickly and accurately loading the magazine, and when doing so to insure such placing of the cartridges therein as shall render it impossible for the head or rim of the upper cartridge to engage with that of the next lower one; otherwise two cartridges instead of one are likely to be moved when the bolt goes forward, and much difficulty be thereby encountered in manipulating the arm, and accidents caused to occur, and provision is made for obviating such inconveniences, as follows: The cam-plates 57 on the inner walls of the magazine before referred to are constructed from sheet metal having such thickness (slightly less than the distance from the side of the cartridge-shell to the border of the rim or head thereof) as adapts their rear edges *o* to engage with rims of said cartridge-heads, as shown in Fig. 15, when the cartridges are put into the magazine, and such thickness as adapts their opposite edges *v* to engage with the end of the cartridge-box 61 at the same time, and thus, when said box containing the cartridges for the magazine is applied thereto and forced into it, as illustrated in Fig. 14, the movement thereof toward the bottom of the magazine causes the box and the cartridges to separate or to move in opposite directions by reason of the tapering or curved forms of the cam-plates, as shown in Fig. 15, until the cartridges find their places in the magazine, and the empty box remains in the hand of the operator and may be thrown away. As the last or uppermost cartridge passes into the magazine the operator pushes its head between the said incurving lips 60, and the cartridges are found in the position shown in Fig. 12, ready to be acted on and fired, as above described, after swinging the magazine upward, as there shown. By the employment of the above-described means the magazine is loaded rapidly and accurately.

In order to accomplish in an economical manner the loading of the magazine, as described, the cartridge-box 61 is made, preferably, of stiff paper (though it may be made of metal or other material, if desired) and of such thickness as allows it to enter between the walls of the magazine, as shown in Fig. 14, and the cartridges are preferably packed in said box or boxes at the manufactory when packed for transportation, and several of said boxes are packed in a larger paper box of the usual dimensions. By this means the contents of said larger box are divided into separate groups, each consisting of as many cartridges as the magazine to be loaded may require, be it five or more or less.

In order to bring the rims of the heads of the cartridges 30 into the above-mentioned proper relation, as shown in Fig. 12, after they are placed in the magazine, so that only one cartridge at a time can be moved by the bolt 4, and to provide for handling an entire magazine-charge of cartridges at once in such

manner that the rims thereof rest in regular succession, one forward of the other, from the lowermost cartridge of the charge upward, a box 61 is provided, having one edge y thereof so inclined, as shown in Figs. 14 and 16, as to permit of packing the cartridges therein in the said relative positions which they are to occupy when placed in the magazine, and which provides for transferring them in a group or mass to the magazine without changing the relative successive positions of their rims. It will be understood that the said degree of incline of the edge y of the cartridge-box relative to its opposite edge is substantially the sum of the united excess of the diameters of the headed ends of the cartridges over those of their opposite ends when they are arranged, as shown in Fig. 16 and other figures, with their rims resting against the sides of the shells one forward of the other.

The within-described improvements in cartridge-boxes for loading cartridges in masses or groups into the magazines of guns do not form any part of the invention described and claimed in this application; but the same form the subject of another application filed December 6, 1889, Serial No. 332,805.

The operation of certain detail parts of the within-described improvements has already been described, and the general operation thereof in loading and firing the gun is as follows: Assuming that no cartridge is in the barrel, and that the magazine, though charged, is adjusted, as described, by depressing its rear edge to prevent the bolt of the gun from engaging with the head of a cartridge therein, and that the bolt, the bolt-lock, and the yoke 24 on the rear end of the sliding bar 6 occupy the positions shown in Fig. 2, (those being the positions of said parts when the gun is fired,) the operator seizes the arm 7 and draws the bar 6 rearwardly by the side of the bolt 4, thereby causing a like movement of the firing-pin cup 33 and of the firing-pin, causing the head of the latter to engage with the sear 35, and thus cocking the arm. The same movement of the bar 6 carries the upper side of the yoke 24 from between the rear end of the bolt-lock and upper part of the receiver, thus unlocking the rear end of the bolt-lock and permitting it to be lifted from engagement with the lower side of the receiver by the lower edge of the said yoke, which next engages with the under side of the cam-arm 23. During the said rearward movement of bar 6 and spring-cup 33 the firing-pin spring 32 and the spring 36 have become compressed and exert a backward force against the spring-cup 37, and said spring force, when the rear end of the bolt-lock is lifted, as aforesaid, and the engaging ends 38 and 26 of the bolt-lock and spring-cup pass each other, as indicated in Fig. 3, acts to throw the rear end of the bolt-lock upward and so retain it until the latter is again swung downward by the action of the said yoke and its engagement with the receiver, as heretofore described. After

the bolt-lock has become disengaged from the receiver, as described, the stud 8 on the bar 6 engages with the rear end of the slot 5 in the bolt, and thereby the latter then moves with said bar and is thus drawn to its most rearward position, fully uncovering the rear end of the barrel, so that a cartridge can be laid into the receiver in front of the bolt or put into the barrel, or bringing the bolt to a position to act on the cartridges in the magazine when permitted to do so. The bolt is arrested at its said most rearward position by the engagement of the stop 17 on the upper side of the bolt with the front end of the rear upper portion of the receiver. If a cartridge-shell be engaged by the extractor and drawn from the barrel during said rearward movement of the bolt and connected parts, the ejector 16, which occupies the position on the bolt shown in Fig. 5, when not forced against the rear end of the groove 46 in the receiver, rests inactive; but when the bolt nearly arrives at its rearward position said ejector, by striking the rear end of said groove, is driven against a part of the cartridge-head nearly opposite that engaged by the extractor 42, (see Fig. 10,) and thus serves to give the shell a blow in a direction which causes its free end to suddenly swing laterally (or to the right looking at Fig. 1) and out of the receiver. After placing the cartridge in the gun, as aforesaid, the bolt and its said connected parts are moved forward by taking hold of said arm 7, thereby carrying the cartridge into the barrel, the said bolt parts at this time occupying substantially the relative positions shown in Fig. 1. When the forward end of the bolt has nearly reached the rear end of the barrel, the cam 10 on the upper side of the bolt-lock 9 strikes the base of the groove 12 in the receiver, thereby swinging the rear end of the bolt-lock downward and disengaging the abutment 25 thereon from the upper part of the yoke 24 and permitting the latter to move between the receiver and the bolt-lock to the position shown in Fig. 2, and at the same time causing the shoulder 21 on the under side of the bolt-lock to become rigidly engaged with a similar shoulder 13 on the receiver, thereby so rigidly locking the bolt in its place behind the barrel as to retain it immovably there and bringing the rear end of the sear 35 directly over the upper end of the trigger 3, so that the latter may act on the sear to fire the gun.

It will be clearly understood by the above description of the construction and operation of the bolt and lock parts of the arm that the trigger is inoperative to cause the arm to be discharged until the transverse slot 22 and the rear end of the sear are brought into the operative relations to the trigger shown in Fig. 2, and, therefore, should it occur, in attempting to fire the arm, that a shell, on account of excessive diameter, cannot be made to fully enter its chamber in the barrel, thereby holding the bolt somewhat removed from the end of the latter and preventing the in-

terlocking of the yoke 24 between the receiver and the bolt-lock, as shown in Fig. 2, the firing-pin cannot be operated by the trigger, and hence the cartridge cannot be exploded until the bolt-lock is in proper position to safely permit it.

What I claim as my invention is—

1. In combination, the receiver, a breech-bolt therein, and a locking-piece for said bolt, the bolt and locking-piece consisting of cylindrical members of about the same diameter, an abutment in the receiver, and a handle arranged as described to engage the locking-piece during the movement of the handle, substantially as described.

2. In combination, the receiver, the breech-bolt therein, the bolt-lock jointed to said bolt and having an engagement with the receiver to prevent the rearward movement of said bolt when in firing position, and a longitudinally-sliding bar attached to the side of said bolt, having a yoke thereon, a portion of which is interposed between the rear end of said bolt-lock and receiver when the breech-bolt is in firing position, substantially as set forth.

3. In combination, the receiver, the breech-bolt therein, the bolt-lock jointed to said bolt and having a projecting cam thereon for engagement with the upper part of the receiver in locking, and a shoulder for engagement with a like shoulder on the inner lower side of the receiver when in locked position, substantially as set forth.

4. In combination, the receiver, the breech-bolt therein, the bolt-lock jointed to said bolt and having an engagement with the receiver to prevent its rearward movement when in locked position, and having a rearwardly-extending curved cam-arm, and a longitudinally-sliding bar attached to the side of said bolt, having a yoke thereon, which engages with the said cam-arm to swing the free end of the bolt-lock from the side of the receiver, with which it engages, substantially as set forth.

5. In combination, the receiver, the breech-bolt therein, the bolt-lock jointed to said bolt and having an engagement with the receiver to prevent the rearward movement of said bolt when in locked position, and having a shoulder 25 and a rearwardly-extending cam-arm 23 thereon, and a longitudinally-sliding bar attached to the side of said bolt, having a yoke thereon, through which said cam-arm extends, and which engages with said shoulder to primarily move the breech-bolt toward the barrel, substantially as set forth.

6. In combination, in a fire-arm, the receiver, the breech-bolt therein, the bolt-lock jointed to said bolt and having a beveled face on its joint-web, the spring-cup having a longitudinal movement in the rear end of said bolt and connected thereto by the joint-pin which unites said bolt and bolt-lock, and having a beveled face on its rear end in position to engage the beveled face on the bolt-lock at

the proper time, as described, and a spring acting against said spring-cup, substantially as and for the purpose stated.

7. In combination, a receiver, the breech-bolt and the bolt-lock jointed together and having longitudinal sear-slots in the under sides thereof, the sear pivoted on the joint-pin of said bolt and bolt-lock and operating in said slots therein, the sear-spring, the trigger, the firing-pin having a longitudinal movement in said bolt and a head thereon for engagement with said sear, the spring-cup receiving the headed end of the firing-pin, and the firing-pin spring, substantially as set forth.

8. In combination, the receiver, the bolt-lock and the breech-bolt jointed together, as described, and having sear-slots therein, the sear pivoted on the joint-pin of said bolt and lock in said slots in position to engage the head of the firing-pin when the latter is retracted, the sear-spring, and the trigger engaging with the rear end of the sear, substantially as set forth.

9. In combination, the bolt having a slot through its side, the firing-cup having a sliding movement in said bolt, a longitudinally-sliding bar having a stud thereon passing through the slot in the bolt and engaging said cup, the firing-pin having its forward end entering said cup, the firing-pin spring, and the spring-cup in the rear portion of the breech-bolt, substantially as described.

10. The breech-bolt having a slot through its side, the bolt-lock jointed to said bolt, the firing-pin cup having a sliding motion in said bolt, the spring-cup engaging with the bolt-lock, a spring 36 interposed between said two cups, and a longitudinally-sliding bar at the side of said bolt, connected by a pin passing through the slot with said firing-pin cup, combined and operating substantially as set forth.

11. The receiver having an ejector-groove 46 in its inner wall, the breech-bolt provided with an extractor, and also having grooves therein, and the ejector 16, having an engagement with said grooves in the bolt and moving in said groove 46 in consonance with the breech-bolt, but to a lesser distance, and engaging with the rear end of said groove 46 to cause the head of said bolt to retire back of the outer end of said ejector, combined and operating substantially as set forth.

12. The breech-bolt, the extractor 42, having an arm thereon engaging with said bolt, a hook on its outer end to engage with the head of a cartridge, and a shoulder thereon back of said hook, combined with a longitudinally-sliding bar attached to the side of said bolt over the extractor, having a cam-point thereon engaging with said shoulder on the extractor when the latter acts on an empty shell to extract it, substantially as set forth.

13. The receiver having a head provided with a lateral recess 45, combined with the breech-bolt and the sliding bar 6, attached to the side of said bolt, the forward end of

said bar entering said recess when the head of said bolt is carried against the rear end of the barrel, substantially as set forth.

14. The receiver having a magazine-slot 5 through its lower side, combined with a magazine having its upper end extending into said slot and having a pivotal connection by its rear edge to the arm below the receiver, and spring-catch devices, substantially as described, engaging the opposite edge of the 10 magazine to hold it in operative position under the said receiver, substantially as set forth.

15. A breech-loading fire-arm having a receiver provided with a magazine-slot through 15 its lower side, combined with a magazine, substantially as described, pivotal connections, substantially as described, between one edge of said magazine and the adjoining part of the arm whereby the rear end of said 20 magazine is swung toward and from the breech-bolt of the gun, and spring-catch devices, substantially as described, engaging the opposite edge of the magazine to retain it in operative position under the arm, sub- 25 stantially as set forth.

16. A breech-loading fire-arm having a receiver provided with a magazine-slot through 30 its lower side, combined with a magazine of box form having a pivot-pin box thereon, through which is an enlarged pivot-pin passage having a rib therein, on each side of 35 which is a pivot-pin socket, and a pivot-pin passing through said box and attached to a fixed part of the arm and interlocking with said box on either side of said rib, and a catch for retaining the magazine, substantially as set forth.

17. The magazine, of box form, having on its inner opposite side walls cam-plates tapering 40 or curved, substantially as described, whose rear edges engage with the heads of the cartridges when introduced therein and serve to draw them from the cartridge-box, substantially as set forth.

18. The magazine, of box form, having on its inner opposite side walls cam-plates tapering 45 or curved, substantially as described, whose opposite edges engage simultaneously with the heads of the cartridges and with the cartridge-box containing the same when the magazine is being loaded and serve to separate 50 the box and the cartridges from each other, substantially as set forth.

19. The receiver having a magazine-slot 55 through its lower side, combined with a magazine having its open edge normally extending into said slot and pivoted by one edge thereof to the arm to permit the said open edge of the magazine to be turned substantially at 60 right angles to its said normal position to provide for charging the same without disengaging it from the gun, substantially as set forth.

20. In combination, the magazine pivoted 65 to the arm, as described, and having a downswinging motion to present its open edge to receive cartridges, and the guard *d*, located near said magazine and having a slot therein to receive a portion of said magazine when swung 70 downward to said charging position, substantially as set forth.

21. The combination, with a gun having a receiver open at the bottom, a reciprocating breech-bolt in the receiver, and suitable boltlocking mechanism and firing mechanism, 75 substantially as described, of a pivot extending transversely of the gun near the bottom of the receiver and a magazine having a slot through which said pivot passes, whereby the magazine may be raised on its pivot so that 80 its upper cartridge comes in the line of movement of the bolt or lowered below the plane of said bolt, substantially as described.

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Witnesses:

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