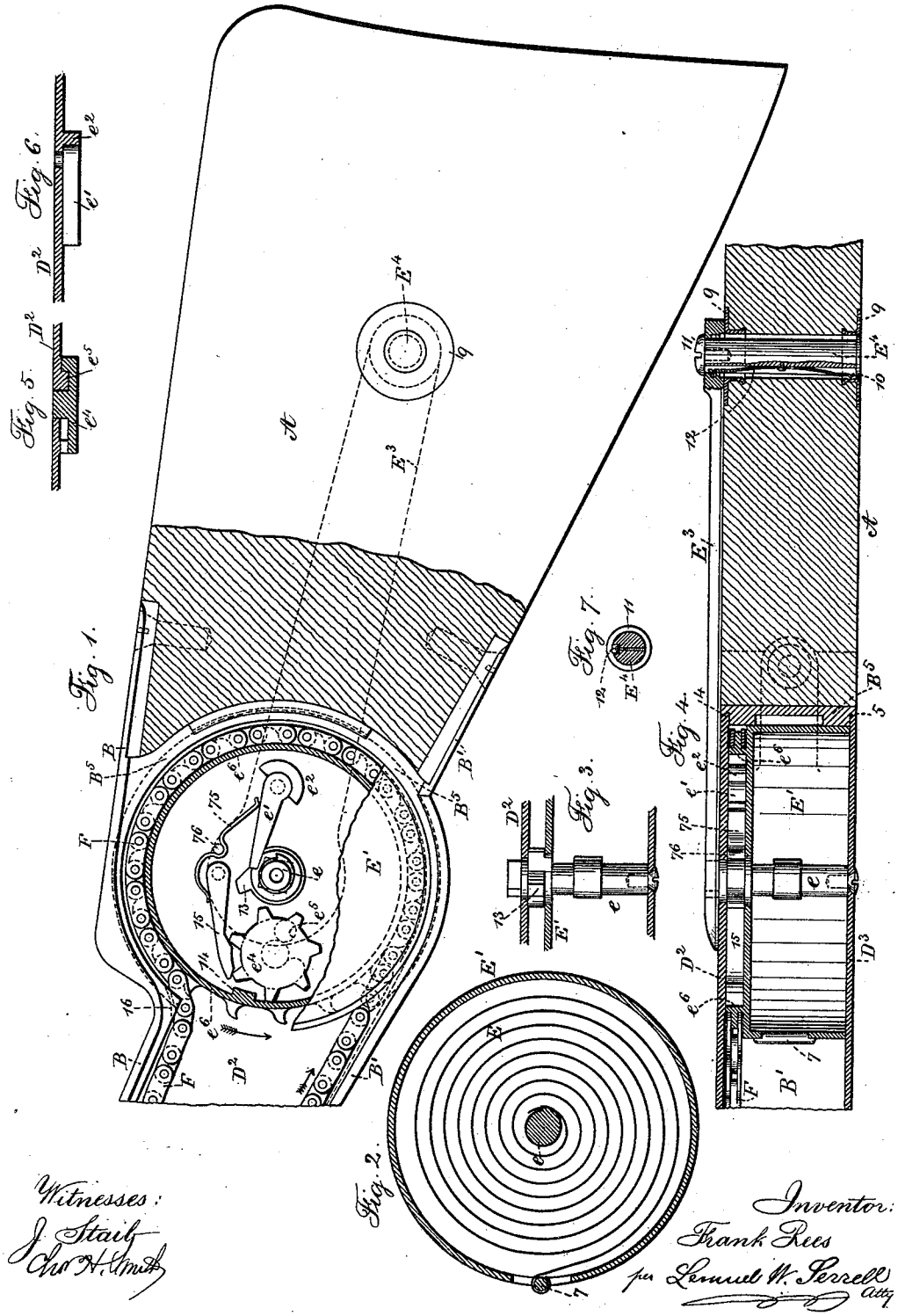
(No Model.) 5 Sheets—Sheet 1.

F. REES.

REPEATING FIREARM.

No. 473,179. Patented Apr. 19, 1892.



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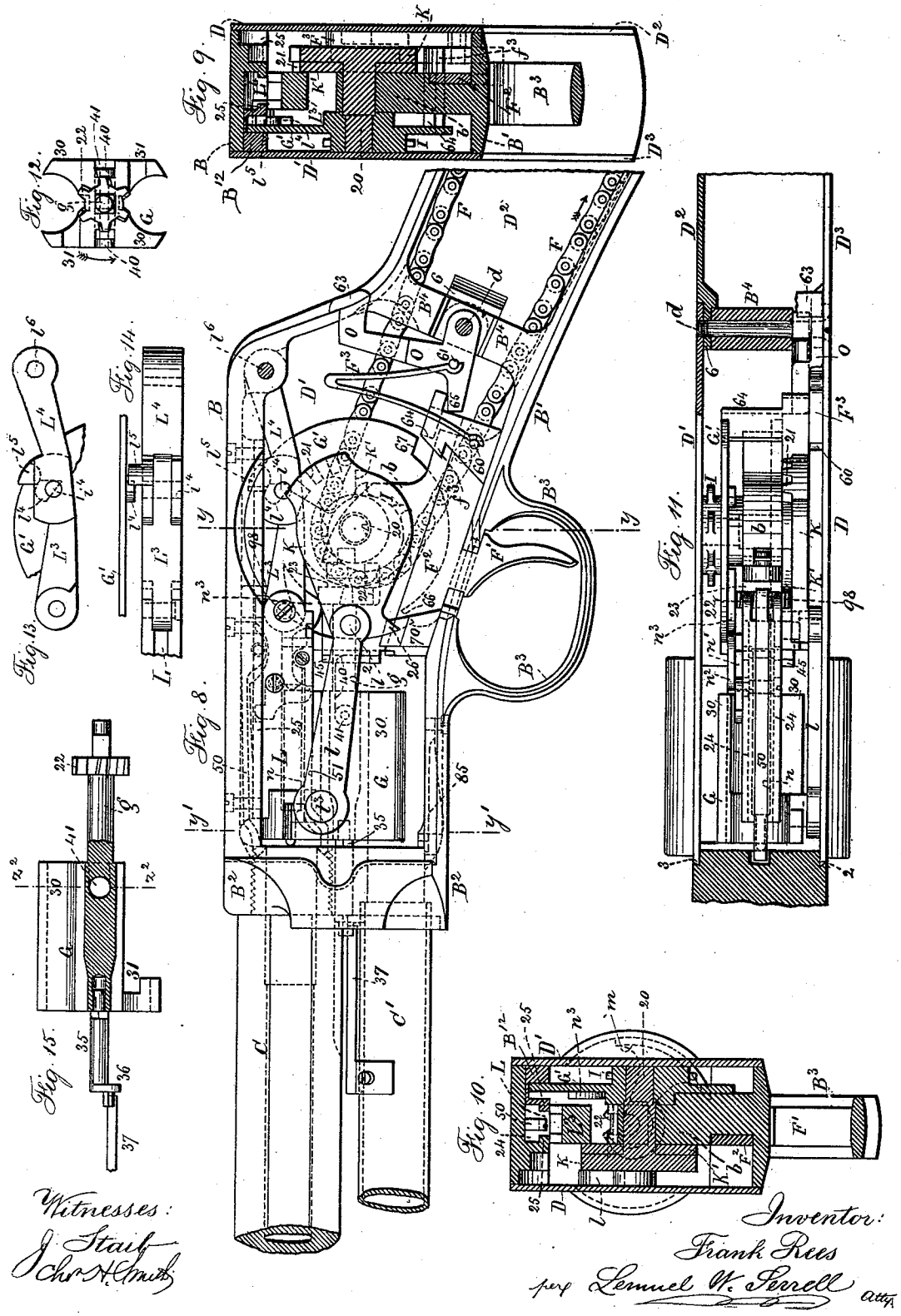

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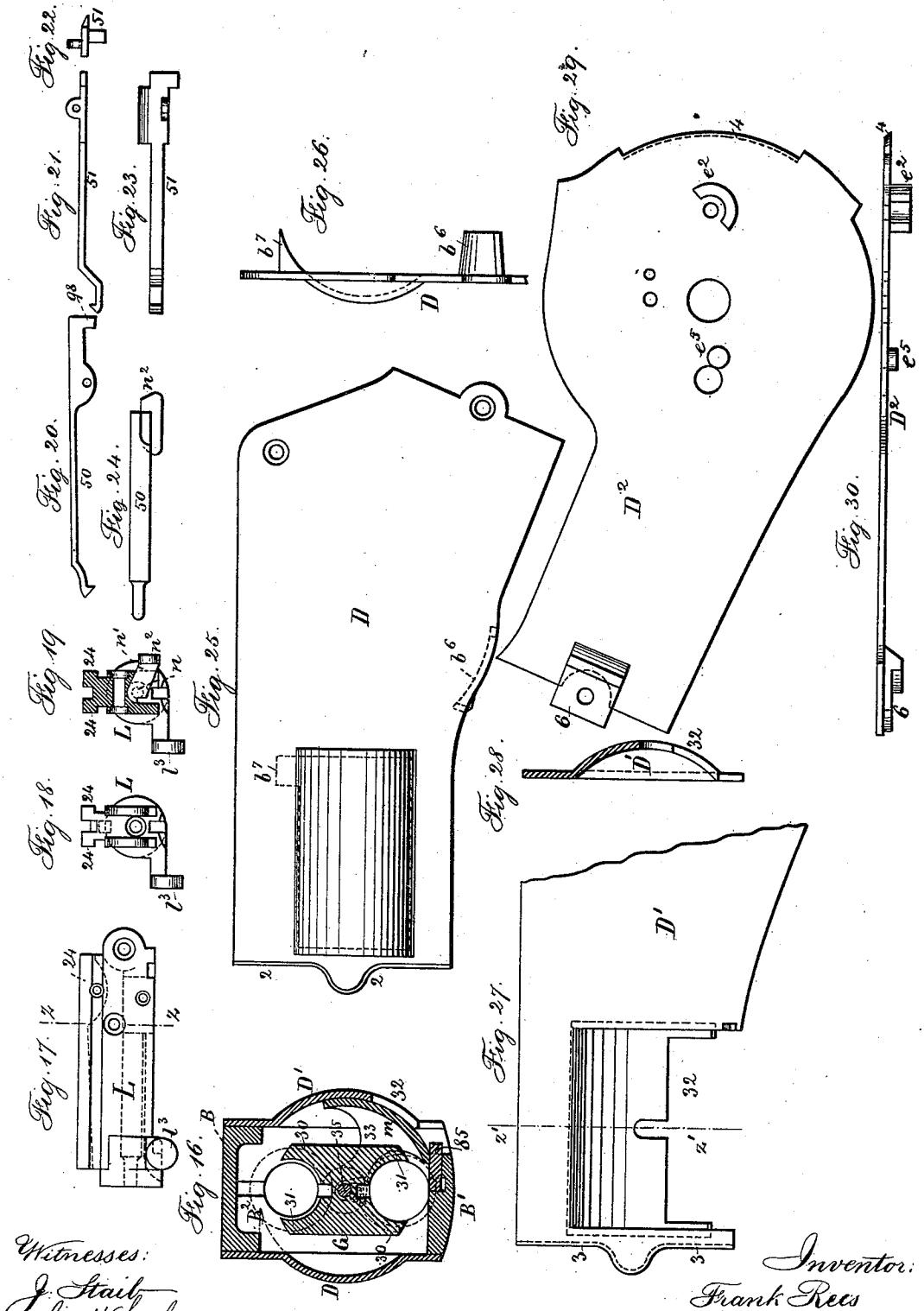

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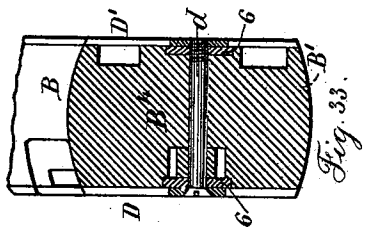

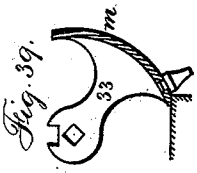

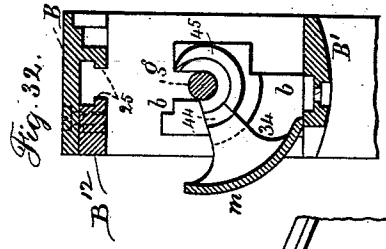

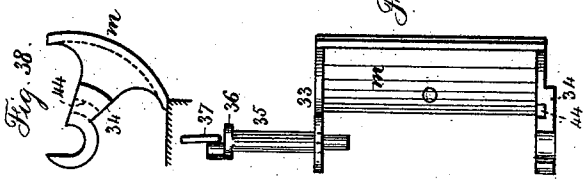

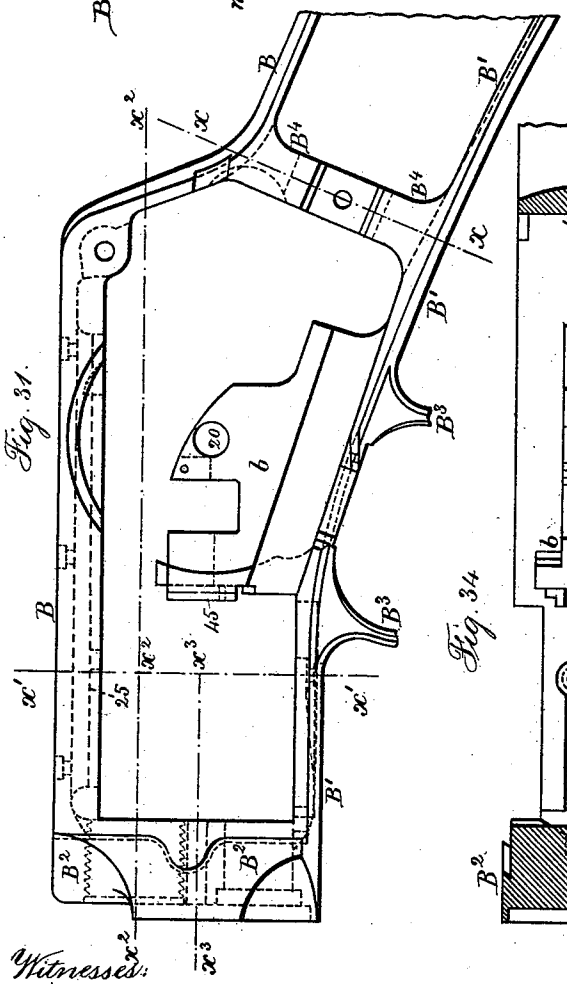

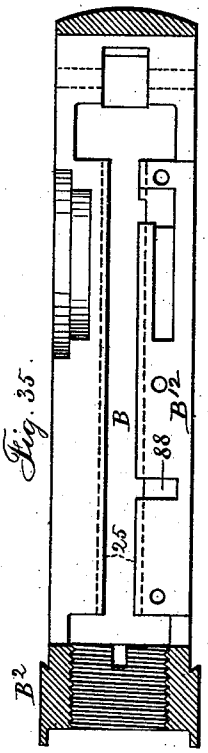

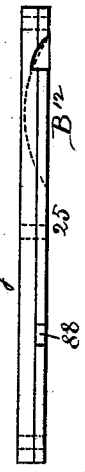

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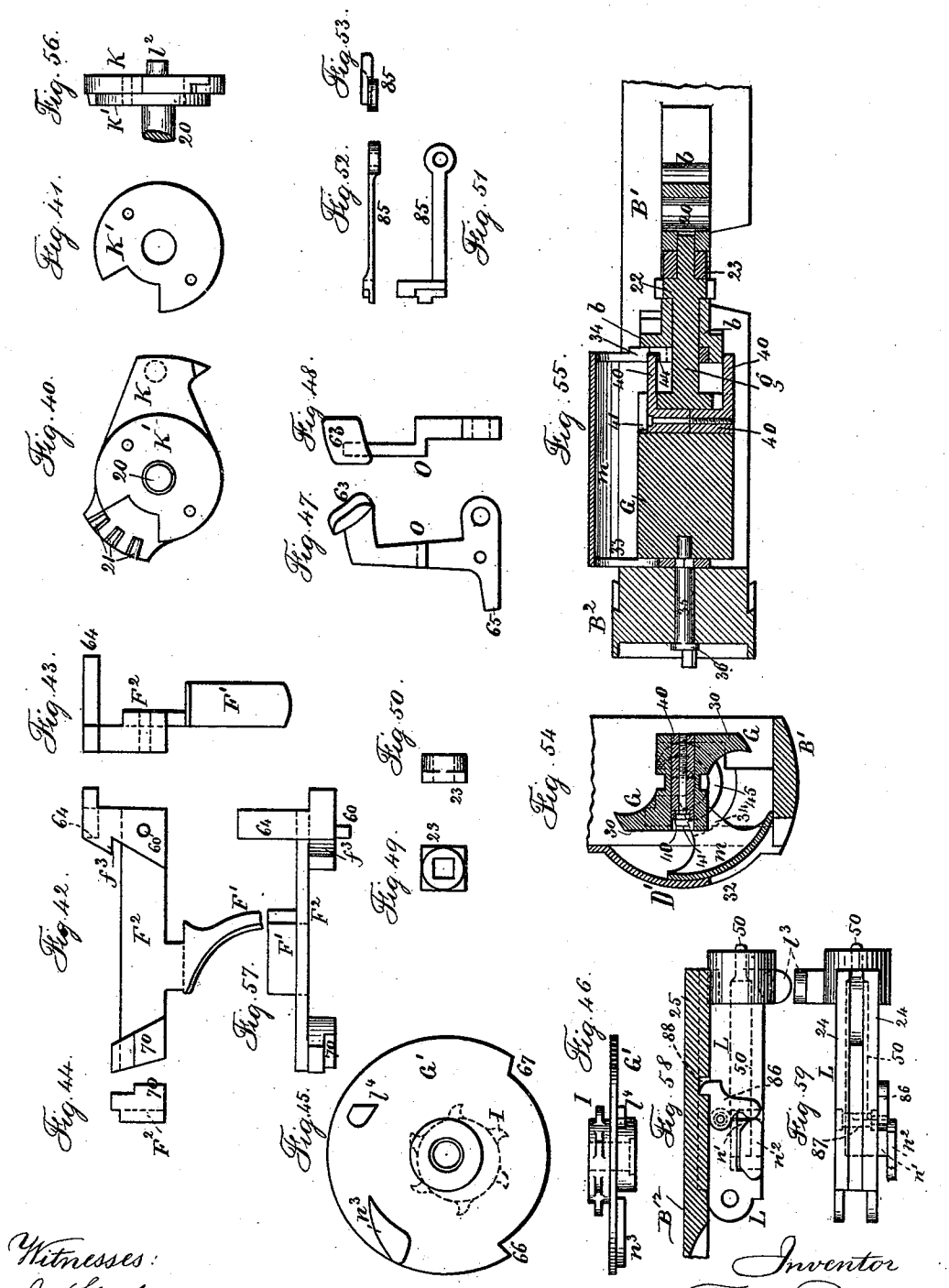

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UNITED STATES PATENT OFFICE.

FRANK REES, OF SOUTH ORANGE, NEW JERSEY.

REPEATING-FIREARM.

SPECIFICATION forming part of Letters Patent No. 473,179, dated April 19, 1892.

Application filed April 22, 1887. Serial No. 235,745. (No model.)

To all whom it may concern:

Be it known that I, FRANK REES, of South Orange, in the county of Essex and State of New Jersey, have invented an Improvement in Repeating-Firearms, of which the following is a specification.

This invention is an improvement upon that for which Letters Patent Nos. 337,992 and 337,993 were granted to me March 16, 1886.

In my present improvements the operations correspond generally to those set forth in my aforesaid patent; but the parts are simplified and less in number and the construction is such that the parts can be easily and cheaply made by machinery.

In the drawings, Figure 1 shows the butt and wooden stock of the gun and the rear portion of the housing or receiver with the left-hand rear side plate removed and a part of the right-hand side of the spring-barrel and the spring also removed to show the stop-wheel and pawl and winding-pawl and chain belt. Fig. 2 is a section of the spring-barrel and mainspring. Fig. 3 is a detached view of the axis of the spring-barrel. Fig. 4 is a horizontal section of the spring-barrel and part of the stock and a section of the end of the winding-crank and part of the crank-handle. Fig. 5 is a section through the stop-wheel and right-hand rear side plate to which the stop-wheel is attached. Fig. 6 is a section of the right-hand side plate and a plan of the winding-pawl for holding the axis of the spring-barrel. Fig. 7 is a cross-section of the handle of the winding-crank and the set-spring therein. Fig. 8 is an elevation of the lock or breech mechanism and a portion of the barrel and magazine, this figure being a continuation of Fig. 1. Fig. 9 is a cross-section of Fig. 8 at the line y y, looking toward the rear of the gun. Fig. 10 is a section at the same line looking toward the front. Fig. 11 is a plan of the parts with the upper strap of the receiver removed and portions of the housing in section. Fig. 12 is a rear view of the revolving carrier. Fig. 13 is a detached elevation, and Fig. 14 a plan, of the toggle-joints attached to the rear of the breech-bolt and part of the actuating-disk. Fig. 15 is a section of the carrier and an elevation of the rear part of the shaft and pinion and the forward axis of the carrier. Fig. 16 is a cross-section at the line y' y', Fig. 8, looking toward the front. Fig. 17 is a side view, Fig. 18 a rear view, and Fig. 19 a section at the line z z, Fig. 17, of the breech-bolt and an elevation of the rear end of the firing-pin. Figs. 20, 21, 22, and 23 are detached views of the upper and lower extractor-springs attached to the breech-bolt. Fig. 24 is a detached view of the firing-pin. Fig. 25 is an elevation of the front left-hand side plate. Fig. 26 is a rear edge view of the same. Fig. 27 is an elevation of the inner side of a portion of the right-hand front side plate. Fig. 28 is a section at the line z' z', Fig. 27. Fig. 29 is an elevation of the inner side of the right-hand rear side plate. Fig. 30 is a plan or edge view of the same. Fig. 31 is a detached view of the receiver or housing for the breech mechanism. Fig. 32 is a section of the same at the line x' x', Fig. 31, looking toward the rear and showing also the gate and axis of the carrier in section. Fig. 33 is a cross-section at the line x x, Fig. 31, looking toward the front. Fig. 34 is a sectional plan view at the lines x^3 x^3 x^2 x^2, Fig. 31. Fig. 35 is an inverted sectional plan view of the upper strap of the receiver at the line x^2 x^2 x^2, Fig. 31. Fig. 36 is a separate view in elevation of the removable slide-guide for the breech-bolt. Figs. 37, 38, and 39 show the gate that closes the opening in the right-hand front side plate, through which the loaded cartridges are inserted in the gun and through which the empty shells are ejected. Fig. 40 is an elevation of the tumbler, showing its inner side. Fig. 41 is an elevation of the tumbler stop-plate which is attached to the inner face of the tumbler. Figs. 42, 43, and 44 show the trigger, trigger-slide, and tumbler-escapement. Fig. 45 is an elevation of the chain-disk, showing the cam striker or hammer and lifting-cam for the toggles and in dotted lines showing the sprocket-wheel for the chain belt behind the disk. Fig. 46 is a plan view of the same. Figs. 47 and 48 show the automatic or safety lock. Figs. 49 and 50 show a detached view of the square on the rear end of the carrier-shaft, Figs. 11 and 55, behind the carrier-shaft pinion for stopping the carrier every half-revolution. Figs. 51, 52, and 53 show the spring cartridge-stop at the rear of the magazine, Fig. 8, for holding the cartridges in the magazine during the revolu-

tion of the carrier. Fig. 54 is a section of the carrier and gate at the line z^2 z^2 of Fig. 15, looking toward the rear and showing some adjacent parts in section. Fig. 55 is a horizontal section through the middle of the carrier, showing in plan view the front carrier-axis, the rear carrier-shaft with pinion and stopping-square, and the gate-lifters and gate. Fig. 56 is a front edge view of the tumbler and tumbler stop-plate. Fig. 57 is a plan of the trigger and its trigger-slide and tumbler-escapement. Fig. 58 is an elevation of the right side of the breech-bolt, showing the firing-pin in dotted lines and the retracting-lever in full lines and a section of the slide-guide. Fig. 59 is a detached plan view of the same.

The stock A, Fig. 1, is preferably of wood and is attached to the metal receiver or housing by screws through the tangs of the portions B B′. This receiver extends forward in one solid forging, and into the forward end of which the barrel C, Fig. 8, is screwed and the magazine-tube C′ is inserted in the usual manner. The trigger-guard B^3 is preferably a solid portion with the receiver, and the upper and lower straps B and B′ of the receiver are connected securely by the tie-block B^4 and the front portion B^2 of the receiver and the rear circular strap B^5, Fig. 1, all forming one solid housing for receiving the various working parts of the gun, hereinafter described. The sides of the receiver are covered by four side plates, which complete the housing for the parts and are shown in Figs. 25 to 30 and marked D D′ D^2 D^3. The plate D, Fig. 11, covers the front left-hand side of the receiver, D′ the front right-hand side and the plate D^2 the rear right-hand side, and the plate D^3 covers the rear left-hand side, so that the working mechanism is completely inclosed by the metal housings, with no opening through which dirt or water can enter. The front ends of the front plates and the rear ends of the rear plates have beveled edges 2 3 and 4 5, which set in the beveled recesses of corresponding shape in B^2 and B^5, respectively, and these serve to hold the plates securely at their ends. The opposite ends of each pair of these plates come together over the tie-block B^4, and the inward perforated extensions 6, Figs. 25 to 30, on the front ends of the rear plates set in under the corresponding extensions on the rear ends of the front plates, and all four plates are held firmly together by the screw *d*, that passes through the tie-block B^4. This screw *d* also forms the axis for the safety-lock O, hereinafter described. By partly unscrewing the screw *d* the side plate D′ can be removed for the purpose of oiling or cleaning the mechanism without loosening any of the other plates or parts, the thread for the screw *d* being in the plate D′. These side plates are shaped so as to cover properly the breech mechanism, and they have cylindrical projections that allow the carrier and cartridges to revolve and an extension b^6, as shown in Fig. 26, to fill in and cover the notch in the lower strap of the receiver through which the trigger is inserted. The screw l^6 passes through the side plates and is employed to bind them together and also to form the axis for the rear toggle L^4.

The volute or coiled mainspring E of the gun, Fig. 2, is placed within the spring-barrel E′, and the outer end thereof is hooked around the cross-bar 7 and the inner end is hooked upon the axle *e*. This axle *e* passes through the circular head of the spring-barrel, Figs. 3 and 4, and also through the side plate D^2, and it is permanently connected with the winding key or crank E^3, which crank is set closely against the side of the stock A and can be revolved. The crank-handle E^4 passes through an eye at the rear end of the winding-crank, and when the mainspring is wound up or the gun not in use this crank-handle can be slipped endwise through the eye of the crank-arm into a hole made to receive and shield it in the stock. This hole in the stock is protected by metal rings or escutcheons 9, sunk into the wood.

The crank-handle E^4 has a flange 10 at the end to prevent it from being pulled entirely through the eye of the crank-arm, and the screw 11 at the other end projects or overhangs, so as to prevent the handle from being pushed into the stock too far, and there is a friction-spring 12 in a grooved mortise running lengthwise of the handle, which spring serves to set or hold the handle in either of its positions when it is pulled out or pushed in by its friction, and the ends of the spring are V-shaped to catch into a groove around within the eye at the end of the winding-crank. The mainspring is wound up after drawing out the crank-handle from the hole in the stock by revolving the crank-arm, and the pawl *e′*, Fig. 1, holds the spring when wound by taking into a recess or tooth in the axis *e*, so that the crank can only be stopped when it is against the side of the stock. This pawl *e′* has a pivot-stud passing into the plate D^2, and its rear rounded end sets within a circular flange e^2 upon the inside of the side plate, and which flange takes the strain off the pivot of the pawl.

The stop cog-wheel e^4 is designed for the double purpose of stopping or blocking the winding-crank when the mainspring is wound up tight, so as to prevent the mainspring from being broken by excessive winding, and this stop cog-wheel also serves to arrest or stop the unwinding of the mainspring before it is too weak to completely revolve the breech mechanism, thereby preventing accident from any incomplete movement in the parts of the gun. This is accomplished in the following manner: Every time the winding-crank is revolved one complete revolution the finger or cog 13, striking against a cog of e^4, turns it one tooth, and when the mainspring has been wound up tight the stud e^5, projecting from the side plate D^2, arrests the further movement of the stop-

wheel e^4. It is to be understood that the wheel e^4 is pivoted upon the side plate, as shown in Fig. 5, and this wheel e^4 has a circular groove cut partly around its pivot, as shown by the dotted lines, Fig. 1; but this groove does not form a complete circle, but is interrupted, so that when the cog-wheel is turned it will only revolve in either direction until it is stopped by the projection e^5, striking against the solid portion of the cog-wheel at the ends of the circular groove. When the cog-wheel e^4 is stopped in this manner, the winding-crank can no longer be revolved, because the finger 13 is blocked in its movement by a cog of the wheel e^4, and in this way the excessive winding of the mainspring is stopped and the mainspring protected from any undue strain. It is also to be understood that the number of cogs on e^4 and the length of its circular groove must be adapted to the number of revolutions of the winding-crank necessary to complete winding the mainspring.

When firing the arm, the mainspring unwinds and turns the spring-barrel E′ in the direction indicated by the arrow, Fig. 1, so that the cog 14 on the inner side of the chain or sprocket flange strikes a cog of e^4 and turns it one tooth in the opposite direction from that just described in winding, and each complete revolution of the spring-barrel turns e^4 one tooth, so that when the mainspring is unwound to near the point when it would no longer have the power necessary to properly and completely turn the breech mechanism the spring-barrel is arrested by the cog 14 being blocked in its movement by a cog of e^4, which itself has been stopped by the projection e^5, striking the end of the groove in the wheel e^4. The pawl 15 is attached to the side plate D^2 and acts to hold the stop-wheel e^4 in whatever position it is forced by the movement of the winding-crank or spring-barrel, and is acted upon by the pawl-spring 75, having a pin at 76, which retains it in position. This spring also acts upon the winding-pawl e'.

The chain belt F passes around the flange e^6, and upon this flange e^6 are sprockets or hook-shaped projections matching in between the double links of the chain and forming a chain-wheel, and as the lower portion of this chain is the pulling portion the upper portion is allowed to be slack, so that there is no material friction at the bend 16 of the receiver. From the chain-wheel e^6 on the spring-barrel the chain belt passes around the chain or sprocket wheel I at one side of the cam-disk G′, Figs. 8, 45, and 46, and this chain-wheel I is eccentric to its axis 20, so that the mainspring, acting through the chain, exerts its greatest power to revolve the parts at or near the commencement of each movement or about the time when the loaded cartridge is forced into the barrel and the cartridge fired and also at the time when the empty cartridge has to be drawn out of the barrel. At all other portions of the movement the power required is very small, the greatest power being required to withdraw the exploded shell from the barrel. The axis 20 passes through the similarly-marked hole in the central block *b*, Fig. 31, which block forms the bearing for the revolving parts of the breech mechanism and in which the trigger-slide also moves, and this block *b* is a solid portion of the receiver. The axis 20 is also a solid portion of the tumbler K, Figs. 8, 10, and 56, and the chain-wheel I is permanently connected with this axis, so that the chain-wheel and tumbler revolve together. The tumbler K and the parts connected therewith are similar to those shown in my aforesaid patents, and a reference is hereby made to the same for the general construction and operations thereof, and there are upon this tumbler the three cog-teeth 21, Fig. 40, that act upon the six-toothed pinion 22 on the carrier *g*, Fig. 8, 11, and 12, to revolve the carrier G a half-revolution each time the arm is fired, and the tumbler-plate K′, which is pinned to the inner side of the tumbler K, Figs. 40 and 41, acts against one face of the carrier-square 23, Figs. 49, 50, and 11, to hold the carrier in position.

The tumbler-plate K′ is cut away to allow the square to revolve at the time the teeth 21 are acting upon the pinion 22, and there is upon the tumbler K a stud l^2, passing into an eye at one end of the connecting-link *l*, Fig. 8, and this link *l* extends to the stud l^3, projecting from the breech-bolt L, Figs. 8 and 17, and serves to draw the bolt backward and forward as the tumbler is revolved, and there are longitudinal ribs at the top edges of the breech-bolt L, forming a T-slide, Figs. 17, 18, and 19, that slide in the undercut slideways 25, Figs. 31 and 32, upon the under side of the straps B, so that the breech-bolt is supported thereby and free to move backward and forward, and the movable piece shown in Fig. 36 forms one side of the slideways to allow for inserting or removing the T-slide of the breech-bolt.

The toggle-links L^3 L^4, Figs. 8, 13, and 14, are similar to those in the aforesaid patents, the link L^4 being pivoted at l^6 and the two links joined at i^4 by a pin or screw, and there is upon the toggle L^4 a projecting cam l^5, beneath which the projecting cam l^4 upon the disk G′ passes, as shown in Fig. 13, to support the toggles and hold the breech-bolt L against the recoil when the arm is fired, and this stud l^4 passes from beneath the projecting cam l^5 as soon as the chain-wheel commences to revolve and allows the toggle-links to be folded downwardly as the breech-bolt is drawn backward by the link *l* and crank-pin l^2 upon the tumbler K. To start the downward folding motion of the toggles, I extend the extractor-spring 50 at its rear end and I provide a nose 98, pressing on the link L^3, and at the proper moment this nose, through the action of the forward part on the spring, pushes the toggle L^3 down sufficiently to start the downward folding movement.

The revolving carrier G, instead of being S-shaped, as in my former patents, is in the form represented in Figs. 8, 12, 15, 16, and 54. The sides 30 of the carrier at one side of each chamber into which the cartridges are received extends but slightly above the middle line of the cartridges, while the opposite sides of the chambers are entirely cut away, except at the front parts 31, Fig. 15. When the carrier is revolved, as indicated by the arrow, Fig. 12, one of the sides 30 pushes against the loaded cartridge in the lower chamber and carries it up into line with the barrel, and then the breech-bolt coming forward forces it into the barrel, where it is exploded, after which the breech-bolt is drawn backward, the empty shell is drawn out of the barrel by the extractor-spring hooks 50 and 51, and the carrier is again revolved and the empty cartridge is carried out sidewise from between the extractor-hooks and moved down by the revolution of the carrier and ejected laterally at the open side of the carrier behind the projection 31 and delivered through the open doorway 32 in the side plate D′, Figs. 16 and 27. The loaded cartridges are passed back into the lower chambers of the carrier, each half-revolution by the action of the magazine-spring and its follower.

I provide a swinging gate *m* to close the opening 32, and this gate is opened during a quarter-revolution of the carrier, and it is open wide when the empty shell is brought down opposite the opening by the carrier, and as the carrier is suddenly stopped the inertia of the empty shell carries it out through the opening 32, after which the gate *m* is released and the gate swings down again and closes the opening 32. The spring 37, Fig. 8, screwed upon the magazine, acts against the crank 36 of the front axis 35, Fig. 15, of the carrier G to close the gate *m* when it is released, and when this gate *m* is closed the lower chamber of the carrier is ready to receive the next loaded cartridge as it is passed into the carrier from the magazine. It is to be borne in mind that in this arm all the movements of the mechanism necessary for loading and firing are effected and controlled by one movement of the trigger backward and forward, as will be more fully described.

The block *b*, Figs. 31 and 34, is recessed for the reception of the axis *g* of the carrier and cut away or notched for the carrier-shaft pinion and stopping-square, and the carrier-shaft is kept in place by a metal piece covering its rear bearing, which is held in place by a pin through the block *b*.

The gate *m*, Figs. 37, 38, and 39, is provided with arms 33 and 34 at front and rear, and the rear arm 34 is hooked and the carrier-shaft *g* passes through the hook, and the front arm 33 has a square hole, Fig. 39, for the axis 35, which axis is in line with the shaft *g* of the carrier, and the rear end of this axis 35 is round and enters a round hole in the front end of the carrier, upon which axis the carrier is supported and can revolve but as the arm 33 is affixed to the square portion of the axis 35 it moves in unison with the gate and is not moved by the revolution of the carrier. This axis 35 passes through the receiver B^2 between the barrel and the magazine, and it has a crank-arm 36, Figs. 37 and 55, and the spring 37, screwed upon the magazine C′, Figs. 8 and 37, acts at its free end against the crank-arm 36 and tends to close and keep closed the gate *m*. The gate *m* is opened against the action of this spring at the right moment by the alternate action of one of the two gate-lifters, Fig. 55. Each gate-lifter is formed by an arm 40, projecting from the cylindrical portion that passes into and through the hole 41, Figs. 55, 12, and 15, through the carrier, and are connected together by a screw passing through the cylindrical portion; but the rear sides of the carrier are slotted longitudinally, so that the arms of the lifters in the rear of the cylindrical portions just described are free to move a small distance across the axis of the carrier, and in the rear arm 34 of the gate *m* is a groove or slot 44.

When the breech mechanism is at rest, the parts are in the positions shown in Figs. 32, 54, and 55, so that when the carrier revolves one lifter 40 on the left-hand side, Fig. 55, passes down under and strikes against the under side of the gate-arm 34 and lifts the same and swings open the gate, and as the carrier completes the last portion of its revolution the opposite lifter 40 runs down upon a cam 45, Figs. 31, 32, and 54, which cam is upon the front end of the block *b*, and the lifters are moved laterally across the axis of the carrier so as to bring the lifting-arm 40, that opens the gate, into line with the segmental groove 44 of the gate-arm 34, so as to allow the spring 37 to instantly close the gate *m*. It will be seen that the gate is opened wide as the carrier is completing its half-revolution, and there is no obstruction to prevent the empty cartridge from being promptly ejected, after which the gate closes instantly and automatically.

In the upper part of the breech-bolt L is a groove, Figs. 18 and 19, for receiving the cartridge-extractor spring 50, Fig. 20, and in the lower portion of the bolt is a groove for receiving the extractor-spring 51, Figs. 21, 22, and 23. The forward ends of these springs are hooked, so as to catch hold of the rim at the butt of the cartridge-shell, and there are grooves in the carrier G for allowing the lower extractor 51 to pass freely backward and forward with the breech-bolt. These extractor-springs are firmly fixed at their rear ends to the bolt by pins passing through them into the breech-bolt. The firing-pin *n*, Figs. 58, 59, and 24, passes through the center of the breech-bolt in line with the axis of the barrel, and there is a lateral projection *n′*, with a cam-head n^2, at the rear end of the firing-pin, and upon the disk G′, Fig. 45, there is a cam striker or hammer n^3, which, striking against

the firing-pin cam n^2, projects the firing-pin forward against fulminating-cap of the cartridge and explodes it immediately after the cam-stud l^4, Figs. 8 and 13, has run under the projecting stud l^5 on the toggle-links to lock the toggles and breech-bolt against such recoil. These movements take place when the main-spring, acting through the chain and eccentric chain-wheel T, developes the greatest leverage and power.

Upon the side of the breech-bolt is pivoted the retracting-lever 86, Figs. 58 and 59, the upper end of which retractor passes into a recess 88 in the slideway B^{12} when the parts are in the proper position for firing, and the lower end of the retractor rests against the projecting arm n' of the firing-pin, so that when the breech-bolt is drawn backward the retractor 86 is carried with it and is partly rotated upon its pivot 87, and the lower end forces backwardly the projecting arm and firing-pin and the extreme front end of the firing-pin is drawn back into the bolt and retained there till the moment of firing. Hence there is no danger of the firing-pin exploding a loaded cartridge in the forward movement of the breech-bolt while the cartridge is being forced into the barrel. The slideway B^{12} is secured to the strap B by screws, and it is made removable to allow for the insertion or removal of the breech-bolt.

The trigger F′, Fig. 8, is made with or connected to a sliding piece F^2, that slides in a recess at the left side of the block *b*, and the trigger-spring F^3, which is V-shaped or folded, acts at one end against a pin 60 upon the trigger to press the trigger forward, and the other end acts against a pin 61 upon the safety-lock O, which lock is pivoted, as aforesaid, upon the screw *d* in a mortise in the tie-block B^4, and the spring acts to press it backward and upward, and the upper end 63 of the safety-lock is swung out through a mortise in the strap B at the small portion of the receiver, and there is a lateral bar or finger 64, Fig. 43, projecting from the trigger across the path of the disk G′, and this disk is cut away or notched between 66 and 67, Figs. 8 and 45, so that the projecting bar 64 prevents the trigger from being pressed forward by the action of the spring F^3 until the end 67 of the notch has passed above the projecting bar 64, so that the trigger cannot go forward and allow the tumbler K to revolve and the toggles to unlock until the explosion has been accomplished. By this device the arm is made perfectly safe, so that the trigger cannot act except when the parts are in proper position for firing, no matter how fast the trigger may be pulled.

Upon the forward end of the trigger-slide F^2 is the block 70, and upon this block the tumbler K is arrested in its revolution until the firing has taken place, as shown in Fig. 8, there being a flat bearing behind the point 26 of the tumbler K, as shown in Figs. 40 and 56, to rest upon the block 70 and stop the revolution of the tumbler.

In Fig. 8 the parts are in the position assumed after the firing has taken place, the trigger still being in its backward position, and when the pressure on the trigger F′ is released the spring F^3 slides the trigger and all its parts forward and the bar 64 of the trigger passes under the part 67 of the disk G′, while the block 70 passes forward and away from under the tumbler K and said tumbler is free to make a partial revolution until the end 26 of the tumbler is arrested by the hooked rear portion f^3 of the trigger and the end 66 of the notch is just below the finger or bar 64 of the trigger, and the parts remain in this position until the trigger is pulled. When the trigger is in this forward position, the safety-lock O swings upwardly, so that the end 63 projects through the strap B and the part 65 upon the lower portion of the safety-lock is behind and against the rear projecting end of the trigger. Hence the trigger is locked and cannot be moved or the gun fired except by properly grasping the firearm around the small portion of the receiver, in doing which the inside of the thumb of the grasping-hand presses inwardly the projecting part 63 of the safety-lock and throws down the end 65 below the projection of the trigger, so that the trigger can now be pulled back, liberating simultaneously the fingers 64 from the notch in the disk G′ and drawing back the hook f^3 out of the path of the point 26 of the tumbler K and allowing the parts to be revolved, and in so doing the carrier receives a half-revolution, carrying down and ejecting the empty cartridge and elevating a loaded cartridge from the line of the magazine to the line of the barrel, and then the breech-bolt, coming forward, projects the loaded cartridge into the barrel, the toggles are locked, and the hammer strikes the firing-pin to fire the cartridge.

In the upper surface of the strap B′ at the rear of the magazine C′ is the spring-catch 85, Figs. 8, 51, 52, and 53, recessed into the surface of the metal. The projecting forward end of this spring serves to detain the cartridges in the magazine while the carrier is being revolved and the gate *m* opened, and the front end of this spring adjacent to the rear end of the magazine is provided with an arm extending outward under the gate 85, Fig. 16, so that when the gate is thrown down it strikes against the arm 85 and presses the spring and holds it down, so that the next loaded cartridge in the magazine is pressed backwardly into the carrier by the action of the magazine-spring. It will be apparent that the convex segments upon the side plates D and D′ allow for the revolutions of the carrier and the cartridges and shells slide upon the inner surfaces of these convex segments in their movements during the revolutions of the carrier.

The notch in the convex segment of the

plate D′ allows the thumb-piece or handle, Figs. 27 and 39, of the gate to swing up the necessary distance, and the gate may be opened by hand when it is desired to insert or remove a cartridge or cartridges by pressing against this thumb-piece.

The parts 31 of the carrier G extend but a short distance back from the forward end of said carrier, and hence the bullet of each cartridge rests in a semicircular recess and cannot be thrown too far by the inertia when the carrier stops; but the ball is held in line with the barrel and the rear end of the cartridge cannot become displaced because there is a projection b^7, Fig. 26, upon the inner face of the side plate D, that forms a curved continuation of the inner surface of the recess, so that the proper space is left for the base of the cartridge between the recess of the carrier and this projection b^7.

When the cartridge is projected backwardly from the magazine into the carrier its movement is arrested by the forward end of the block *b;* but, as seen in Fig. 8, there is considerable space between this block and the rear end of the carrier. The object of this space is to allow for assembling the carrier and also to prevent the carrier coming into contact with the ends of the retractors 50 and 51, as they project beyond the end of the block *b* after they have drawn back the cartridge-shell into the carrier, and from which retractors the shell is taken off laterally and then a cartridge is brought up between them and in front of the firing-pin to be projected into the barrel. I also remark that the bottom of the arm n^2, that projects from the firing-pin, rests upon the top part of the block *b*, so as to support this arm against the downward action of the hammer-cam as it revolves in contact therewith.

The part B′ of the receiver is cut away adjacent to the bottom of the gate *m*, so that there is no ledge or projection upon which sand or foreign substances can accumulate.

It will be apparent that most all the features of improvement in this firearm are not necessarily dependent upon the chain as the connection between the spring-barrel and tumbler axis. I have shown and prefer the chain; but bevel gear-wheels may take the place of the chain-wheels, and a shaft, with bevel-gears at its ends gearing into such bevel-wheels, may take the place of the chain to connect the spring-barrel and tumbler-axis.

I claim as my invention—

1. The combination, with the gunstock and the cheeks, of the spring and spring-barrel for actuating the moving parts of the gun, a winding-crank attached to the axis of the spring-barrel, and a sliding crank-handle adapted to pass into a hole in the stock when the crank is in line therewith, substantially as set forth.

2. The combination, with the stock, the cheeks, and the spring and spring-barrel for actuating the firing mechanism in the gun, and a winding-crank, of the stop-wheel pivoted upon the cheek and having teeth upon its periphery, the finger upon the axis of the spring-barrel for turning the stop-wheel in one direction and a projection upon the spring-barrel for turning the stop-wheel in the other direction, and a projecting pin for blocking the rotation of the stop-wheel, substantially as set forth.

3. The combination, with the straps or receiver, spring and spring-barrel, and the connections to the moving parts in the firearm, of the side plates D D′ D^2 D^3, beveled at their ends, and the screws *d* for holding the plates to the straps or receiver of the gun, substantially as set forth.

4. The combination, with the spring and spring-barrel in the stock and the chain for actuating the firing mechanism in a gun, of a breech-bolt and carrier in the rear of the barrel, a tumbler, and a chain-wheel that is eccentric to the axis of the tumbler, and a link connecting the tumbler and breech-bolt, substantially as set forth.

5. The combination, with the spring and spring-barrel in the gunstock, wheels, and connections therefrom for actuating the firing mechanism in a gun, of the revolving tumbler and an axis on which the same revolves, the trigger, and trigger-slide below the tumbler and having a block and hook, forming an escapement for the end of the revolving tumbler, substantially as set forth.

6. The combination, with the revolving tumbler, the trigger, and the trigger-slide, of a safety-lock acting behind the trigger-slide and having an end that projects through a a mortise in the strap or receiver at the small of the stock, substantially as and the purposes set forth.

7. The combination, with the spring, spring-barrel, chain, and chain wheels or connections for actuating the firing mechanism in a gun, of a notched disk G′, the tumbler K, having an axis upon which the disk G′ and chain-wheel are attached, the trigger, the trigger-slide, the finger 64, projecting laterally at the rear of the trigger-slide and acting in connection with the notched disk G′, the safety-lock O behind the trigger-slide, pivoted in the block B^4 and having the projection 65 adjacent to the rear end of the trigger-slide, and the spring F^3, acting between the safety-lock and the trigger-slide, substantially as set forth.

8. The combination, with the breech-bolt, the tumbler, and the link connecting the breech-bolt to the tumbler, of a spring, spring-barrel chain, and chain wheels or connections for revolving the tumbler, a carrier and sectional gearing for rotating and holding the same, and a swinging gate covering an opening in the housing, and means for opening the swinging gate to allow the cartridge-shell to pass out, substantially as set forth.

9. The combination, with the barrel and magazine, of the carrier and means for revolv-

ing the same, and the side plate D′, having an opening adjacent to the carrier, the swinging gate to close the said opening, the axial pin 35, connected with the same, the crank 36 upon the axis 35, and the spring 37 for closing the gate, substantially as set forth.

10. The combination, with the revolving carrier and the swinging gate, of a spring to close the gate, and the gate-lifters sliding transversely across the axis of the carrier, and a cam for moving the gate-lifters, substantially as set forth.

11. The combination, with the breech-bolt, of a revolving tumbler and link for moving the breech-bolt, toggle-arms for supporting the breech-bolt against the recoil, a disk connected to and revolving with the tumbler, a stud upon the disk for holding the toggles during the explosion of the cartridge, and a hammer upon the disk, and a firing-pin sliding through the breech-bolt, substantially as set forth.

12. The combination, with the magazine, the revolving carrier, the breech-bolt, and the firing-pin within the same, of a hammer to act upon the firing-pin, and a retractor pivoted upon the breech-bolt and acting to withdraw the firing-pin as the breech-bolt is moved back, substantially as set forth.

13. The combination, with the magazine and the revolving carrier, of a swinging gate covering the opening through which the cartridge-shell is ejected, and a retaining-spring at the rear end of the magazine to keep the cartridges in the magazine, against which the gate acts as it is closed, substantially as set forth.

14. The combination, with the spring-barrel and spring in a magazine-gun, of an axis for the spring-barrel and a winding-crank permanently connected together, and a pawl to engage one notch in the axis for holding the parts with the winding-crank against the side of the stock, substantially as specified.

15. The combination, with the sliding breech-bolt having grooved sides, of the receiver-strap B, grooved on its under side to form a slideway for the breech-bolt and having one portion B^{12} below the fixed portion of the strap B removable to allow for the insertion of the breech-bolt, substantially as set forth.

Signed by me this 18th day of April, A. D. 1887.

FRANK REES.

Witnesses:
GEO. T. PINCKNEY,
W. L. SERRELL.