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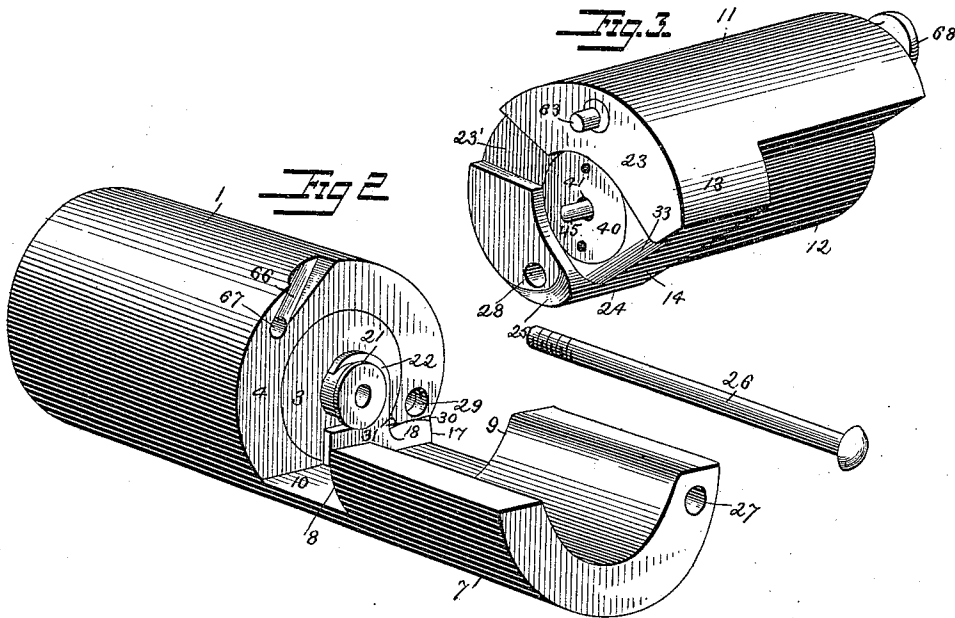
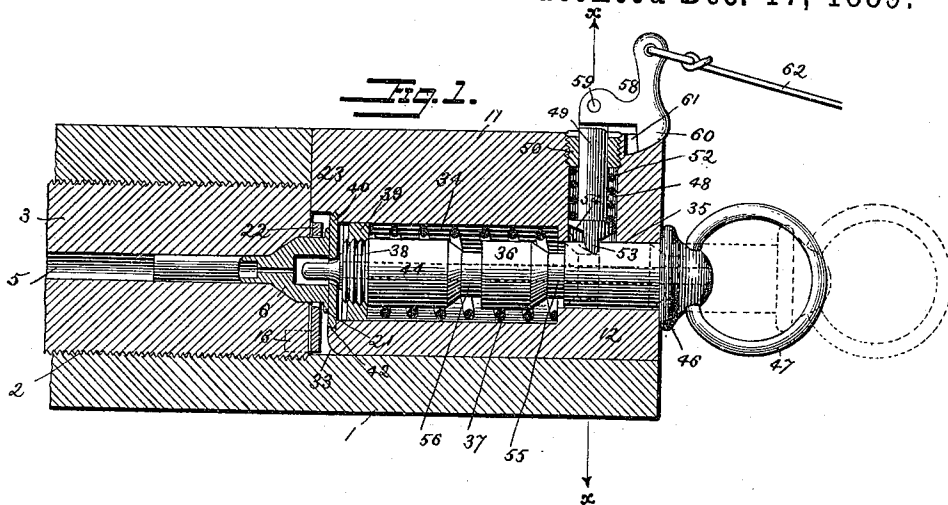
2 Sheets—Sheet 1.

A. J. WIEGAND.

FIRING ATTACHMENT FOR BREECH LOADING GUNS.

No. 417,693.

Patented Dec. 17, 1889.



Witnesses

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Fannie Wise.

Inventor

Andrew J. Wiegand,

By Joseph Lyons

his Attorney

(No Model.)

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Fig. 4.

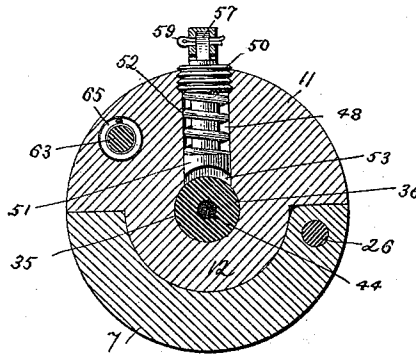


Fig. 5.

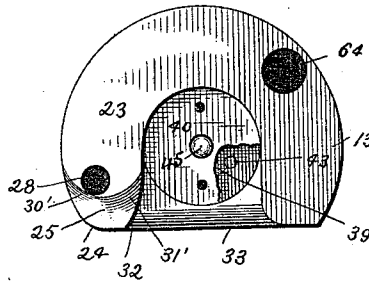
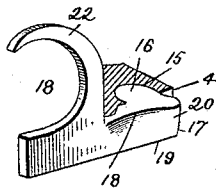


Fig. 6.



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UNITED STATES PATENT OFFICE.

ANDREW J. WIEGAND, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
OF ONE-HALF TO O. T. BEAUMONT, OF SAME PLACE.

FIRING ATTACHMENT FOR BREECH-LOADING GUNS.

SPECIFICATION forming part of Letters Patent No. 417,693, dated December 17, 1889.

Application filed September 26, 1888. Renewed May 16, 1889. Serial No. 311,072. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. WIEGAND, a citizen of the United States, and a resident of the city of Washington, in the District of Columbia, have invented certain new and useful Improvements in Firing Attachments for Breech-Loading Guns, of which the following is a specification.

My invention relates more particularly to improvements in firing attachments for breech-loading guns; but it is also applicable to muzzle-loading guns, and if constructed upon a sufficiently small scale my improvement may be employed as the gun-lock of a small fire-arm—as, for instance, in breech-loading muskets and carbines. If thus employed, my invention loses the character of a mere attachment and constitutes the principal operative part of the fire-arm.

In breech-loading cannons as now generally used the cartridges employed consist, broadly speaking, of a shell having the explosive compound (the powder) packed against the head and the projectile forced against the powder-charge and projecting more or less beyond the shell of the cartridge. In the modern cartridges for breech-loading cannons there is no primer or cap containing a compound that will explode by concussion employed, and the firing of the cartridge is effected by the fire of a small secondary cartridge located in a firing attachment behind the breech-block, and provided with a channel, which communicates, through the so-called "mushroom," with the breech of the gun. This secondary cartridge is primed in the usual manner, and contains a very small projectile, which, when the secondary cartridge is fired, penetrates the head of the main cartridge, which latter is now fired by the fire from the said secondary cartridge, which reaches the charge of the former by the channel above referred to, and by the hole in the head produced by the small projectile.

The special object of my invention is to provide a firing attachment by which the functions thus set forth can be performed with safety, certainty, and ease; and for this purpose my firing attachment is itself of the breech-loading type—that is to say, the sec-

ondary or firing cartridge, which is also sometimes called the "primer," is placed in position, fired, and the shell of the same is extracted in the manner of using the regular cartridges of breech-loading muskets. All this will more fully appear from the following detailed description, in which reference is made to the accompanying drawings, in which I have shown in—

Figure 1 a longitudinal section of my improved firing attachment complete. Figs. 2 and 3 represent perspective views of the two hinged parts, respectively, of the firing attachment. Fig. 4 is a transverse sectional view on line *xx* of Fig. 1. Fig. 5 is an end view of the part shown in Fig. 3, and Fig. 6 is a detail perspective view of the extractor seated in a recess in the main body of the firing attachment.

Like numerals of reference refer to like parts in all the figures of the drawings.

The main body of the firing attachment consists of a hollow cylinder 1, which is formed with internal screw-threads 2, by means of which the firing attachment is screwed upon the mushroom 3, which in effect is a cylindrical projection from the rear of the breech-block of a cannon, which latter is not shown in the drawings. The outer end of the mushroom is flush with the outer face 4 of the cylindrical main body 1, and it is provided with an axial bore 5, which communicates with the breech-chamber of the cannon containing the cartridge, and is suitably enlarged and shaped at its outer end to accommodate the secondary cartridge 6, which is inserted in the same. From the main body 1, and in one piece with the same, extends a segmental semi-cylindrical web 7, which is cut away at 8 and 9 on diametrically-opposite sides down to or below the inner surface, so as to form a flat ledge intermediate between the cylindrical main body 1 and the segmental extension 7. The latter is shown in the drawings as extending throughout the arc of a semicircle; but this is not absolutely necessary, since it may be formed to extend throughout a greater or lesser part of a circle.

The breech-block 11 of the firing attachment has the general outline of a segmental cylinder, the external rear portion of which

extends throughout a semicircle, (more or less,) and has projecting from its inner side a semi-cylindrical protuberance 12, the diameter of which is equal to the inner diameter of the segmental extension 7. The external front portion 13 of the breech-block extends throughout a greater arc of a circle, and the inner side 14 is made flat, so as to correspond to the flat ledge 10, which joins the main body 1 and the segmental web 7. The length of this front portion of the breech-block is equal to the length of the ledge 10, and the length of the rear portion, with its protuberance 12, is equal to the length of the segmental web 7, and it will now be understood that the inner side of the breech-block exactly fits into the space between the outer face 4 of the main body 1 and the outer end of the segmental web, so that when the breech-block is put into position, as shown in Figs. 1 and 4, the whole firing attachment will present the appearance of a solid cylinder.

In the outer face 4 of the cylindrical main body is formed a recess 15, which is curved at the bottom, as shown in Fig. 6. This recess receives the rearwardly-expanded lug 16, formed on the lip 17 of the extractor 18. The lug 16 is rounded to conform to the shape of the bottom of the recess, so that the extractor, when the lug is seated in the recess, may be turned about the lug as a pivot, the recess constituting the bearing of the latter. The outer face of the lip 17 is formed slightly concave, and this concavity is deeper on the upper edge 18 and vanishes toward the lower edge 19, where it is so shallow as to present very nearly a straight line. From this construction, which is clearly illustrated in Fig. 6, it follows that the outer face of the lip 17 of the extractor presents a surface which is curved concavely from its upper edge downwardly toward the lower edge, and also laterally from the point where lip 17 extends from the body of the extractor toward its outer edge 20. Near this outer edge, however, the face of the lip is formed slightly convex, as shown. When the lug 16 is well seated in the recess 15, the deepest portion of the concavity of the upper edge is flush with the face 4 of the main body, while the outer edge 20 slightly projects beyond said face, as is clearly seen in Fig. 2. The main body of the extractor is hook-shaped, as shown at 22, and the same normally rests against the face of the mushroom 3, partly surrounding the enlarged end of the bore 5, and when the secondary cartridge or primer 6 is inserted, as shown in Figs. 1 and 2, the flange 21 of the same bears upon the face of the hook 22. If, now, the extractor is turned about its pivotal lug 16, the hook 22 of the former is moved outwardly, and, pressing against the flange of the shell of the secondary cartridge, loosens or starts the same, so that it may now be withdrawn without trouble. If the cartridge is made sufficiently short, and if the extractor is turned through a correspond-

ingly-large angle, the shell of the cartridge will be extracted completely, as will be readily understood. The turning of the extractor about its pivotal lug is effected by the action of the breech-block 11, the general outline of which has hereinbefore been described without reference to its functional relation to the extractor, which, however, will presently appear.

The end face of the front portion of the breech-block is centrally recessed, as shown, so as to leave a segmental annular ledge 23, which is preferably, although not necessarily, somewhat wider than the thickness of the wall of the main body 1, so that when the breech-block is in place the ledge 23 overlaps the face 4 of the main body and covers a portion of the mushroom, as shown in Fig. 1. One edge 24 of the front portion of the breech-block is rounded off, as shown in Figs. 3 and 5, and the adjacent end of the ledge 23 has a convex-curved bevel 25, which is so shaped as to fit into the concave bevel on the outer face of the lip 17 of the extractor; and it constitutes a cam, which, when turned so as to bring its higher portions against the higher portions of the face of the lip 17, will force the extractor to turn about its pivotal lug 16.

The breech-block is hinged to the main body by a pin 26, which is inserted in a hole 27 in the segmental web 7, which pin also passes through a hole 28 in the front portion of the breech-block, and is then screwed into a screw-threaded hole 29 in the main body, which is in alignment with the hole 27. Thus hinged to the main body, the breech-block may be turned down, with its inner flat side 14 covering the ledge 10 on the main body and the cylindrical protuberance 12 seated within the segmental web 7, and in this condition the whole firing attachment presents the appearance of a solid cylinder, as stated above, and the cam-surface 25 is seated within the cavity in the face of the lip of the extractor. If, now, the breech-block is turned about its hinge, the breech of the firing attachment is opened and the more elevated portions of the cam-face 25 are brought to bear against the more elevated portions of the concavity in the lip of the extractor, and the latter will thus be made to turn outwardly about its pivotal lug 16, whereby the cartridge will be started or completely extracted, as the case may be. The convex cam-surface 25 as seated in the concavity formed in the lip of the extractor is similar in appearance to a sectional ball-and-socket joint; but it differs from such joint in that both parts are movable and each about a different axis, the axes being, in fact, at right angles to each other.

It has been stated above that the outer edge 20 of the lip of the extractor projects slightly beyond the face 4 of the main body of the firing attachment, and it should also be noticed that the inner end of the lip 17, where it joins the hook portion of the extractor, slightly projects beyond the face 4,

as is clearly indicated in Fig. 2, where these projecting portions are marked with the numerals 30 and 31, respectively. The central portion of the cam-face 25 is normally, when the breech is closed, against the deepest or most depressed portion of the cavity in the lip 17, while the two lateral portions 30' 31' of the cam-face (see Fig. 5) are against the projecting portions 30 31 of said cavity. From this it follows that when the breech-block is turned back the outer part 30' of the cam-face will act upon the outer projecting portion 30 of the cavity, and the inner part 31' of the cam-face will act upon the inner projecting portion of the cavity, so that the movement of the extractor about its pivotal lug will be positive in both directions.

The inner edge of the ledge 23 is cut away and rounded off near and toward the end at which the breech-block is hinged, as indicated at 32 in Fig. 5. This is done in order that this end of the ledge may clear the hook 22 of the extractor when the breech is being closed. The space within the annular ledge 23 presents a segmental surface, the terminal straight edge 33 of which is rounded, in order that it may act as a cam upon the head of the cartridge or primer to drive the same home when the breech is being closed, and may not catch upon the flange of said cartridge, as it would if the edge 33 were left angular.

The firing devices are mounted in the breech-block as follows: A central longitudinal bore 34 is produced in the breech-block, which bore extends from the face of the block within the segmental ledge 23, and communicates with a counterbore 35, of smaller diameter, extending from the outer face of the cylindrical protuberance 12. The cylindrical firing-bolt 36 is inserted and moves loosely in the counterbore, and a helical spring 37, surrounding the firing-bolt, is located within the larger bore 34, abutting at the offset where the smaller counterbore communicates with the former. The firing-bolt is screw-threaded at its inner end 38, and a cylindrical head-nut 39 is there screwed upon the end of the firing-bolt. The diameter of this head-nut is such that it practically closes the large bore 34, but can move within the same without perceptible friction, like a loose piston. A small circular disk 40, having a central perforation 41, is screw-threaded upon its edge, and is screwed to a screw-threaded rabbet 42, formed at the outer end of the large bore, whereby the breech-block is closed at this end and presents a smooth surface within the segmental ledge 23. After being screwed upon the firing-bolt the head-nut 39 is preferably keyed to the latter by a key 43, as indicated in Fig. 5, and if, for the purpose of repair, the head-nut has to be removed this key must first be drilled out. The firing-bolt is axially perforated throughout its whole length, as indicated at 44 in dotted lines in Fig. 1, and by black shading in Fig. 4, and the firing-pin 45

is inserted into said perforation and projects through the central perforation 41 in disk 40, when the bolt is in its forward position—*i. e.*, when the cartridge has been fired. The use of the central perforation 44 is to enable a driving-tool to be inserted from the rear end of the firing-bolt, by which the firing-pin may be driven into the head of the cartridge to fire the same in case the trigger mechanism should fail to work by reason of mutilation of the parts, or by which the firing-pin may be conveniently removed from its seat for repairs. A head 46 is formed on the rear end of the firing-bolt, and a ring 47, serving as a handle, is pivoted in said head, by which the firing-bolt may be drawn back to the position indicated in Fig. 1 for cocking the firing attachment. When this is done, the helical spring 37 is compressed between the bottom of the large bore 34 and the head-nut 39, so that when the firing-bolt is released it is driven out by the reaction of said spring, and the cartridge is fired.

There is a cylindrical hole 48 formed in the body of the breech-block at right angles to and communicating with the counterbore 35, and in this hole is inserted the locking-pin 49, the main portion of which is cylindrical, and is guided in its upward and downward movements by a cylindrical bearing in screw-plug 50, which closes the outer end of the hole 48. The lower end of the locking-pin is expanded into a head 51, which is fitted to the hole 48 to constitute a kind of piston capable of moving up and down within the same, and a helical spring 52, surrounding the cylindrical portion of the pin, occupies the space between the head and the screw-plug 50. This head 51 is cut away on diametrically-opposite sides, and is at its lower end shaped into a flat tooth 53, the edge of which is hollowed out to present a concave circular curve of such diameter as to fit the surface of the firing-bolt, against which it is forced by the helical spring 52. One face of tooth 53 is a plane surface parallel with the axis of the locking-pin, while the other face is curved down to the edge, as shown in Fig. 1. From the line where this curved face of the tooth joins the cylindrical portion of the head 51 the latter is again cut away to form an inclined surface 54, the function of which will presently appear.

The firing-bolt has formed upon its surface two circumferential grooves 55 and 56, and these grooves have each one rectangular and one inclined wall, the latter flaring toward the inner end of the bolt, where the firing-pin is attached, and a smooth cylindrical bottom extends between these two walls. It will now be seen that when the bolt is drawn out toward the position indicated in dotted lines in Fig. 1 the locking-pin will first drop down with its tooth into engagement with groove 55, and when still further drawn out the tooth will drop into engagement with groove 56. In either of these two positions

the firing-bolt will be securely locked until the locking-pin is again raised, for the firing-bolt being, with its rectangular wall of the groove, forced against the plane face of the tooth of the locking-pin, is positively prevented from returning to its normal forward position. The groove 55 determines the position of the firing-bolt, which is technically known as "half-cock," and in this position the inclined surface 54, just above the curved face of the tooth, fits against the inclined wall of the groove. By reason of this inclined wall the bolt can be drawn out to "full-cock," for this wall, acting as a cam both upon the inclined surface 54 and upon the curved face of the tooth, raises the locking-pin against the tension of spring 52, and the tooth is thus made to ride up the inclined wall of the groove, so that the bolt can now be drawn out until it arrives in the position shown in dotted lines, where it is locked at full-cock by the tooth of the locking-pin engaging the second groove 56. When the bolt is on half-cock, the firing-pin is just withdrawn within or flush with the face of the disk 40, so that the breech-block may now be turned open without meeting with any obstruction, as would be the case if the firing-pin were projecting beyond the face of the disk 40.

The upper end of the locking-bolt, which projects through the screw-plug 50, is made flat, as shown at 57 in Fig. 4, and to this end is pivoted the trigger 58 by a split pin 59, passing through the flat end of the locking-pin and through the cheeks of a recess formed in one end of the trigger, as shown in Fig. 4. At the other end 60 the trigger is formed into a cam seated in a curved recess 61, which is formed at the outer end of the body of the breech-block, and is shaped to conform to the shape of the cam 60.

The trigger is worked by a lanyard 62, as usual, and it will now be understood that a pull upon the latter will cause the cam 60 to more fully enter the recess 61, upon the bottom of which it finds a frictional bearing. At the same time the locking-pin is raised out of engagement with the groove 55 or 56, with which at the time it may be in engagement, and the bolt being now released will shoot forward. If the bolt is released from its position at half-cock, it has not force enough to drive the firing-pin into the cartridge or primer to fire the same, for in that case the helical spring has not been put under sufficient tension; but if the bolt is released from its position at full-cock it is driven forward with great force and the cartridge or primer is fired.

The mounting of the trigger in the manner hereinbefore described I consider an important feature of my invention, for the cam 60 moving frictionally along the curved bottom of recess 61 permits to give to the trigger a long sweep of motion. Consequently the annular grooves 55 and 56 may be made quite

deep, whereby the firing-bolt is locked at half and full cock with great security.

It is not essential that the inclined surface 54 be formed on the head 51 of the locking-pin 49. The same may be omitted, in which case the curved face of the tooth 53 is made to extend from the edge of the tooth without break, in the manner indicated in dotted lines in Fig. 1.

By preference a notch 23', of suitable width, is cut into the face of the segmental ledge 23, which notch serves as a vent for the gases or products of combustion which always find their way backward from the breech.

For locking the breech-block when the same is turned down after the cartridge or primer has been inserted, a locking-pin 63, extending longitudinally through a counter-bored hole 64 in the body of the breech-block, is used. This locking-pin is of ordinary construction. It is surrounded by a helical spring 65, which tends to push the pin forward, and when the breech-block is turned down the projecting end of the pin rides up the cam-groove 66, formed on the face 4 of the main body, whereby it is pushed back against the tension of spring 65 until it reaches the hole 67, at which groove 66 terminates, when the pin is forced forward by the spring and shoots into said hole, thus securely locking the breech-block. When the breech-block is to be turned up, the locking-pin 63 is drawn back by means of the head 68, which is indicated in Fig. 3.

The operation of my improved firing attachment will now be readily understood by those skilled in the art. It will be seen that before the breech can be opened the firing-bolt must first be withdrawn to half-cock. The locking-pin is then withdrawn from hole 67, when the breech-block will either turn by its own weight or will be turned by hand to open the breech. The former takes place if the firing attachment is so screwed upon the mushroom that the center of gravity of the breech-block is to the right hand of the axis of the pivotal pin 26. By the turning of the breech-block about pin 26 the lateral portion 30' of the cam-face 25, acting upon the projecting portion 30 of the face of lip 17 of the extractor, turns the latter outwardly about its pivotal lug 16, whereby the shell of the cartridge is started, or completely extracted, as the case may be. A new cartridge or primer is then inserted, and the breech-block is turned down, by which action the lateral portion 31' of the cam-face, acting upon the projecting portion 31 of the face of lip 17 of the extractor, turns the latter positively about its pivotal lug 16 to assume its normal position against the face of the mushroom, while the rounded edge 33, acting as a cam upon the head of the cartridge or primer, rams the same home by a gentle continuous pressure. When the breech-block has been turned into position, it is locked by the pin 63 in the man-

ner hereinbefore described, and is "wedged" by engagement of its front portions 13 with the cuts 8 and 9 in the segmental web 7. The firing-pin is now drawn back to full-cock, and the trigger may now be operated by the lanyard, all as hereinbefore described.

It will be noticed that since the firing-bolt has smooth cylindrical bearings and is itself cylindrical throughout, and since the grooves 55 and 56 in the same are uniform and circumferential, the firing-bolt may be turned about its axis, by means of the ring 47, without disturbing in any way or manner the position of the same at half or full cock. This is a great advantage, since it obviates the necessity of providing special guides for the firing-bolt, as splines or feathers and grooves or angular bearings, which are difficult to make and to maintain in repair. In addition to this, it will be noticed that the operative parts of my firing attachment can all be removed, repaired, and exchanged with great ease, the breaking up and remounting of the whole firing attachment requiring only a few minutes of time.

Having now fully described my invention, I desire it to be understood that I am not limited to the identical details of construction shown, since the same may be variously changed without departing from the fundamental features of my improvement.

I claim and desire to secure by Letters Patent—

1. A firing attachment for breech-loading guns, composed of a main body adapted to be fixed to the mushroom of the gun, and a breech-block pivoted to the main body, the two parts supporting the extracting and firing mechanisms and shaped to fit each other and to present a smooth solid cylinder when fitted together, substantially as described.

2. A firing attachment for breech-loading guns, consisting, essentially, of a cylindrical main body screwed upon the mushroom of the gun and having the extractor mounted therein, a segmental web extending from and in one piece with the main body, and a breech-block pivoted to the main body having a cam-surface formed thereon for operating the extractor and the firing mechanism mounted therein, substantially as described.

3. In a firing attachment for breech-loading guns, the combination of a main body adapted to be secured to the mushroom of the gun, with an extractor pivotally seated in the main body, and a pivoted breech-block provided with a cam-surface for actuating the extractor, substantially as described.

4. In a firing attachment for breech-loading guns, the combination of a main body having a curved recess sunk into its outer face, with an extractor provided with a curved lug fitting into and pivotally movable within the recess, and with a pivoted breech-block

having a cam-face formed thereon for turning the extractor about its pivotal lug positively in both directions, substantially as described.

5. In a firing attachment for breech-loading guns, the combination of a main body having a curved recess sunk into its outer face, with an extractor formed with a curved lug fitting into and pivotally movable within the recess, a beveled concavity also formed on the extractor, and a pivoted breech-block having a convex beveled cam-face fitting into the concavity in the extractor, for actuating the latter positively in one direction when the breech-block is turned up and in the other direction when the breech-block is turned down, substantially as described.

6. In a firing attachment for breech-loading guns, the combination of a main body having a curved recess sunk into its outer face, an extractor having a rearwardly-projecting curved lug fitting into the recess and capable of moving pivotally therein, and a concavity formed in the extractor, with a breech-block pivoted to the main body so as to turn about an axis which is at right angles to the axis of movement of the extractor, and a convex cam-face formed upon the breech-block fitting into the concavity in the extractor and in operative relation thereto, whereby the extractor is actuated when the breech-block is moved about its pivot, substantially as described.

7. In a firing attachment for breech-loading guns, the combination of a breech-block and a firing-bolt capable of reciprocating movement therein, with a firing-pin inserted in an axial channel or hole passing throughout the bolt, whereby the firing-pin may be removed from the bolt by the application of a driving-tool, substantially as described.

8. In a fire-arm, the combination, with the locking-pin for the firing-bolt thereof, of a trigger pivoted to said locking-pin, a cam formed upon the trigger, and a recess receiving said cam and constituting a friction-bearing for the same, substantially as described.

9. In a fire-arm, the combination of a trigger pivoted to the locking mechanism of the firing-bolt and having a rearwardly and downwardly extending cam, with a concave recess in the body of the fire-arm receiving the cam and constituting a frictional bearing for the same, and means for actuating the trigger to release the bolt, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW J. WIEGAND.

Witnesses:

JOSEPH LYONS,
MYER COHEN.