(No Model.)

J. M. & H. VILLA.

NEEDLE GUN.

No. 277,385. Patented May 8, 1883.

Fig 7.

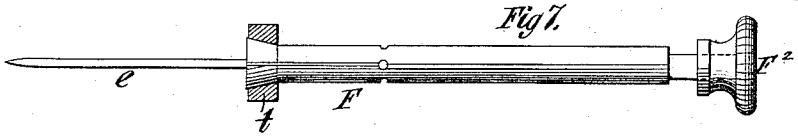


Fig 1.

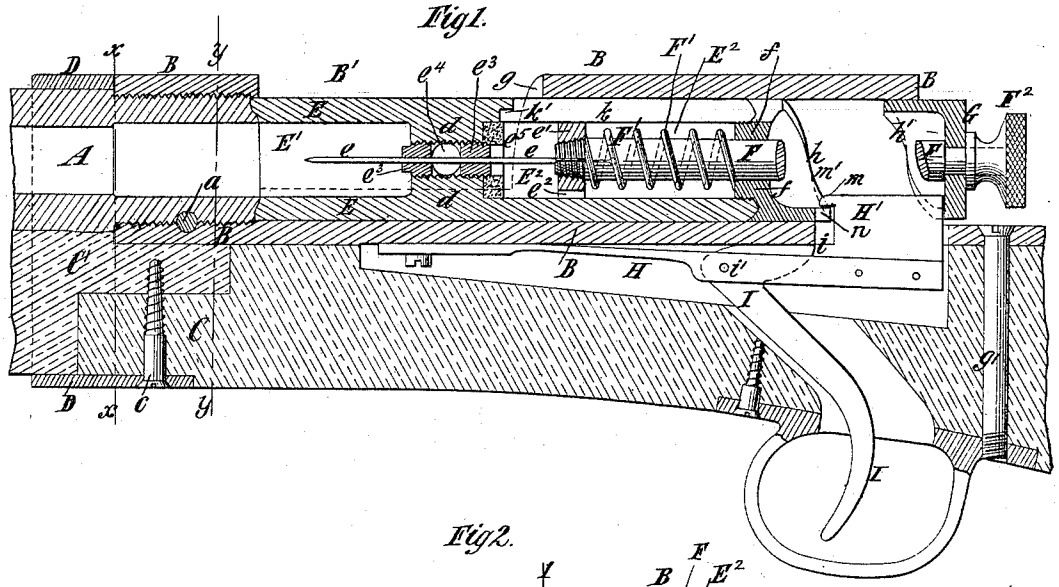


Fig 2.

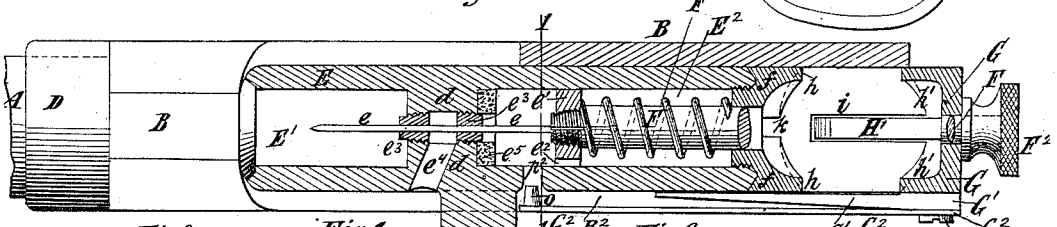


Fig 3.

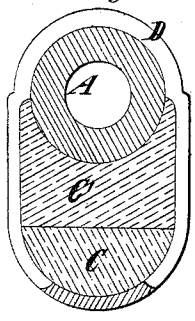


Fig 4.

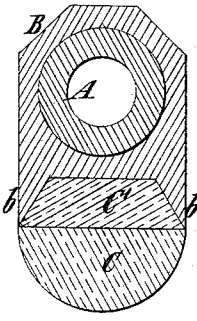


Fig 6.

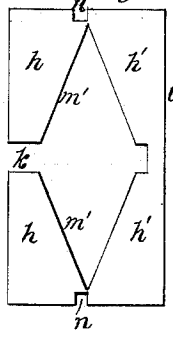
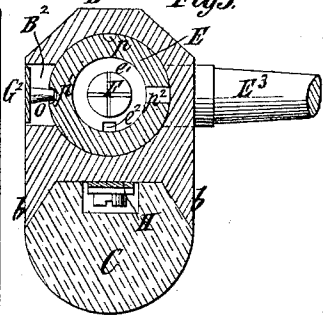


Fig 5.



Witnesses

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UNITED STATES PATENT OFFICE.

JOSÉ M. VILLA AND HENRIQUE VILLA, OF MEDELLIN, UNITED STATES OF COLOMBIA.

NEEDLE-GUN.

SPECIFICATION forming part of Letters Patent No. 277,385, dated May 8, 1883.

Application filed March 9, 1882. (No model.)

To all whom it may concern:

Be it known that we, JOSÉ M. VILLA and HENRIQUE VILLA, both of Medellin, in the United States of Colombia, have invented certain new and useful Improvements in Breech-Loading Fire-Arms, of which the following is a specification.

Our invention relates, principally, to breech-loading fire-arms in which the breech-piece consists of a sliding bolt containing a plunger and a needle, which are actuated by a spring to explode the cartridge; but certain features of the invention may be applicable to other kinds of fire-arms.

Our invention consists in various novel details of construction and combinations of parts, which are illustrated in the accompanying drawings and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a longitudinal section of the breech portion of our improved fire-arm, showing the breech closed and the fire-arm as ready for firing. Fig. 2 represents a plan view and partial horizontal section thereof, showing the breech-piece or bolt fully turned to open the breech, but before it is slid back. Fig. 3 represents a transverse section on the dotted line *x x*, Fig. 1. Fig. 4 represents a similar section on the dotted line *y y*, Fig. 1. Fig. 5 represents a transverse section on the dotted line 1 1, Fig. 2, looking forward when the bolt is turned to the right. Fig. 6 represents a diagram view of the exterior surface of the bolt or breech-piece, showing a development of two cams, whereby the plunger is retracted when the bolt is turned. Fig. 7 represents a special device for attaching the needle to the plunger.

Similar letters of reference designate corresponding parts in all the figures.

A designates the breech portion of the barrel, and B the breech-receiver. The breech-receiver has a cylindric bore from end to end, and is cut away on top at B′, immediately in rear of the breech of the barrel, to afford facility for the insertion of cartridges and the removal of empty or spent shells. The barrel A may have a screw-thread cut upon its exterior to engage with an internal screw-thread in the receiver B, or it may be fitted thereto without a screw-thread and secured by a pin, *a*, inserted through the breech-receiver transversely and engaging with a groove in the under side of the barrel, as shown in Fig. 1. Both of these constructions are here shown, and either may be used. The top of the receiver B is here represented as of polygonal formation; but it might be rounded or of other form. The said receiver is shown as flat upon the under side and provided on each side with downwardly-projecting ribs *b*, extending longitudinally, as shown in Figs. 4 and 5. The ribs *b* have their inner sides inclined inward and upward, and between these ribs and against the flat under side of the receiver is fitted the butt-stock C of the fire-arm, the sides of which are also inclined or diverging correspondingly to said ribs, as shown clearly in Figs. 4 and 5. The barrel-stock or fore-stock C′ is fitted to the barrel in the usual way, as shown clearly in Fig. 3, and the butt-stock and barrel-stock are tenoned into each other, as clearly shown in Figs. 1, 3, and 4. The portion or tenon of the fore-stock C′ which overlaps the butt-stock C is shaped so as to fit between the ribs *b* of the receiver B, and both the stocks are held by the band D, which surrounds them and the barrel, and by a screw, *c*, which is inserted upward through the tenoned parts of the two stocks and through a projection on the band D, as shown in Fig. 1. One part of the cartridge-chamber is formed in the barrel and the other part, E′, thereof in the forward end of the breech-piece or bolt E. The formation of the cartridge-chamber partly in each part is very advantageous, because in loading the fire-arm the cartridge is placed in the chamber E′, and by the movement of the breech-piece or bolt forward in closing the breech the cartridge is forced into the barrel, because the spent shell is withdrawn from the barrel by the backward movement of the breech-piece or bolt, and may be readily taken out of the breech-piece by the fingers, and because the overlapping of the shell at the joint between the barrel and breech-piece prevents the escape of gas.

We may here remark that the fire-arm here shown is constructed for paper cartridges or any other flexible shell-cartridges; but certain features of our invention are equally applica-

ble to fire-arms for using metallic cartridges. When the chamber is formed partly in the barrel and partly in the breech-piece or bolt the shells can be made of paper thick enough to make them impermeable to moisture; or they may be of paper, with metallic foil interposed between the thicknesses of the paper, or of varnished paper. The breech end of the barrel is slightly conical, which fits a corresponding seat in the forward end of the breech-piece or bolt, and forms a tight joint between the two when the breech-piece or bolt is adjusted to close the breech.

In the back end of the bolt E is a cylindric socket or bore, E^2, which extends forward about half the length of the bolt, and is separated from the cartridge-chamber E′ by a partition, *d*.

F designates the firing-plunger, which is arranged centrally in the socket or bore E^2, and carries the firing-needle *e*, which projects through the partition *d* at all times and considerably into the cartridge-chamber E′. The needle *e* may be secured in the plunger F in any desirable way; but in this example of our invention we have represented the forward end of the plunger as slit longitudinally, as shown in Figs. 1, 2, 5, and 7, to form a number of jaws, between which the needle is inserted. The end of the plunger is externally tapered and screw-threaded, and the jaws are clamped tightly upon the needle *e* by a tapered nut, *e′*, which has in it a notch, e^2, for a purpose hereinafter described. The nut *e′* is cylindric, and fits snugly in the bore of the bolt E, thereby forming a guide for the forward end of the plunger F in its longitudinal movements.

Near the rear end of the bolt is formed an internal screw-thread, into which is screwed a plug, *f*, through which the plunger F works, and which forms a guide for the back end of the plunger. The plunger F is actuated in firing by a stout spiral spring, F′, which surrounds it and bears at one end against the nut *e′* and at the other end against the plug *f*. When the plunger is retracted to prepare for firing, the nut *e′* acts upon the spring F′ and contracts it against the stationary abutment formed by the plug *f*, and when the plunger is released it is impelled forward by the expansive force of the spring.

The bolt E is provided with a horn or handle, E^3, projecting from it transversely, and in the left-hand side of the receiver B is a slot or groove, B^2, extending rearward from the opening B′ entirely to the end of the receiver. The slot or groove B^2 is shown in Figs. 2 and 5. In opening the breech the bolt E is first turned or twisted from right to left by swinging the horn or projection E^3 over from right to left to bring it into line with the groove or slot B^2, and the bolt is then drawn back, the said horn or projection working in said groove or slot, thereby leaving a clear opening the full length of the opening B′ at the breech of the barrel. The cartridge is then inserted into the chamber E′ in the bolt, and the latter is pushed forward and then swung or turned over from left to right to close and lock the breech. The back end of the opening B′ in the breech-receiver is inclined transversely to the receiver, so as to form a stationary cam, *g*, and as the bolt is turned from left to right the horn or projection E^3 bears against the stationary cam, and thereby the bolt is pressed forward tightly against the end of the barrel to securely close the breech.

In the partition *d* between the cartridge-chamber E′ and the socket E^2 are removable bushings e^3, which are inserted in opposite directions, and are made of steel and hardened. These bushings guide the needle *e* in its movements, and when they become worn may be removed and replaced by others.

In the bolt E, between the bushings e^3, is a transverse vent, e^4, of comparatively-large size, and any gases which are driven through the bushing in the bottom of the cartridge-chamber when the gun is fired will escape through the vent, and will not pass through the other bushing and thence backward through the bolt, where they might injure the person using the fire-arm. The vent e^4 is inclined forward as clearly shown in Fig. 2, so that it will direct the escaping gases forward instead of backward, and it terminates immediately in front of the horn or projection E^3, so that the latter is made to serve as a shield or guard to prevent the escaping gases from passing directly rearward.

In the bottom of the bore or socket E^2 is a leather or other washer, e^5, which receives the impact of the nut *e′* in firing, and thus prevents violent shocks, and which likewise prevents gases from escaping rearward around the bushing e^3.

The forward end of the receiver B is securely connected to the barrel, and the back end of the receiver is secured by a screw, *g′*, inserted downward through the butt-stock C, as shown in Fig. 1.

We will now describe the firing mechanism in the bolt E. The outer end of the plunger F carries a milled head, F^2, whereby it may be turned, as hereinafter described, and immediately in front of said head is a flange or disk, G, which fits loosely on the plunger F, between two shoulders. The flange or disk G carries a forwardly-projecting arm or bar, G′, which is permanently attached to it, and fits in the longitudinal slot or groove B^2 in the receiver B, whereby the said flange or disk is prevented from turning in the receiver B. The plug *f* has a rearward cylindric extension, on which is formed a suitable cam, *h*, as shown clearly in Figs. 1 and 2 and in the diagram Fig. 6, and on the front of the flange or disk G is an equal and inverted suitable cam, *h′*, also shown in said figures, which bears against the cam on the plug, and is held in engagement therewith by the main spring F′, which has a constant tendency to draw the plunger F forward relatively to the bolt E. The cam

h may be considered as upon the bolt, and the cam h' as upon the plunger. The flange or disk G is prevented from turning upon the receiver by its arm or bar G′ engaging with the slot or groove B^2 in said receiver, and consequently when the bolt E is turned from right to left in opening the breech the cam h acts upon the cam h', and through this considerably retracts the plunger relatively to the bolt and draws back the needle e, so that it will not project so far into the cartridge-chamber E′. After the entire turning movement of the bolt from right to left is accomplished the bolt is slid back to open the breech, and carries with it the plunger F and all its appurtenances. The spent paper shell may then be withdrawn from the chamber E′ and a new one inserted.

The cartridges intended for use in this fire-arm have the priming or fulminate placed between the powder and the ball, instead of back of the powder, and consequently when the cartridge is inserted it is pierced by the needle e, which does no harm so long as it does not reach the priming. The piercing of the cartridge by the needle when the cartridge is inserted is advantageous, because then the priming receives the whole striking force of the needle in firing, and no part of the force is absorbed or spent in piercing the cartridge before the priming is reached. The retraction of the plunger by the turning movement of the bolt in opening the breech is sufficient to obviate any danger of the needle penetrating the cartridge far enough to reach the priming when the cartridge is inserted in the cartridge-chamber E′ in loading.

In order to give additional security against the needle reaching the priming, the bushing e^3, which is inserted in the bottom of the cartridge-chamber, may project slightly, as clearly shown, so that it will form a stop, against which the cartridge bears when inserted. When the bolt is moved forward and turned to close the breech the cartridge-shell will be forced over the bushing and against the bottom of the chamber, and the spring still further compressed.

H designates a spring-lever attached permanently to the under side of the receiver B at its forward end, and projecting upward through an opening, i, in the receiver at its rear end, as shown in Figs. 1 and 2. The natural elasticity of the lever H causes the rear end thereof to project upward into the receiver, save when drawn down by the trigger I, which is pivoted therein at i', and acts upon the under side of the receiver, and the upwardly-projecting part H′ of the lever H may be considered as the sear.

In the bolt E is a longitudinal slot or groove, k, (shown in Fig. 1,) which is in line with the sear H′ when the bolt is turned, as shown in Fig. 2, to bring it in position to be drawn backward, and enables the bolt to be drawn back over the said sear. The front end of the slot or groove k is hook-shaped at k', as shown clearly in Fig. 1, and when the bolt is drawn back sufficiently far for loading, the hook-shaped end of the slot or groove engages with the front end of the sear H′ and stops the bolt. The hook in the end of the slot or groove engages with the lip or hook m on the sear, and prevents the latter from being depressed. Instead of the sear H′ forming a stop, the receiver might be provided with a shoulder, against which the horn or handle E^3 strikes when the bolt is drawn back, and which forms a stop therefor. When the bolt is slid forward the sear H′ rises in front of the flange or disk G and holds it back while the bolt continues its movement, and is then turned from left to right to tightly close the breech. Fig. 1 represents the parts in this position, the plunger F being held back against the force of the mainspring by the sear H′, and the fire-arm is ready to be discharged. By pulling back the trigger I the sear H′ is drawn down or depressed out of the way of the flange or disk G, whereupon the plunger and needle are impelled forward by the mainspring and explode the cartridge. The sear H′ has a forwardly-projecting lip or hook, m, which projects over the edge of the cam h, as shown clearly in Fig. 1, and when the bolt is turned fully to the right to tightly and securely close the breech, a notch, n, in the cam comes immediately below the lip or hook m, and when the trigger is pulled the lip or hook passes downward through this notch and permits of the fire-arm being discharged. The notch n is shown in Figs. 1 and 6. In all other positions of the bolt the lip or hook m overlaps a solid part of the cam, and thus prevents the trigger from being able to draw the sear H′ out of engagement with the flange or disk G. By this means we absolutely prevent the fire-arm from being discharged except when the breech is tightly and securely closed. When the bolt E is turned from left to right in closing, it is carried forward by the action of the stationary cam g on the receiver B, and to prevent the edge of the cam from being carried beyond the lip or hook m on the sear H′ we make the edge m' of the cam h inclined correspondingly to the cam g, as shown in Fig. 6, and hence the edge m' always works under the lip m in turning it.

Upon the arm or bar G′, which projects from the flange or disk G, is a spring, G^2, which carries an inwardly-extending tooth or projection, o, and in the periphery of the bolt E are two notches or cavities, p p'. (Shown clearly in Fig. 5.) When the bolt is turned so that the tooth o enters either of the cavities p p the said tooth holds the bolt against accidentally turning, but permits it to be turned by a desirable pressure exerted on the horn or projection E^3, the cavities p p' being so shaped as to deflect the tooth when the bolt has any considerable force applied to turn it. When about half the turning of the bolt from left to right is accomplished the tooth o enters the cavity p and prevents the bolt from being accident-

ally turned from that position. When the entire turning of the bolt from left to right is accomplished the tooth enters the cavity p', as shown in Fig. 5, and prevents the bolt from being accidentally turned from right to left.

In the bolt, in the same transverse plane with the tooth o and cavities $p\,p'$, is a hole or slot, p^2, extending into the socket or bore. When the bolt is turned fully to the left the hole or slot p^2 is brought opposite the tooth o upon the spring G^2, and if the plunger be turned in the bolt by means of its milled head F^2 until the notch e^2 in the nut e', which secures the needle e, is brought opposite the hole or slot p^2 in the bolt, the tooth o may be pressed inward sufficiently to engage with the notch e^2 in the nut e' to keep the latter from turning, and by then turning the plunger the nut e' may be loosened and the needle e released. A new needle may then be inserted and the plunger turned in the opposite direction to tighten the nut and clamp the jaws of the plunger around the needle. By this means we enable the firing-needle to be removed and a new one inserted and secured in the plunger, when desirable, without ever taking the plunger out of the bolt. To facilitate the insertion of the needle, the holes formed between the jaws of the plunger and in the bushings may all be made flaring at their forward ends. The arm or bar G' may be notched or let into the periphery of the flange or disk G, and both it and the spring G^2 may be secured to the flange or disk by a single screw, s, as shown in Fig. 2.

By our invention we provide a fire-arm having few parts, which is of simple construction, and in which the utmost precaution is taken to prevent accidents by the careless handling or using of the fire-arm.

Instead of securing the needle e in the plunger F by means of the nut e' and taper thread, we may make the end of the plunger tapered in the reverse direction and with a smooth exterior, as shown in Fig. 7, and fit a ring or collar, t, thereon correspondingly tapered. The spiral mainspring F' would then constantly press the collar or ring forward upon the tapered plunger and clamp the jaws of the plunger upon the needle, as shown in Fig. 7. In this case the bearing of the plunger F in disk G may be square to prevent its turning therein, and to remove the needle we may loosen the mill-head E^2 and push the plunger forward, whence the collar will stop against leather washer e^5, and the jaws will open by their own elasticity.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, in a fire-arm, with a barrel, of a butt-stock and a fore-stock tenoned into each other at their meeting ends, and a band surrounding the barrel and the tenoned ends of the two stocks, substantially as described.

2. The combination, with the barrel and a breech-receiver having downwardly-projecting ribs at the sides, of a butt-stock fitting between said ribs, a fore-stock tenoned into said butt-stock and having its tenoned end also fitting between said ribs, and a band surrounding the barrel and the meeting ends of the two stocks, substantially as described.

3. The combination, with a barrel and a sliding breech-piece or bolt, having a cartridge-chamber formed partly in each, of a plunger and a needle carried thereby and projecting into the portion of the chamber which is in said breech-piece or bolt, so that the cartridge in loading will be pierced by the needle, substantially as described.

4. The combination of the bolt E, containing the chamber E' and socket E^2, and having the vent-opening e^4, the removable bushings e^3, and the needle e, substantially as described.

5. The combination of the bolt E, containing the chamber E' and the socket E^2, and provided with the horn or handle E^3 and the vent-opening e^4, terminating in front of said horn or handle, the removable bushings e^3, and firing-needle e, substantially as described.

6. The combination of a sliding breech-piece or bolt containing a plunger-socket, a firing-needle, a plunger having its end tapered and slitted to form jaws for grasping the needle, and a nut or collar fitting said tapered end and serving to clamp the jaws upon the needle, and a spring bearing against said nut or collar for actuating said plunger, substantially as specified.

7. The combination of the bolt E, provided with the hole or slot p^2, the slitted plunger F, the needle e, the nut e', provided with the notch e^2, and a tooth adapted to be pressed through said hole or slot and into said notch, for holding the plunger, substantially as described.

8. The combination of the bolt E, having the cartridge-chamber E' in its front end, and provided with the cam h, the plunger F and its needle e, which, when retracted, projects into said chamber E', the flange or disk G, having the cam h', the breech-receiver B', provided with the slot or groove B^2, and the arm or bar G', substantially as described.

9. The combination of the bolt E, provided with cam h and the peripheral cavities $p\,p'$, the plunger F, the flange or disk G, having cam h', the breech-receiver B, provided with the slot or groove B^2, and the spring G^2, provided with the tooth o, substantially as described.

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