

S. F. VAN CHOATE.

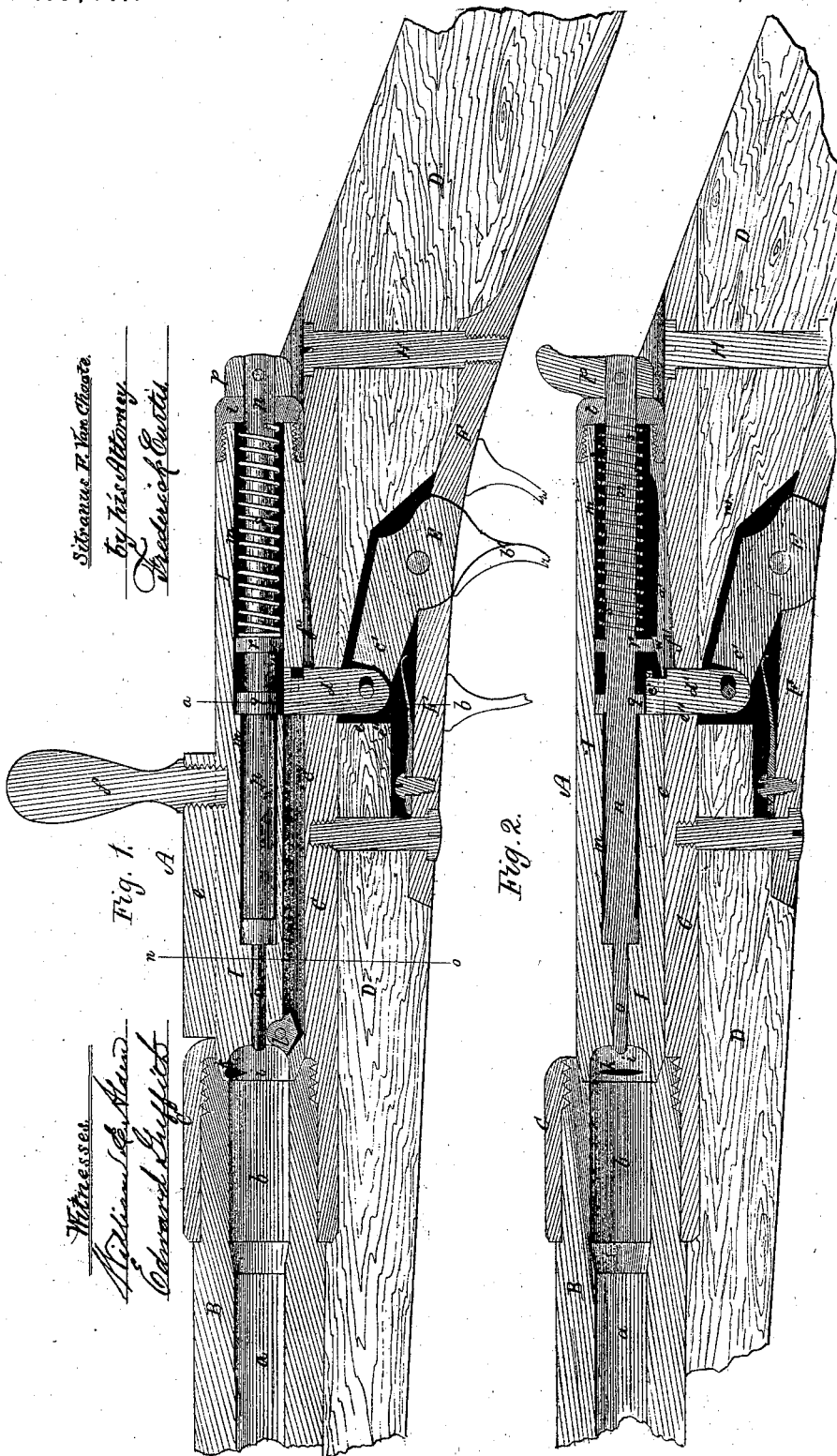
Improvement in Breech-Loading Fire-Arms.

No. 115,911.

Patented June 13, 1871.

Situated at New York
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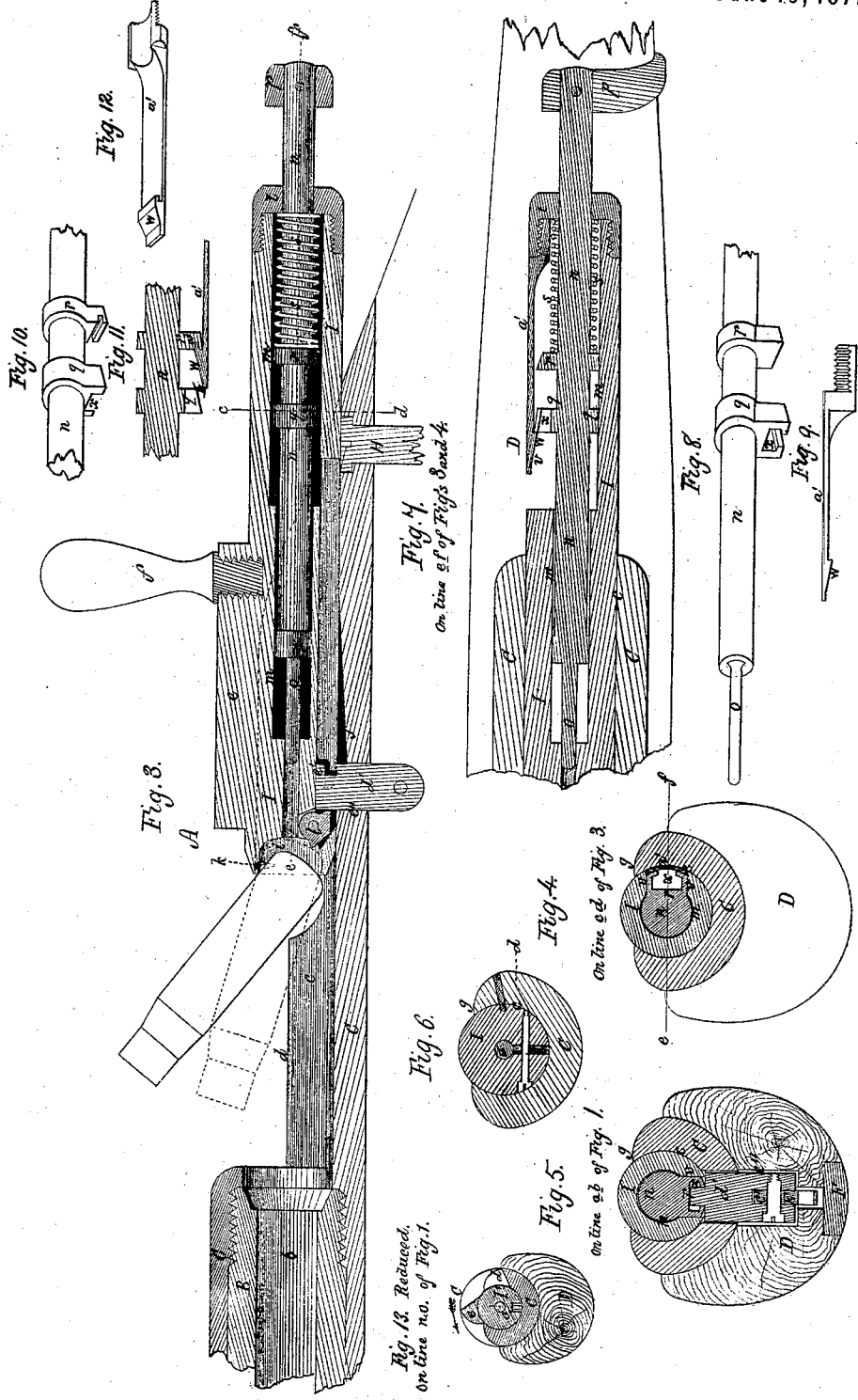


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UNITED STATES PATENT OFFICE.

SILVANUS FREDERICK VAN CHOATE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN BREECH-LOADING FIRE-ARMS.

Specification forming part of Letters Patent No. 115,911, dated June 13, 1871.

To all to whom these presents shall come:

Be it known that I, SILVANUS FREDERICK VAN CHOATE, of Boston, in the county of Suffolk and State of Massachusetts, have made an invention of certain Improvements in Breech-Loading Fire-Arms; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawing making part of this specification, and in which—

Figures 1, 2, and 3 are vertical and longitudinal sections. Figs. 4, 5, and 6 are vertical and transverse sections, and Fig. 7 a horizontal section, of my invention; Fig. 8, a perspective view of the firing-pin; Fig. 9, a perspective view of the sear; and Figs. 10, 11, and 12, modifications of the arm, to be hereinafter explained. Fig. 13 is a transverse section of the arm on a reduced scale.

These improvements have for their basis a class of breech-loading fire-arms of which the Prussian needle-gun and the French chassepot are notable instances, in which the breech-loading mechanism consists of a cylindrical bolt sliding longitudinally within a channel formed in the frame or stock in rear of the barrel, and in axial alignment with its bore, such bolt carrying not only the firing-pin for exploding the fulminate of the cartridge, but containing the greater part or the whole of the lock mechanism, with the exception of the trigger; but, while arms of this character require a paper or cloth cartridge, I have adapted my present arm to the use of a metallic-cased cartridge, or "fixed ammunition," so called, the use of this ammunition in an arm of this nature enabling me not only to produce such arm at much less cost, but to entirely avoid the clogging and derangement of the breech-loading mechanism by reason of the escape of gas and dirt from the rear end of the barrel, to which the arms heretofore produced have been subjected.

The drawing accompanying and making part of this specification represents at A a portion of a fire-arm of full size, of which B is the barrel; C, the frame or receiver, in which the breech-bolt slides; D, the stock; E, the trigger; F, the trigger-strap; G, the trigger-guard; and H, the screw-bolt—such parts being arranged essentially after the manner of fire-arms of the class to which allusion has hereinbefore

been made, the bore of the barrel being indicated by the letter *a*, and its cartridge-receiving chamber at *b*.

In carrying out the improvements which embody my present invention I produce a cylindrical bolt, I, of about eight inches in length and of a diameter somewhat exceeding that of the cartridge-chamber *b* of the barrel, such bolt traversing a segmental channel or roadway, *c*, created in the receiver or frame C before mentioned, a lateral opening, *d*, being made in such channel in order to permit of ready insertion of the cartridge into the barrel or the expulsion of the spent shell of such cartridge. The rear boundary of this opening or depression *d* serves as an abutment or recoil-seat to maintain the breech-bolt in secure position when locked thereto, this locking of the bolt being effected by a rib, *e*, produced upon it, as shown, and provided with a handle, *f*, departing from it at right angles to its axis, substantially after the manner of the Prussian needle-gun before referred to, the disposition of the rib and handle being such that, when the latter is brought into a vertical position, as shown in Fig. 1 of the drawing, the rib is in alignment with the opening *g* of the roadway *c*, and is released from contact with the recoil seat, thus permitting of unlocking and rearward movement of the bolt and its adjuncts. The rib *e* is of such size as to fill the lateral opening *d* and present a uniform and pleasing union and finish of the surrounding parts. The forward end of the breech-bolt, which extends a short distance into the cartridge-chamber, is concave, as shown at *i*, the form of the concavity being semi-spherical, or approximately so, in order to inclose the end of the cartridge-shell, whose rear end is of a similar shape and size, this form being adopted in order that I may be enabled readily to expel such shell, whose ejection is effected as hereinafter stated.

I. In order to seize the spent cartridge-shell I create in the wall of the concavity *i*, near its outer edge, and upon that side thereof immediately adjacent to or in alignment with the rib *e*, a small depression or score, *k*, as shown in Fig. 1 of the drawing, this score being of such a shape and depth as to retain a hold upon the cartridge-shell, when, by the explosion of the charge, a small portion of the metal composing it has been driven into such score.

This mode of retracting the shell is productive of a very important advantage, as it leaves no opening for the escape of gas and dirt from the rear end of the barrel.

II. *l* in the drawing denotes a small lever or tripper playing within a slot, *m'*, formed in the forward end of the breech-bolt and communicating with its inclosure *i*, this slot and tripper being arranged diametrically opposite the score *k*, before mentioned, and the latter pivoted to the bolt in such manner as to oscillate upon this pivot. The form of this tripper, which is shown in Fig. 3, is such that it presents a flush surface with the inclosure *i* when the breech is advanced and locked in firing position, and the rear end of a cartridge-case rests in such inclosure, the advance of the breech-bolt in driving a cartridge within the barrel serving to deflect the tripper into this, which we may consider its normal position. As the breech is unlocked and retracted after firing the arm, the shell, by means of the score *k*, is withdrawn from the barrel and carried with the breech-bolt until the latter reaches its extreme loading position, at which point tripper *l* is brought in contact with the upper end of the trigger *E* and forced into the position shown in Fig. 3 of the drawing, by which means the shell is thrown with a quick movement from out of the cavity *i*. It will be observed that when the breech is locked in firing position, as shown in Fig. 2, the tripper *l* and score *k* are in a plane horizontal to the vertical axis of the barrel and receiver, and that when the said breech-bolt is revolved in the arc of a circle to the extent of ninety degrees in the direction of the arrow thereon, as shown in Fig. 13, the said tripper and score are brought into vertical alignment with the bore of the barrel, the score being uppermost. This twisting motion of the breech-bolt is imparted to the spent shell seized by such bolt, and effects a very important function, since it is well known that if the spent shell of a fire-arm is started to a small extent in any direction its hold upon the chamber of the barrel is loosened and its extraction thereafter easily effected. I bore entirely through the breech-bolt a concentric cylindrical hole, *m*, whereof the rear half is largest, for reception of the firing-pin, which is represented in the drawing at *n*, the forward portion of this bore or that nearest the barrel being reduced in diameter for about one inch rearward from the end of the bolt and containing the exploder, which plays within it, this exploder being represented at *o* as an attenuated rod or needle, which projects forward from the end of the firing-pin and is formed integral with it. The firing-pin *n* extends rearward entirely through the breech-bolt, and is provided at this extremity with a knob or handle, *p*, which serves to set the firing-pin at half or full cock, as the case may be. The firing-pin *n* is formed with two collars or ears, *q* *r*, disposed about midway between its two extremities and situated about three-eighths of an inch apart, a spiral or other spring, *s*, being coiled about the

pin, and between the rearward collar or abutment *r* and the nut *t*, which incloses the rear end of the breech-bolt, and serving by its extension to drive the firing-pin and exploder forward to strike and explode the fulminate of the cartridge. The nut *t* last above mentioned is shown in the drawing as a tubular sleeve provided with a female screw to screw upon a male screw cut upon the end of the breech-bolt, and with a hole through its rear end, in which the extremity of the firing-pin plays, as before mentioned. A rectangular open orifice or slot, *v*, is cut in the lower part of the breech-bolt and opening into its bore, this slot being at right angles to the axis of the handle *f* and to the greatest plane of the tripper *l*, and occupying about one-half the entire length of the breech-bolt, or extending from the forward collar *q* of the firing-pin (when the latter is released from the sear) to the extreme rear end of the bolt. This slot *v* serves to guide the movements of the firing-pin and maintain it at all times in the same axial alignment with respect to the bolt which incloses it; and this slot is covered or partially filled by a spring-catch, *a*¹, of equal width, which enters it, the rear end of this catch, whose outer face is the segment of a circle corresponding in extent to that of the bolt, being formed with two shoulders or abutments and a sectional male screw, which is inclosed within the nut *t*, as represented, and by it securely held in proper position, the outer face of this catch being flush with the circumference of the breech-bolt and forming, with the latter, a perfect cylinder.

The spring catch *a*¹ is formed upon its inner face with an inclined or sloping projection, *w*, as shown in Fig. 2 of the drawing, the disposition of this hook with respect to the collars or studs *q* and *r* being such that when the firing-pin is advanced to its greatest extent the stud *r* shall be slightly in advance of such hook, while the forward stud *q* is at such time straddling the upper end of the trigger *E*, the stud being formed with a passage or slot, *x*, to enable this to be done. The trigger, thus inclosed by and locked to the firing-pin, which in turn cannot revolve within the breech-bolt, prevents any rotation or unlocking of the latter until the said firing-pin is fully cocked, which act retracts the stud *q* from about the trigger and leaves both bolt and pin free to revolve. This full cocking of the firing-pin is effected by seizing hold of the handle with the thumb and retracting it until the collar *q* has passed by and been caught by the hook *w* of the spring catch or sear *a*¹, the spring *s* serving to drive the firing-pin suddenly forward when it is released from the control of the sear by the action of the trigger.

The trigger of this arm is a compound one, and its construction and operation are as follows: In addition to its finger portion *b'*, which is of ordinary form, and besides being pivoted to the trigger-strap *F* in the usual manner of fire-arms, it is formed with an arm, *c'*, which slopes

forward at a rising acute angle with respect to the trigger-plate; and to the free extremity of this arm e' the lower end of an upright block, d' , is pivoted, such block rising through an aperture, e' , made in the lower part of the stock and receiver of the arm, and into the road-bed of the breech-bolt; and it is this block which has hereinbefore been alluded to as the upper part of the trigger against which the tripper l abuts when expelling the empty shell. The extreme upper part of this block d' has an overhanging rearward lip, e' , and it is this lip which effects the release of the firing-pin at the proper time. We will suppose the firing-pin to have been retracted to its utmost extent and set at full-cock, the breech-bolt subsequently advanced and locked in position, it being observed that by the last act the forward end of the sear has been brought below the lip e' . As the breech-bolt is advanced the spring catch is prevented from falling away from and releasing the firing pin by the roadway, as the catch bears directly upon it; consequently no accidental release of the pin can take place, for it is only when the breech-bolt has reached its extreme forward position that the catch coincides with a depression, f' , cut in the road-bed, of sufficient depth to allow it to recede from the collar q . At this time, however, the catch or sear is entirely protected by the receiver of the arm, and cannot be actuated until struck by the trigger, which act takes place as follows: As the breech-bolt is turned in the arc of a circle ninety degrees to the right of the operator in the act of locking it, as before explained, the nose or point of the catch or sear a' is brought directly under the lip e' of the trigger or its block d' ; consequently a pull upon the finger portion of the trigger will release the firing-pin from the control of the sear and permit its spring to advance it and explode the cartridge. The collar or projection r , as before stated, effects the half-cock of the firing-pin, and when in this position a pull upon the trigger has no effect, as the trigger is at this time situated within the slot or shelf-groove of the collar q , the said trigger being formed with lateral ears to enter this groove and arrest its descent. The half-cock of the firing-pin also prevents rotation of the breech-block by means of the slot in the aforesaid collar, so that such half-cock is the safest position in which the arm can be carried, for it is only when it is at full-cock that the control of the trigger upon the firing-pin is released and the breech-bolt permitted to rotate. As the spring catch cannot be lowered until by the locking of the breech-bolt, it, the catch, reaches the depression f' , and as the firing-pin cannot be released until the catch is lowered, it follows that the impact of the spring upon the bottom of the roadway of the breech-bolt absolutely prevents release of such pin until, as before stated, the sear reaches the depression f' , which it only does when the breech-bolt is in firing position and is locked,

and not then until, by a partial revolution of the bolt and firing-pin, the sear or catch has been brought into contact with the trigger or into the path of movement of the same.

In the above arrangement of the breech-block, firing-pin, spring, and trigger, with their accessories, will be seen the means of carrying out the third and fourth portions of these improvements, and in the combination and arrangement therewith of the sectional spring-catch a' and tubular nut t , the fifth and last classified portion of said improvements.

An arm made as above described is extremely simple, durable, and effective. Owing to the very few parts composing it, and the fact that these component parts are chiefly produced by boring and turning in a lathe, my present arm may be manufactured at very low cost, while, in addition to these merits, it possesses no unsightly protuberances or bulky unwieldy proportions to interfere with the most approved manual, but is symmetrical in general form and smooth and even in general finish, with no loose joints for permitting sand or dirt to find its way to its working parts. This arm will also stand the unreasonable test now required of cutting off a portion of the rear end of the cartridge-shell, as the breech-bolt, requiring no mechanical appliances to seize the shell, entirely fills the breech-chamber at the end of the barrel. To withdraw the breech-bolt entirely from the cam it is only necessary to lower the trigger-block d' to its lowest point, which will permit the said breech-block to be drawn directly backward and out of its receiver.

I have contemplated a modification of the mode herein shown for controlling the movement of the sear and trigger, or for setting the arm at half-cock, which consists in forming a short shelf or lip, a^2 , upon the upper side of the forward end of the sear, this lip extending horizontally rearward and being so disposed as to lock into a groove or cross-channel cut across the forward face of the collar r when the latter has been retracted to its safety or half-cocked position. This construction enables me to dispense with the herein-described shelf-groove in the collar q and the lateral ears upon the trigger-block, and is in other respects a more desirable arrangement. The figures in the drawing which represent this modification are 10, 11, and 12, the former, 10, being a perspective view of the two collars q r and their rod; the second, 11, a section of the same, in combination with the sear; and the last, 12, a perspective view of the sear.

Claims.

1. In a breech-loading fire-arm, substantially such as described, the combination, with the rear end of the barrel, of a rotating and sliding bolt, having a recessed front end to receive the rear of the cartridge-shell and a notch or equivalent formation in said recess

into which a portion of the shell is forced, by the explosion of the cartridge, under the arrangement shown and set forth, so that the cartridge-shell shall be started by a rotary movement of said bolt, and then withdrawn from the barrel by the sliding movement of the same.

2. In combination with the elements named in the preceding clause, a cartridge-ejector, arranged and operated substantially as shown and described.

3. The breech-bolt, provided with hemispherical or equivalently-formed cavity in its front end, and a notch or score, *k*, formed in said cavity, in combination with the ejector, hinged to said bolt in such position that its front end shall form part of the wall of the said cavity or recess, as set forth.

4. The arrangement, herein shown and described, of the breech-bolt, the ejector hinged

to the recessed front end of said bolt, and the blok *d'* of the trigger in the slot *m'* formed in the bolt, said parts being constructed and operated as set forth.

5. The combination of the breech-bolt, the firing-pin, the grooved collar *q* and collar *r*, the blok *d'*, and trigger *E*, under the arrangement and for operation as shown and set forth.

6. In combination with the breech-bolt, trigger, firing-pin, and collars *q r*, the sear *a'*, operating in connection with said parts, substantially as herein shown and set forth.

7. The sear *a'*, united with the breech-bolt, in the manner and by the means herein shown and described.

S. F. VAN CHOATE.

Witnesses:

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