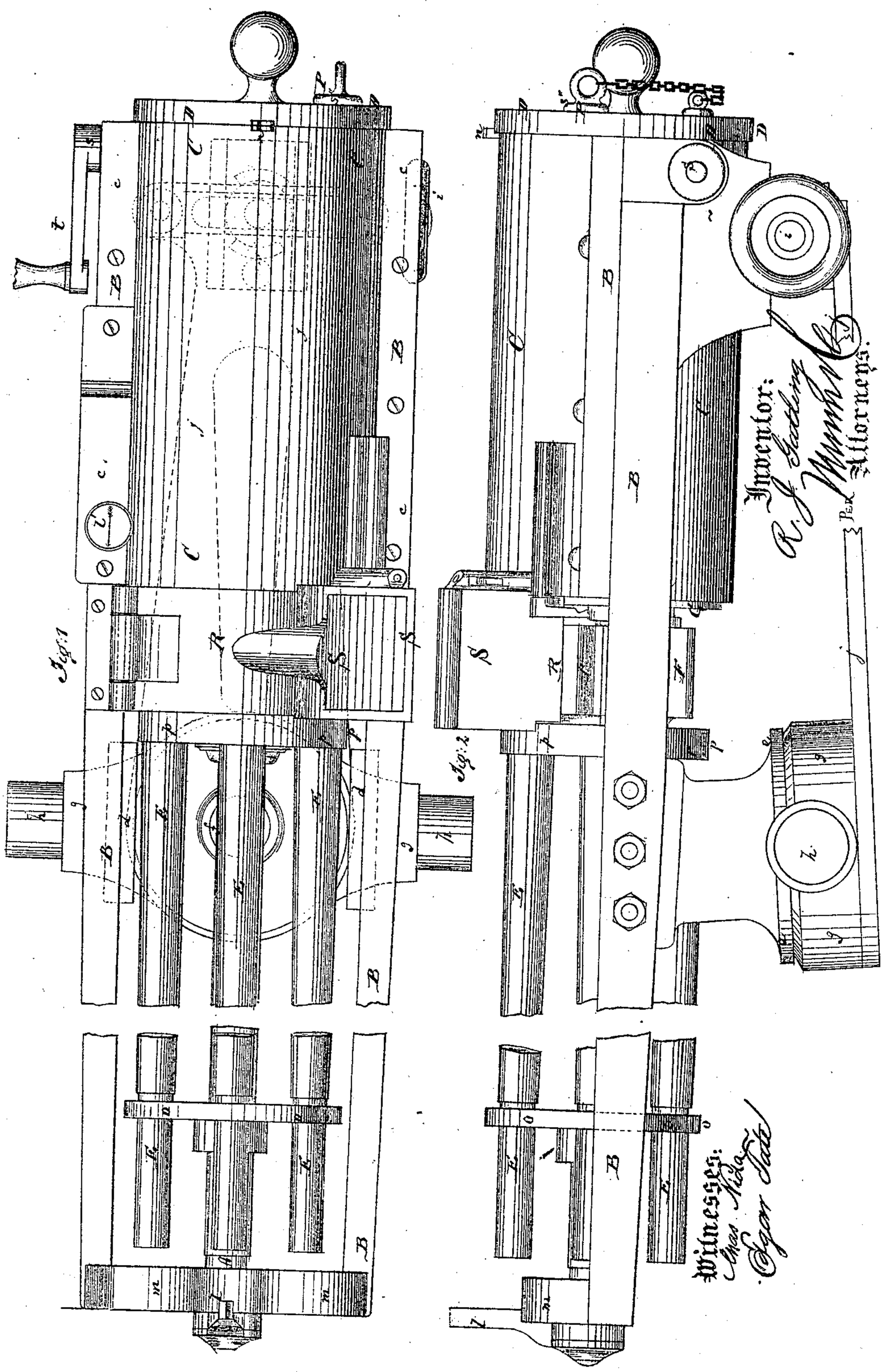
3 Sheets—Sheet 1.

R. J. GATLING.

REVOLVING BATTERY GUN.

No. 112,138. Patented Feb. 28, 1871.



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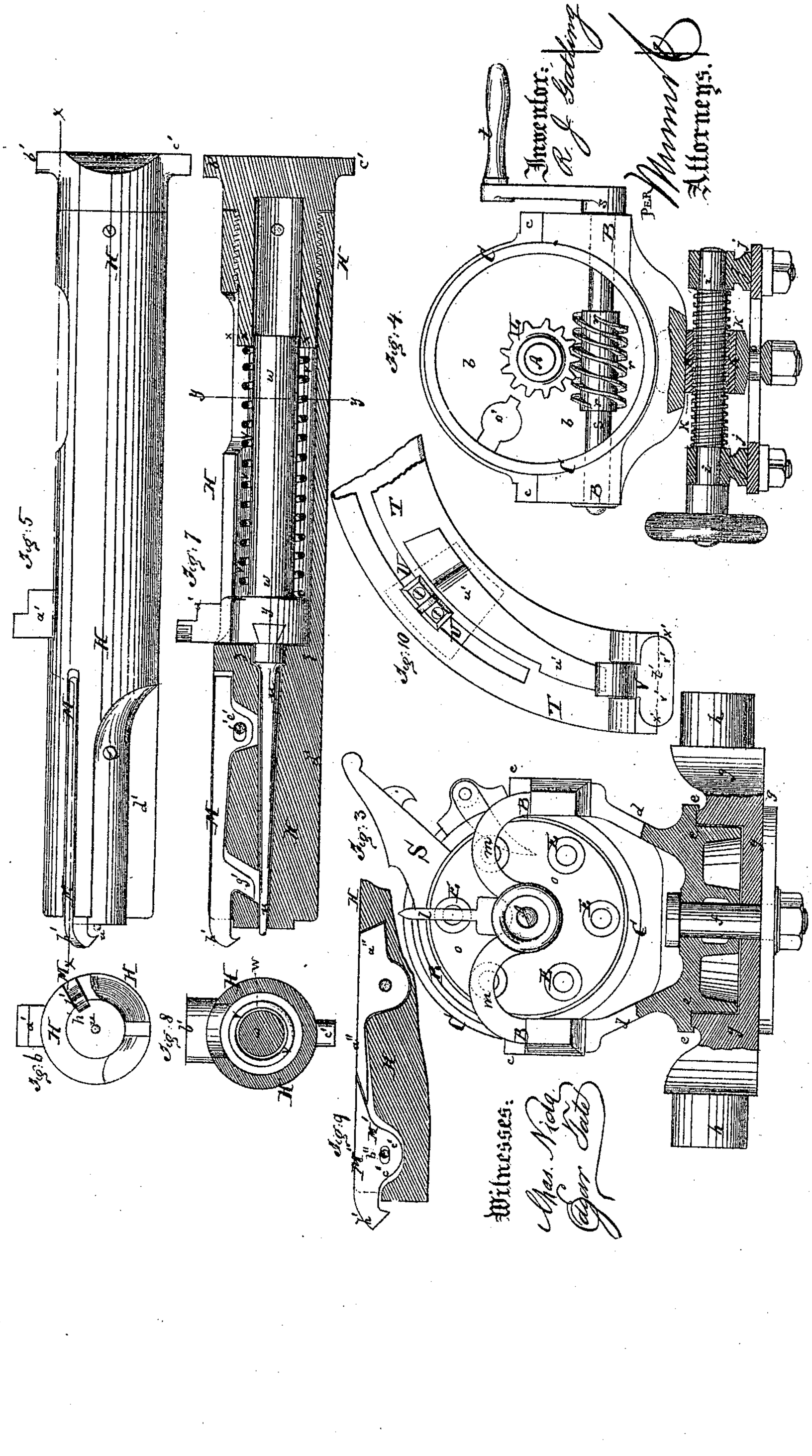

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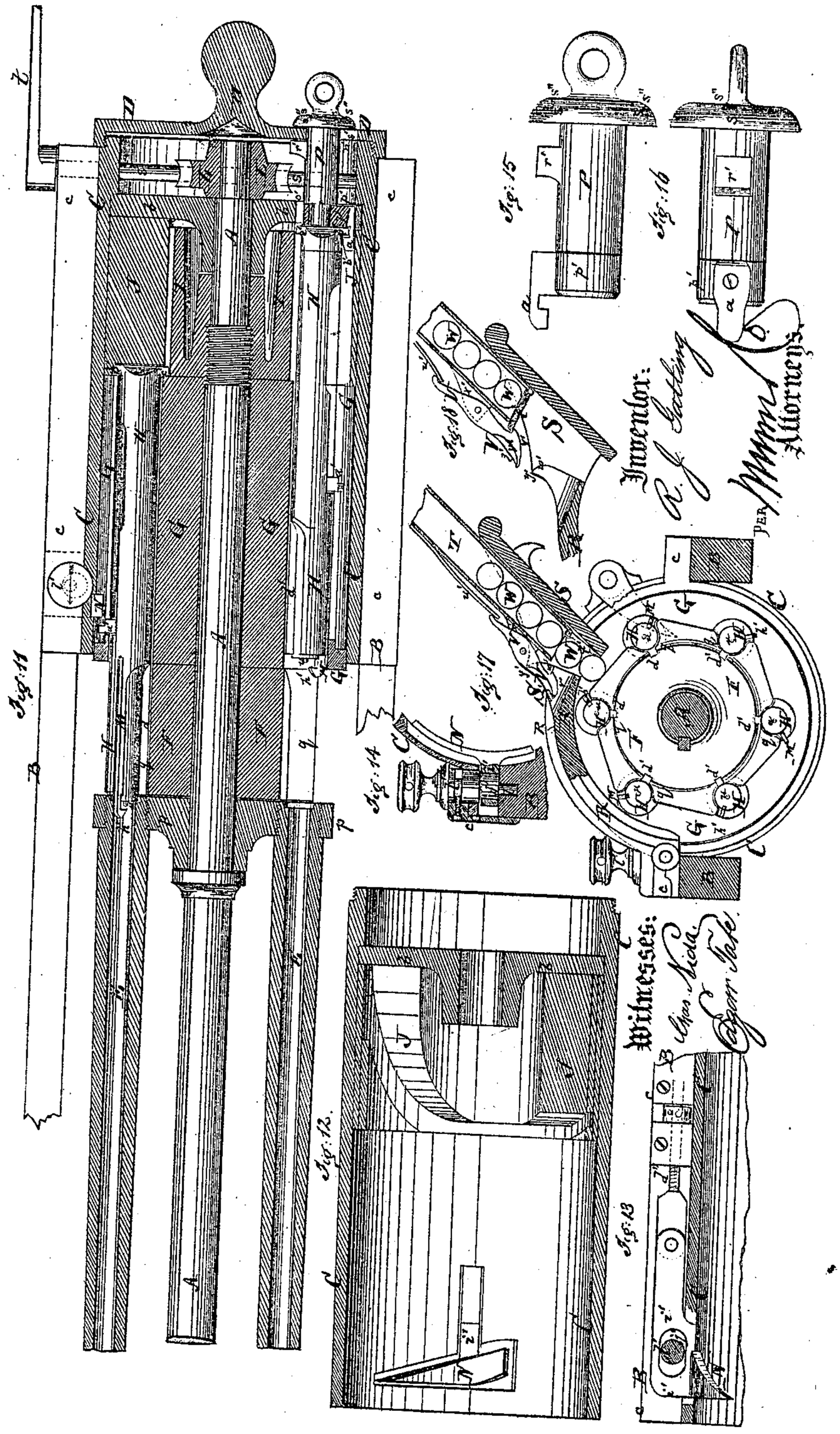

United States Patent Office.

RICHARD JORDAN GATLING, OF INDIANAPOLIS, INDIANA.

Letters Patent No. 112,138, dated February 28, 1871.

IMPROVEMENT IN REVOLVING-BATTERY GUNS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, RICHARD JORDAN GATLING, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and improved Revolving-Battery Gun; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to certain improvements in the continuous acting revolving-battery gun for which Letters Patent for the United States, numbered 47,631, were granted to me on the 9th day of May, 1865.

The object of this present invention is to perfect the mechanism described in the aforesaid Letters Patent in such manner that more satisfactory operation, greater strength and durability, and simpler construction, will be obtained.

The invention consists, chiefly, in making the "cocking-cam" laterally adjustable, so that the same may, while experiments are made with the gun, without firing the same, be drawn out, to not snap the locks, and that it may also be easily set in to operate the locks when firing is to be carried on. The cocking-cam is also made longitudinally adjustable for the purpose of varying thereby the force of the spring which operates the lock-hammer. Some kinds of cartridges are made of thicker metal than others, and require, consequently, stronger blows, in order to explode their fulminates. It is, therefore, very essential that the blow should be regulated in accordance with the material of which the cartridges are made.

The invention consists, also, in perforating the cascabel-plate and the back diaphragm in the outer casing, and in closing the apertures through both these plates by a removable plug, for the purpose of enabling the removal and reinsertion of either one or more of the locks without requiring the cascabel-plate to be taken off. The repair or inspection of all parts of the gun is thereby considerably facilitated.

The invention consists, further, in enlarging the diameters of the movable locks at their front ends, so that the said locks will be of equal diameter throughout their entire lengths, whereby greater strength and durability are obtained, and in correspondingly increasing the apertures in the front end of the lock-cylinder for the passage of such enlarged locks.

Finally, the invention consists in the use of convenient devices for automatically opening the feed-box which contains the cartridges as soon as the same is inserted in the hopper.

In the accompanying drawing—

Figure 1 represents a plan or top view of my battery-gun.

Figure 2 is a side view of the same.

Figure 3 is a front elevation, partly in section, of the same.

Figure 4 is a rear elevation, partly in section, of the same, without the cascabel-plate.

Figure 5 is a detail side view, on an enlarged scale, of one of the locks.

Figure 6 is a detail front end view of the same.

Figure 7 is a longitudinal section of the same, the plane of section being indicated by the line *x x*, fig. 5.

Figure 8 is a transverse section of the same, taken on the plane of the line *y y*, fig. 7.

Figure 9 is a detail side view of the double-lever extractor-hook.

Figure 10 is a detail side view of the cartridge feed-box.

Figure 11 is a horizontal longitudinal section of the gun.

Figure 12 is a detail longitudinal section of the breech-case.

Figure 13 is a plan view of the cocking mechanism.

Figure 14 is a transverse section of the same.

Figure 15 is a side view of the cascabel-plug.

Figure 16 is a top view of the same section of the same.

Figure 17 is a front view of the carrier-block, lock-cylinder, hopper, and feed-box, the latter being in section.

Figure 18 is a detail transverse section of the feed-box and hopper.

Similar letters of reference indicate corresponding parts.

A in the drawing represents the axial or main shaft of the gun.

It is journaled at its front end in a transverse bar, *m*, of the supporting-frame B, and near its rear end in the partition or diaphragm *b* of the stationary cylindrical breech-case C.

The breech-case C has at its sides longitudinal projecting ribs *c c*, which rest upon and are supported by the side bars of the frame B, and which serve to hold the said case stationary.

The frame B has, at or near the middle of the gun, downwardly-projecting arms *d d*, which hold under the gun a horizontal plate or turn-table, *e*, as is clearly shown in figs. 2 and 3.

The plate *e* is, by a vertical pin or bolt, *f*, pivoted to a plate, *g*, which has at its sides the projecting trunnions *h*.

The trunnions are hung into a suitable gun-carriage. Around the pin *f* the gun can be swung horizontally, and on the trunnions vertically.

The vertical adjustment is produced by a screw under the breech end of the gun, as usual, while a horizontal screw, *i*, hung in arms *j*, that project back-

ward from the plate *g*, and fitted though a nut, *k*, serves to adjust the gun horizontally around the pin *f*.

The trunnions may, if desired, be formed on the frame B, in which case the horizontal adjustment can only be produced by setting the entire gun-carriage.

l is the front sight, secured upon the front cross-bar *m* of the frame B, and

n is the rear sight, secured upon the case C or upon the cascabel-plate D, which is screwed to the same.

The shaft A has two flanges, *o p*, one in front, somewhat behind the bar *m*, and the other near the middle.

In these flanges are secured the barrels E E.

The barrels are with their rear ends screwed into the rear flange *p*, as in fig. 11, where their front ends are fitted loose through apertures in the front flange *o*, to be merely supported by the same.

The flanges *o p* are firmly secured to the shaft A, so that they will revolve with the same and carry the barrels around with it.

There are six barrels shown in the drawing. Any other suitable number may, however, be employed.

Directly in rear of the flange *p* is mounted, upon the shaft A, the carrier-block F, which is to receive the cartridges from the feed-box.

This block has as many longitudinal grooves *g g* as there are barrels E, one groove in line with each barrel. The grooves are of suitable form, preferably as in fig. 17, and should be adapted to the form of cartridges employed.

The grooves are so set that a cartridge placed into one of them can, by longitudinal motion of a rammer or rod from behind, be conveniently pushed into the barrel pertaining thereto, the locks forming such rammers, as hereinafter more fully described.

Directly in rear of the carrier-block F is mounted, upon the shaft A, the lock-cylinder G, which, with its front end, is about in line with the case C, while its length is about half that of the said case.

The cylinder G has as many longitudinal perforations as there are barrels, and the axes of such perforations are in line with the grooves *g* in F, and of the barrels.

The perforations in the cylinder are entirely cylindrical, that is to say, of equal diameters from end to end, to receive the locks H H, which are also of cylindrical form, as indicated in fig. 7.

Directly in rear of the lock-cylinder G is screwed, upon the shaft A, a nut, I, which serves to firmly secure the flange *p*, carrier F, and cylinder G together, and which, when withdrawn, permits their removal from the shaft.

Between the nut I and the diaphragm *b* of the case C is arranged the stationary cam J, by which the locks are longitudinally adjusted in the cylinder G. This cam is firmly secured in the case C, so that it will remain stationary with the same, while the shaft A with the nut I and its other appendages is free to revolve. The cam is of annular form, and surrounds the nut I, as shown in fig. 11, by which arrangement considerable room is economized.

Between the diaphragm *b* and the cascabel-plate D is mounted, upon the extreme rear end of the shaft A, a worm-wheel, L, whose diameter is not larger than that of the carrier-block F, so that an aperture may be made through the diaphragm for reaching the locks.

A worm, *r*, formed on a transverse shaft, *s*, that is hung in the rear part of the case A, engages in the teeth of the wheel L, as in fig. 4.

By means of a crank, *t*, on said shaft *s*, the same can be readily revolved, and will thereby also revolve the shaft A and all the appendages of the same, to wit, the nut I, cylinder G, block F, flanges *o p*, and barrels E, the latter revolving around and with the shaft A, but not around their own axes.

The locks H are of the following construction:

Each lock is made in form of a cylindrical shell, slightly longer than the combined length of the cylinder G and block F. The front part of each lock is nearly solid, having only a small longitudinal central bore for the reception of the firing-pin *u*. The rear part of the lock, however, forms a cylindrical chamber for the reception of the hammer-spring *v*, as is clearly shown in fig. 7.

The firing-pin *u* is, with its rear end, dovetailed and firmly secured into a rod, *w*, which is called the lock-hammer.

The spring *v* bears with its rear end against a shoulder, *x*, of the lock-case H, and with its front end against a shoulder or sleeve, *y*, of the lock-hammer, it having, therefore, the tendency to push the lock-hammer forward, so that the front end of the firing-pin will project from the front end of the lock H, as in figs. 5 and 7.

When the lock-hammer is thus pushed forward its shoulder *y* rests against a front inner shoulder, *z*, of the shell H, as shown.

From the shoulder *y* projects through the side of the shell H, and also through the cylinder G, a lug, *a'*, which is acted upon by the cocking apparatus, as hereinafter more fully described.

In order to permit the longitudinal motion of the lock-hammer and firing-pin, and consequently, also, that of the lug *a'*, the lock H and cylinder G must both be longitudinally slotted to let the lug pass backward and forward. Each lock H is therefore longitudinally slotted, and the cylinder has as many slots of equal length as there are locks and barrels.

On the rear end of each lock H is a projecting ear, *b'*, which fits into the double inclined or spiral groove or channel of the stationary cam J, and which, as the cylinder G is revolved with the locks, slides in said inclined or spiral groove, and causes the required reciprocating motion of the locks by which the cartridges are forced into the barrels, the breech ends of the latter closed, and the empty cartridge-shells withdrawn.

In order to prevent the locks from turning in the cylinder G, they have each ribs or ears *c'*, fitting into and sliding in longitudinal grooves of the nut I, and other ribs *d'*, fitting into longitudinal grooves formed at the bottoms of the main grooves of the carrier-block F.

In figs. 5 and 17, these latter ribs *d'* are clearly shown.

When the lock is pushed forward to close the breech-end of the barrel, the bar M strikes the collar of the cartridge and is first moved back, and then, owing to the inclined front edge of the hook *h'*, swung up and covers the said collar, so that the latter is engaged by the hook.

When the lock is moved back again by the cam J, the hook draws the cartridge-shell back with it, but the bar M is first drawn forward on the lock to fit the inclined edge of the ear *g'* against that of its recess, as in fig. 17. Thereby the bar M is locked down so that it cannot spring up to again release the cartridge-shell. The latter is thereby safely withdrawn from the barrel.

The slot of the ear *e'* is therefore of great importance, as by its means the retractor-bar can be locked down to retain the cartridge-shell, and again liberated to let the hook swing over the head of the cartridge.

The extractor shown in fig. 9 consists of a lever, M', and spring-holder *a''*. The latter is secured in a groove of the lock, and fits with its inclined front end under the rear arm of the lever M'.

The lever is, by a pin, *b''*, pivoted to the lock, the said pivot passing through a longitudinal slot in an ear, *c''* of the lever. The slot allows slight longitudinal play to the lever M' when the same strikes the cartridge-head, and when it commences to withdraw the shell.

The spring holds its hook *h'* over the flange of the

shell, and prevents it from slipping off, permitting it, however, to swing while it engages said shoulder.

The cocking apparatus is more clearly illustrated in figs. 12, 13, and 14. It is mainly an inclined or spiral plate, N, arranged on the inner side of the breech-case C, so that the lug *a'*, when the lock is moved forward, may be arrested by the same, and the spring *v* gradually contracted and the firing-pin drawn back into the lock-shell H.

When the lug *a'* passes the end of the stationary plate N, it is suddenly released, and the spring *v* with it, causing the latter to expand and to suddenly and violently force the firing-pin forward against the cartridge to explode the same.

The plate N is stationary on the case C, while the lugs *a'* revolve with the cylinder G. The plate N will, therefore, act upon the firing-pins in the several locks successively, and will cause the successive discharge of the barrels as the same arrive in line with it.

The plate N may be arranged on any suitable part of the cylinder G, either above, below, or on either side of the shaft A. In the drawing it is represented as being on the side of the cylinder.

In order to permit the lateral adjustment of the cocking-plate N, the same is secured to a slide, *i'*, which projects into one of the ribs *c*, and which has an aperture to receive the eccentric *j'*, on a vertical arbor, *l'*.

The said arbor is fitted vertically into the rib *c*, as shown. By turning it, the eccentric will draw the slide *i'* in or out, as may be desired, drawing thereby also the plate N into or out of gear with the several lugs *a'*.

The arbor can be so operated by hand that the plate N can be moved into or out of gear, as may be desired. Thus exercise of the gun by recruits, &c., is permitted without snapping the locks.

By connecting the slide with a longitudinal screw, *d''*, which is fitted through ears on the rib *c*, as in fig. 13, the plate N may be made longitudinally adjustable for the purpose of compressing the springs *v* to a greater or lesser degree, and of consequently regulating the force with which the firing-pin is projected against the cartridge.

A sliding bolt may be arranged on the case for locking the shaft *l'*, and with it the cocking-plate N, in either one of the desired positions.

In order to allow the removal and insertion of each lock without requiring the removal of the cascabel-plate, there is an aperture, *n*, through the cascabel-plate, and in line with the same a similar aperture, *o'*, through the diaphragm *b*.

Both these apertures can be closed by a plug, P, which is inserted from behind into the plate D, as is clearly shown in fig. 11.

The gear-wheel L is made small enough to permit the arrangement of the said apertures *n' o'*, and plug P, in line with the locks.

The plug carries at its front end a sleeve, *p*, which has a projecting grooved arm, *a*, that is fitted into a recess of the cam J, the groove in *a* forming a continuation or completion of the groove in said cam, in which the ears *b'* of the locks move.

A nose, *r'*, on the plug P, locks behind the cascabel-plate and holds the plug in place. When the latter is turned to bring the nose *r'* into line with a notch, *s'*, that enlarges the aperture *n'* of the cascabel-plate, (fig. 11,) the plug can be withdrawn. Thereby the apertures *n' o'* are opened, and each lock as it arrives in line with the same can be withdrawn and reinserted. The repair and inspection of the locks are thereby facilitated, and the gun can be kept in perfect repair while in service, without requiring the removal of the heavier parts.

In order to facilitate the removal of the plug, P that is to say, the turning of the same, a lever may be attached to the end of the plug, to form a crank on the same.

Upon the frame B is secured a curved plate, R, which covers partly the carrier-block F, and which, at its outer upper end has a hopper, S, formed on it, for the reception of the feed-box T, which is the box containing the cartridges to be fired.

The box T is a curved or straight sheet-metal case of suitable height, its width and length corresponding with that of the cartridges to be used.

At one end this case has a hinged bottom, *t'*, which is held closed by a hook on a pivoted lever, V, that is acted upon by a spring, *u'*, as in figs. 17 and 18.

When the case T is inserted into the hopper, the inner face of the hook *v'* of the lever V is moved on an inclined face, *w'* of the hopper, so that the hook is drawn off the bottom *t'*, causing the same to drop open, as in fig. 17, and to liberate the cartridges W, which will be taken up by the carrier-block F as the grooves of the same are brought successively under the case T.

A lug, *x'*, on the case T, strikes against a nose, *y'*, of the hopper, when the case has been inserted sufficiently far.

When a feed-box has been emptied, it is withdrawn from the hopper and another one put into its place, the empty one being readily refilled to be ready for further use.

I prefer to have the case T curved, as in fig. 10, and a weight, U, in it, to rest on the cartridges, so that the weight will have less effect when the case is full than when the same is nearly empty.

A full box, T, is placed into the hopper S, so that its cartridges will be liberated. The plug P is put and locked into the cascabel-plate and diaphragm, so that its flange *s''* abuts against the face of the cascabel-plate.

The cocking-plate N is put into gear to act on the lugs *a'*, and the shaft *s* is revolved. The cartridges are thereby successively fed into the grooves of the carrier-block F.

As soon as a groove, *q*, has been filled, the lock H in line with it is gradually moved forward by the cam J, and the cartridge pushed into the barrel E, pertaining to and in line with such lock.

When a cartridge has been fully inserted, the breech-end of the barrel is closed by the lock H, and then the firing-pin is violently thrown forward by the spring *v*, to explode the fulminate in the cartridge, and by the same ignite the charge.

While the lock was being pushed forward, the lug *a'* was detained by and moved along on the cocking-plate N, whereby the spring *v* was compressed and the firing-pin drawn into the shell H.

At the same that the lock H closed the breech of the barrel the lug *a'* passed the plate N' and liberated the firing-pin, which was propelled as stated.

While the lock passed forward to close the breech of the barrel, the hook of the retractor M was slipped over the head of the cartridge, and remained in that position during the operation of firing.

After firing the lock is gradually drawn back by the cam J, and the hook of M draws the empty cartridge-shell back with it.

Another lock, barrel, and cartridge arrive in line with the cocking-plate N, and are acted upon as aforesaid.

When a lock is out of order and firing can be ceased, the plug P is taken out and the shaft A turned until such damaged lock arrives in line with the apertures *n' o'*, when the same can be withdrawn and repaired, and a new lock put into its place.

Whenever, during the revolution of the shaft A, a lock, H, is quite drawn back, a cartridge drops into the groove *g* in front of it.

Having thus described my invention,

I claim as new and desire to secure by Letters Patent—

1. The cocking-plate or cam N, arranged laterally adjustable in the breech-case of the gun, substantially as and for the purpose set forth.

2. The arbor *l'*, eccentric *j*, and slide *i'*, in combination with the laterally-adjustable cocking-plate N, all arranged as set forth.

3. The cocking-plate N, arranged longitudinally, adjustable to permit the regulation of the firing-spring *v*, as set forth.

4. The perforated cascabel-plate D, in combination with the perforated diaphragm-plate *b*, relatively constructed and arranged, as and for the purpose set forth.

5. The plug P, in combination with the perforated cascabel-plate D, and perforated diaphragm-plate *b*, all relatively constructed and arranged as and for the purpose heretofore specified.

6. The worm-gear or its equivalent, of less diameter than the circle described by the locks, in combination with the perforations in the diaphragm and cascabel-plate, to permit the removal of the locks, in the manner and for the purpose described.

7. The plug P, having the lug and ring with lip projection, the latter having an inner transverse groove in which the rear lugs of the locks work when the gun is revolved, the said plug not being designed to receive any part of the force of the charge, but used with its appendages for the purpose of preventing the locks from working forward or backward at the time they are passing the slot in the rear cam, and the perforation in the diaphragm during the revolution of the gear, all as described.

8. The cylindrically-formed locks H, working in uniform-sized perforations, made longitudinally and entirely through a revolving lock-cylinder, in contradistinction to locks and perforations reduced in diameter at their front parts, as shown and described in my patent dated August 9, 1865.

9. The lever V, acted upon by the spring *u'* to hold the bottom *t'* closed, and allow it to be automatically opened when its lower part comes in contact with the hopper, in combination with the feed-box T, for the use and purpose specified.

10. The nut I, arranged on the shaft A, to hold the carrier-block F and cylinder G in place, and to act as guide for the locks, substantially as specified.

RICHARD J. GATLING.

Witnesses:

H. CLAY,

THOMAS L. SULLIVAN.