No. 709,881. Patented Sept. 30, 1902.

V. P. DE KNIGHT.

AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.) 7 Sheets—Sheet 1.

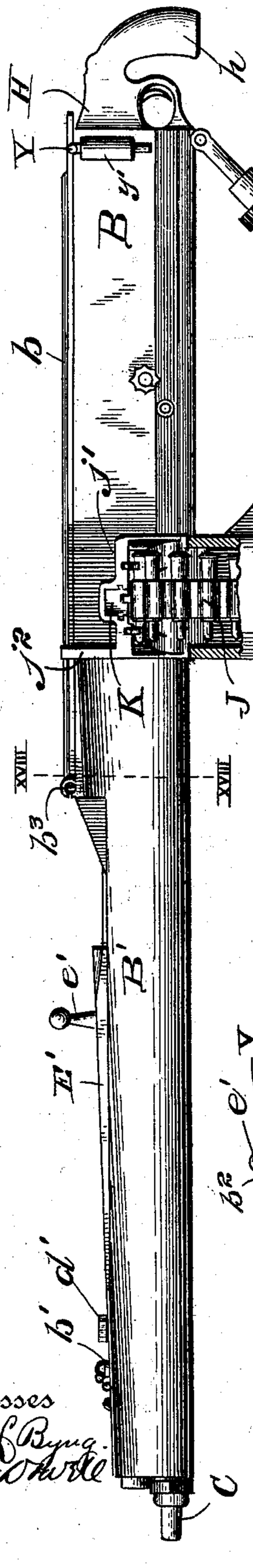

Fig. 1.

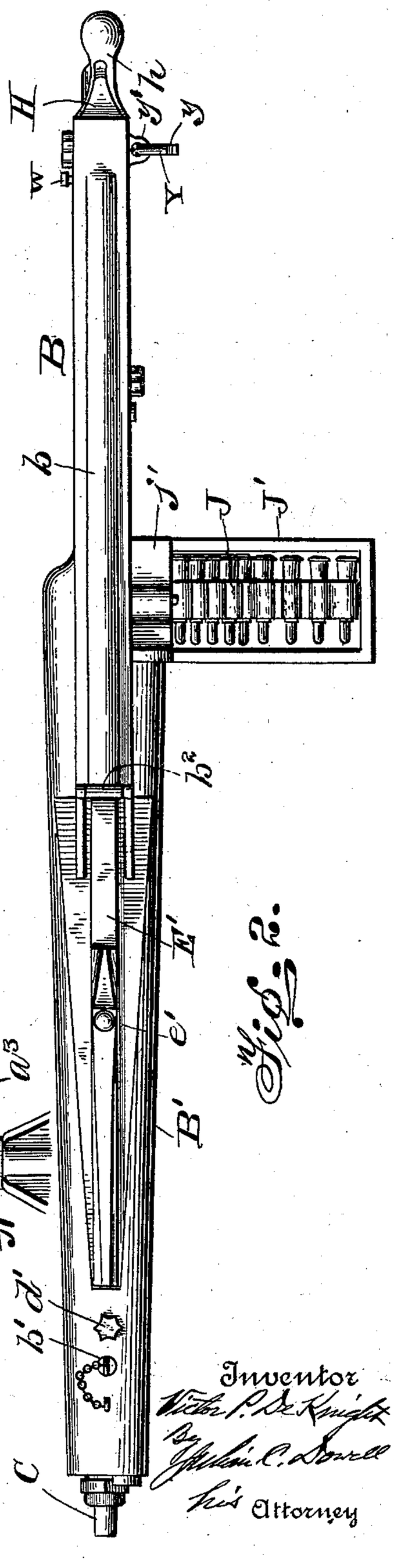

Fig. 2.

Fig. 4.

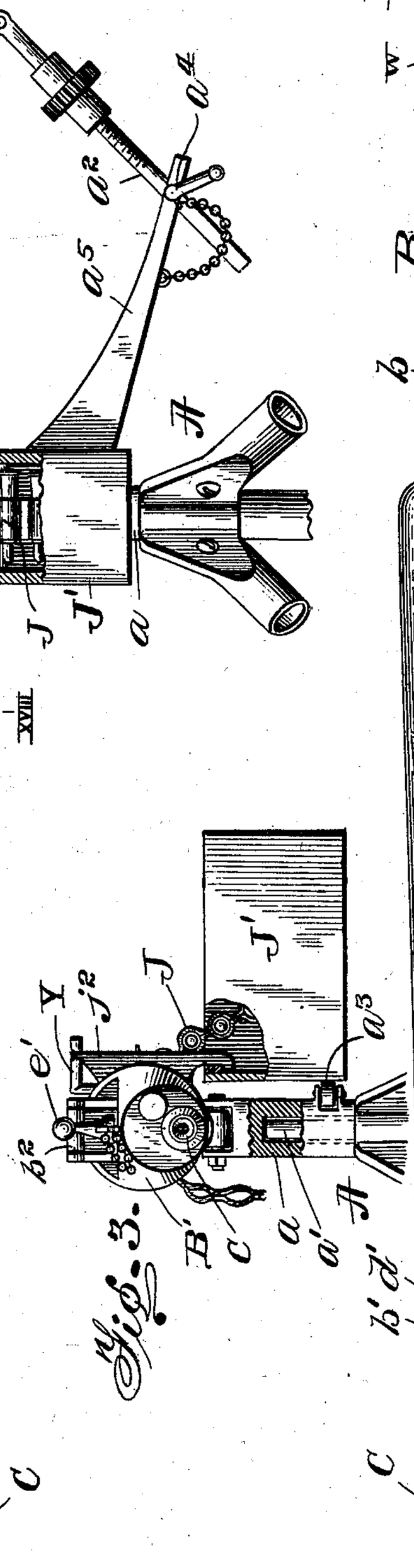

Fig. 3.

Witnesses
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No. 709,881. Patented Sept. 30, 1902.

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AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.) 7 Sheets—Sheet 2.

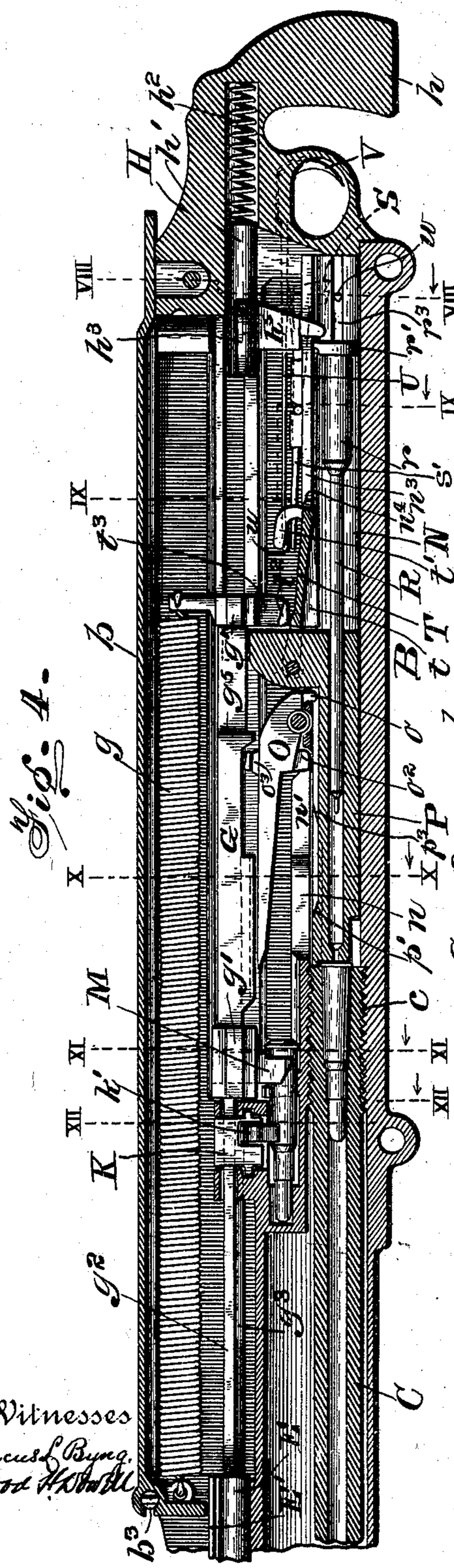

Fig. 4.

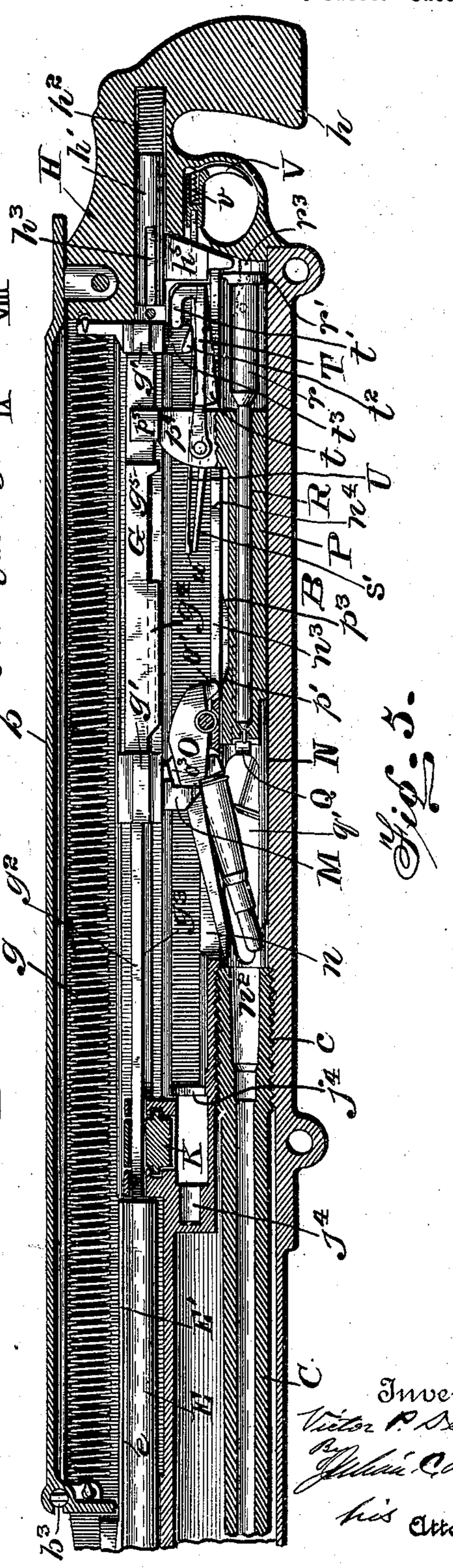

Fig. 5.

Witnesses
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No. 709,881. Patented Sept. 30, 1902.

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AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.) 7 Sheets—Sheet 3.

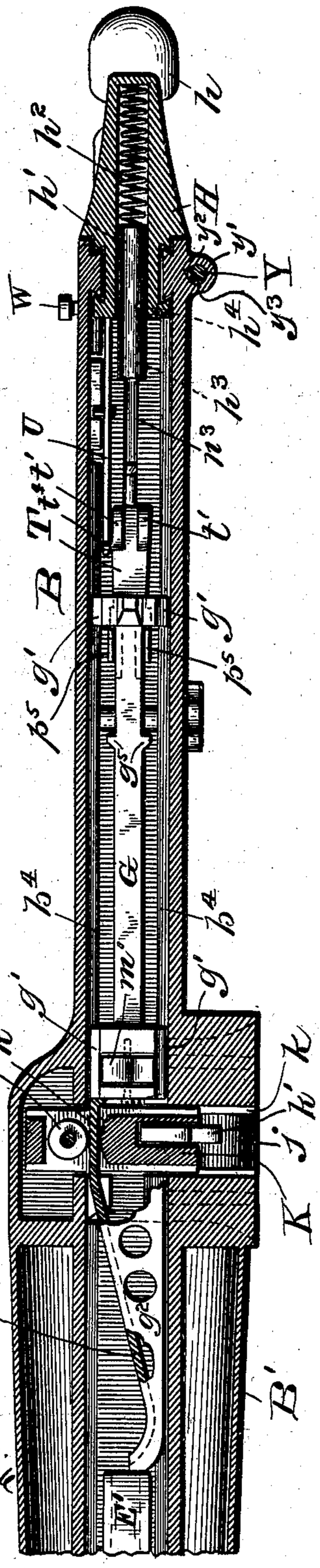

Fig. 6.

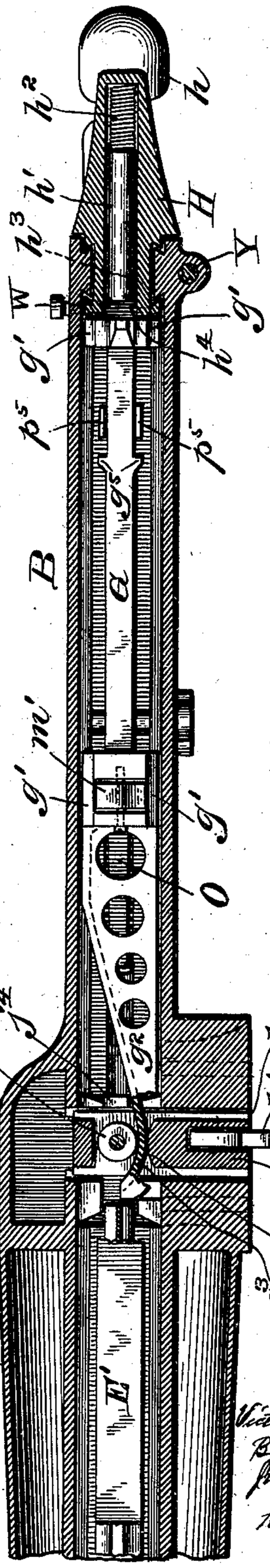

Fig. 7.

Witnesses
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No. 709,881. Patented Sept. 30, 1902.

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AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.) 7 Sheets—Sheet 4.

Fig. 8.

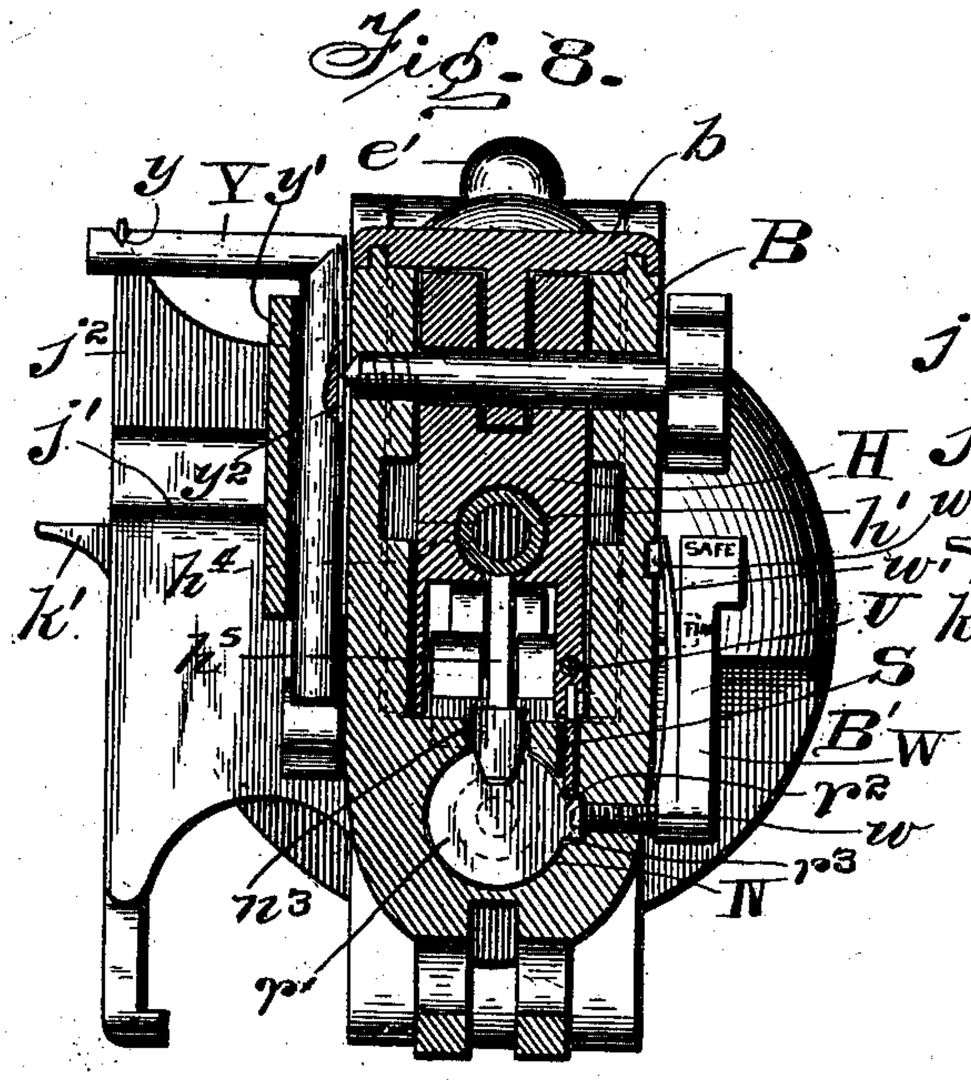


Fig. 9.

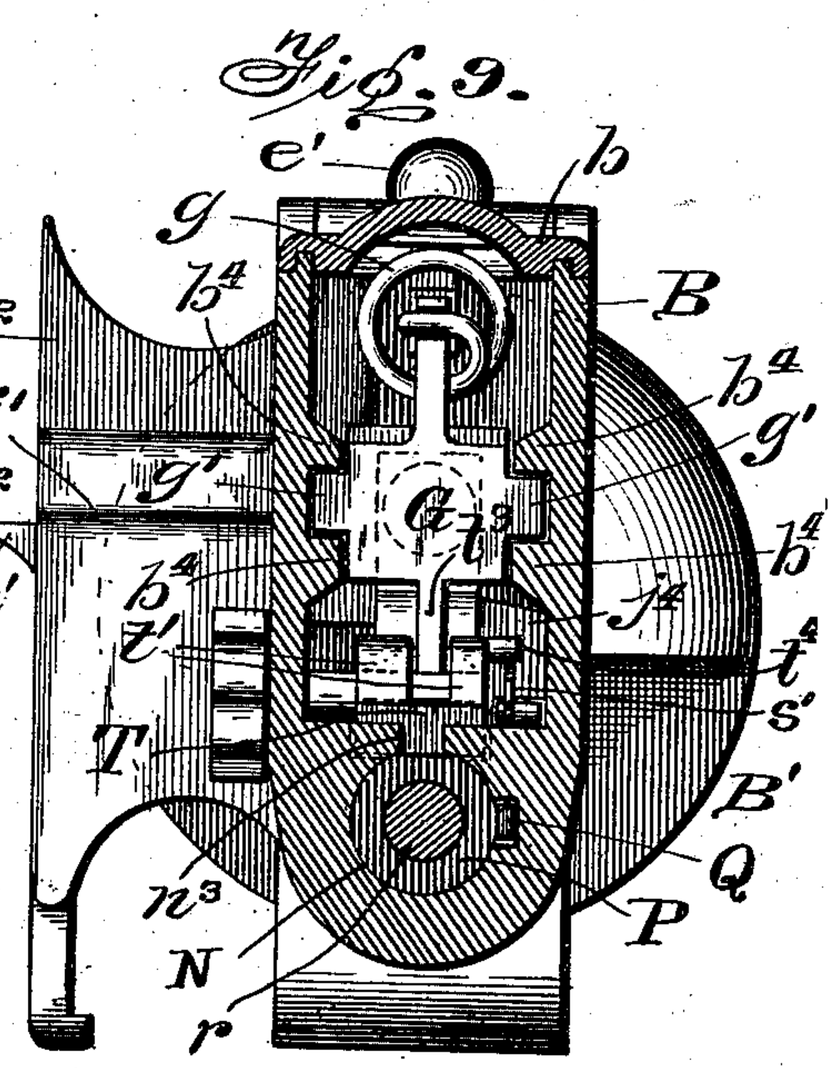


Fig. 10.

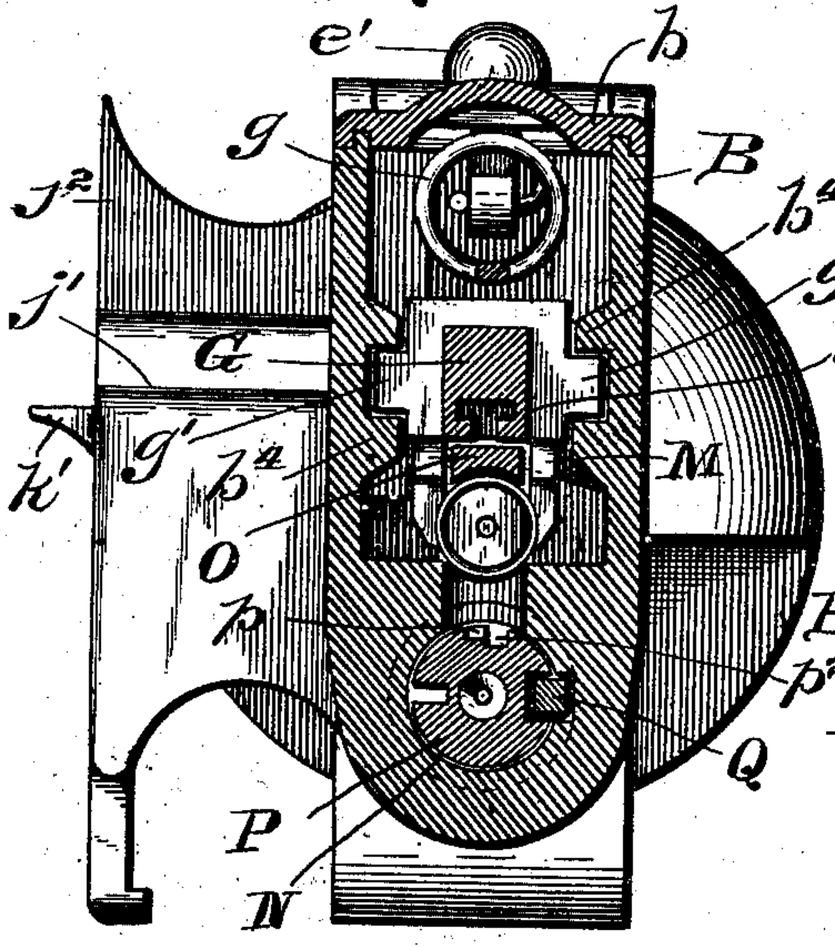
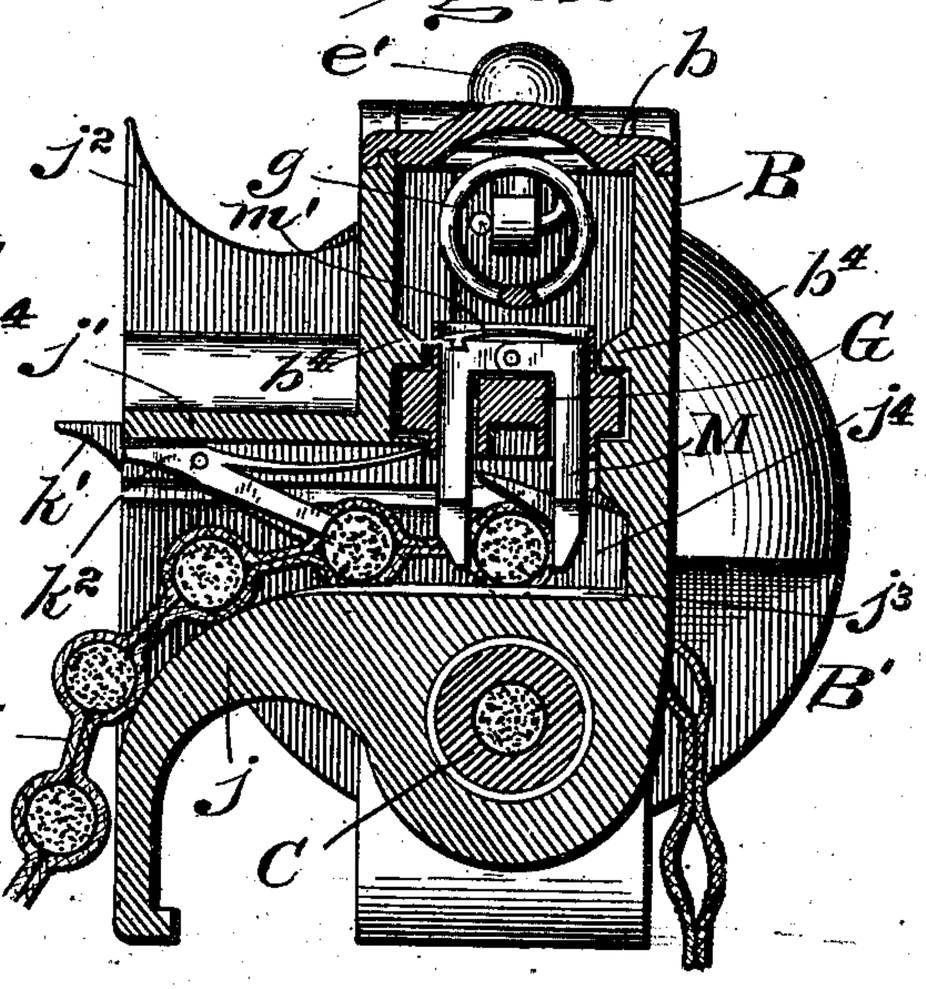


Fig. 11.



Witnesses
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AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.)

7 Sheets—Sheet 5.

Fig. 12.

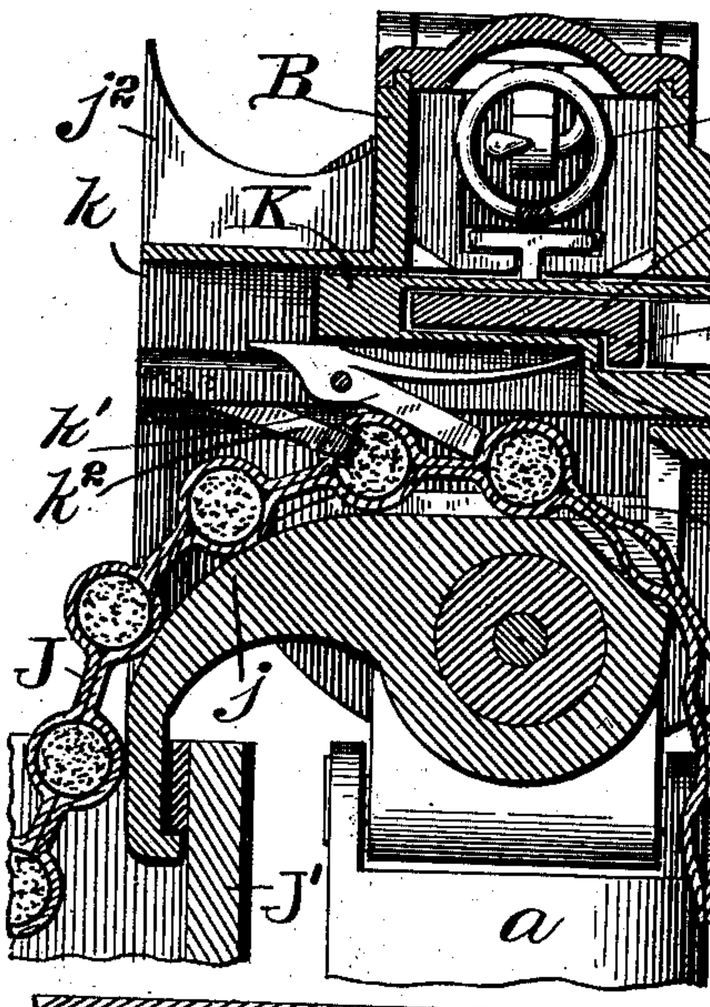

Fig. 13.

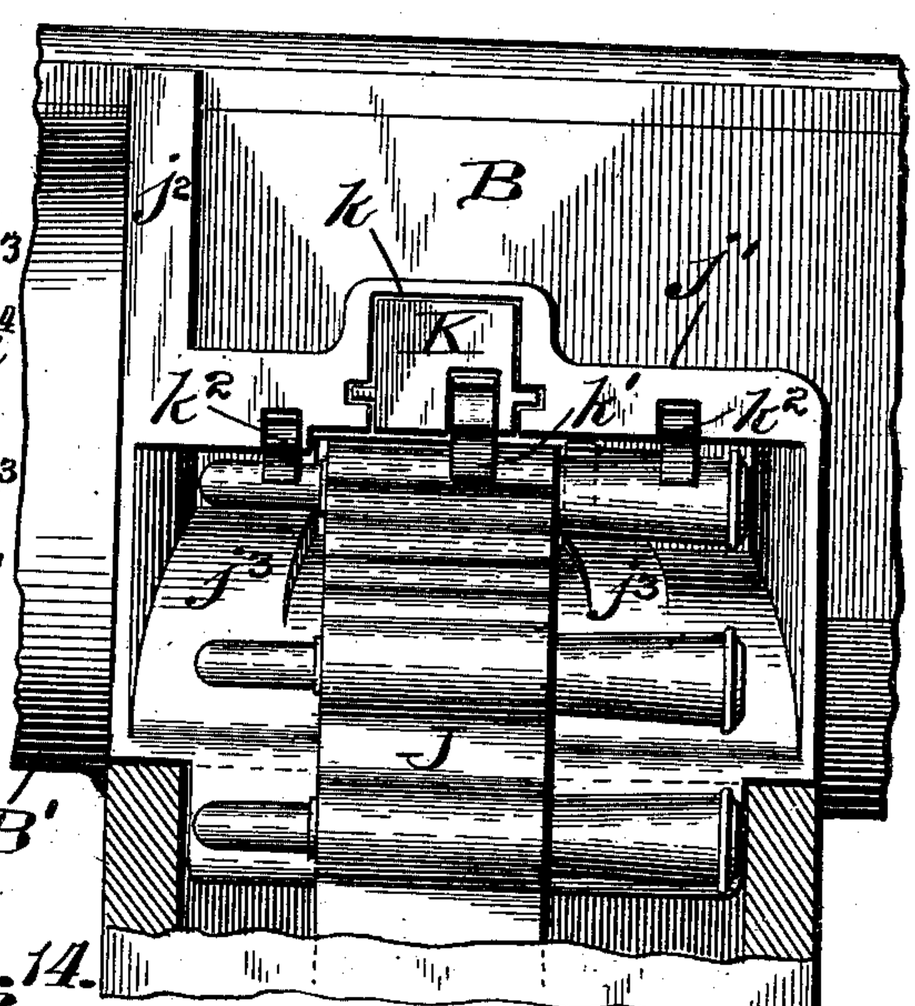

Fig. 14.

Fig. 15.

Witnesses
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No. 709,881. Patented Sept. 30, 1902.

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AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.) 7 Sheets—Sheet 6.

Fig. 16.

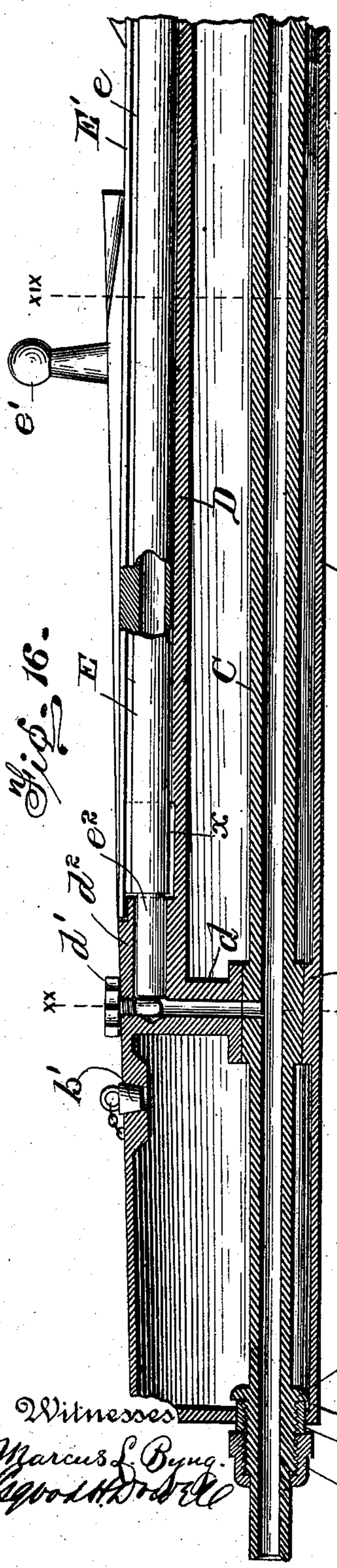

Fig. 17.

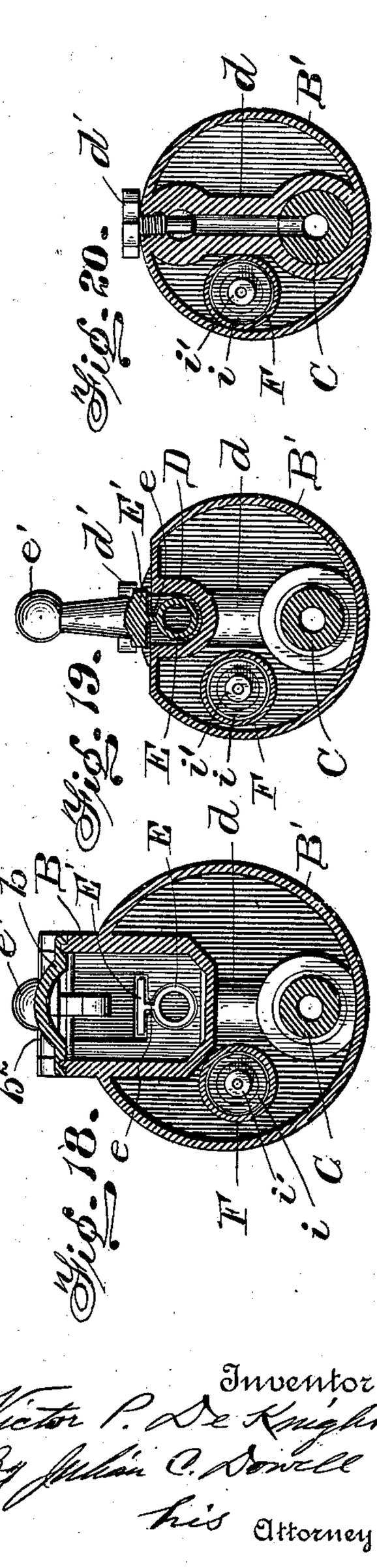

Fig. 18.

Fig. 19.

Fig. 20.

Witnesses
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No. 709,881. Patented Sept. 30, 1902.

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AUTOMATIC RAPID FIRE GUN.

(Application filed Sept. 12, 1900.)

(No Model.) 7 Sheets—Sheet 7.

Fig. 21.

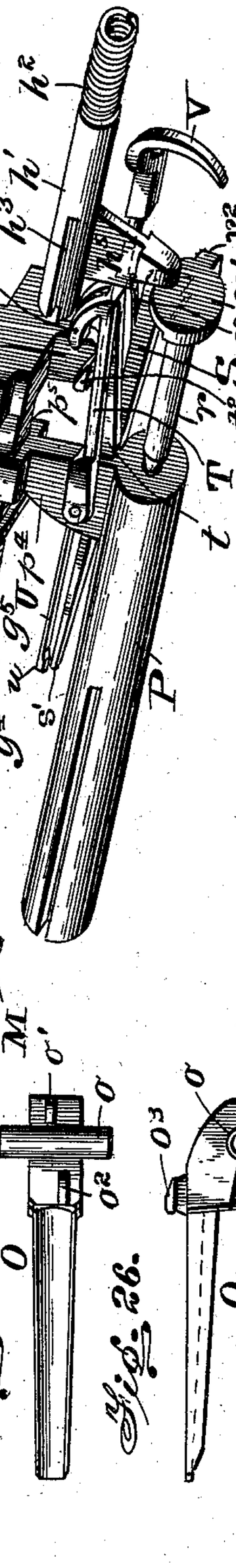

Fig. 22.

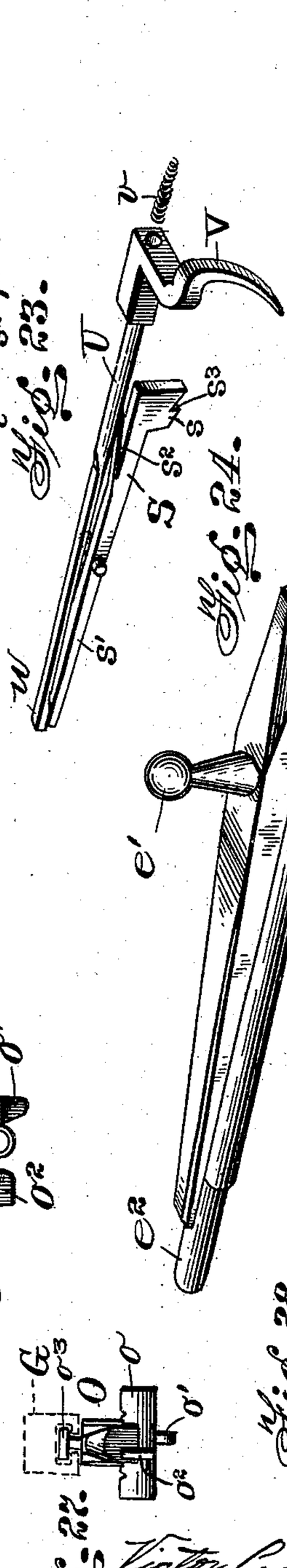

Fig. 23.

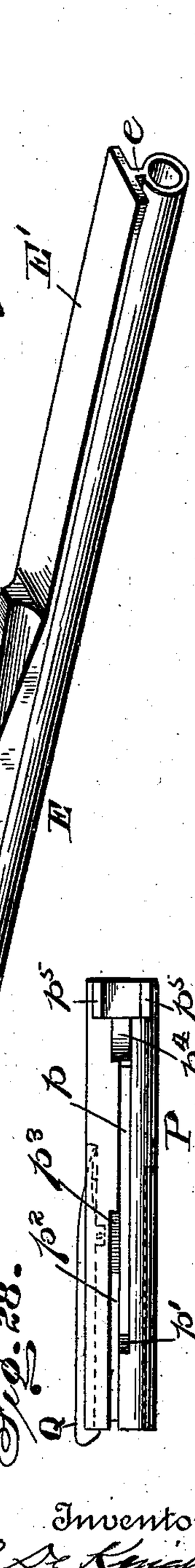

Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

Fig. 28.

Witnesses
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Osgood H. Bissell

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UNITED STATES PATENT OFFICE.

VICTOR P. DE KNIGHT, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE VICTOR P. DE KNIGHT GUN COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF DELAWARE.

AUTOMATIC RAPID-FIRE GUN.

SPECIFICATION forming part of Letters Patent No. 709,881, dated September 30, 1902.

Application filed September 12, 1900. Serial No. 29,854. (No model.)

To all whom it may concern:

Be it known that I, VICTOR P. DE KNIGHT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Automatic Rapid-Fire Guns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to breech-loading ordnance or rapid-fire machine-guns, and more particularly to gas-operated guns of the character shown and described in a prior application filed by me September 5, 1900, Serial No. 29,072, though some features of my present invention are susceptible of a general application and may be used with good results in other classes of guns.

The primary objects of the present invention are to produce an efficient and durable rapid-fire gun consisting of a few strong and simple parts, rendering the gun as a whole comparatively light, to adapt the parts to be readily and quickly assembled or detached, so as to facilitate cleaning or repairs, and to render the operations of the gun direct and to improve the general features thereof over prior constructions of similar character.

A further object is to provide reliable and efficient means for actuating the cartridge-feeding mechanism by the direct and positive action of the actuator for the breech mechanism, and likewise breech-block, breech-block lock, cartridge-depressor, and actuating mechanism; all of which parts shall be of the simplest order and without the numerous and cumbersome details with which prior contrivances of a similar character are usually burdened, such mechanism being so constructed as to insure the desired operation in firing either automatically or at will.

A further object is to provide trigger and sear devices consisting of a few simple parts employing an easily-manipulated reciprocating wedge-like extension or tongue adapted to release the firing-pin, which is mounted in the breech-block in rigid connection with the stem of the hammer, and to adapt the latter to be positively held by the sear to be released only when the breech-block is securely locked in position.

A further object is to utilize the retractile force of a spring which serves as a buffer or cushion to receive the backward thrust of the actuator and breech-block as a means for impelling the hammer and firing-pin when the latter is released by the sear.

The invention will hereinafter be first more particularly described with reference to the accompanying drawings, which form a part of this specification, and then pointed out in the claims at the end of the description.

In the drawings, in which corresponding parts in different views are denoted by the same reference-letters, Figure 1 represents a side elevation of a machine-gun embodying my invention, parts of the ammunition-box and supporting-tripod being broken away. Fig. 2 is a top plan view of the gun. Fig. 3 is a front elevation thereof, partly in section. Fig. 4 is a vertical longitudinal sectional view through the receiver, showing the breech-block locked in firing position and the firing-pin in flight. Fig. 5 is a similar sectional view showing the breech mechanism retracted to loading position with a cartridge in position to be dropped down back of the cartridge-chamber and in advance of the breech-block, also showing a portion of an ejected cartridge-shell. Fig. 6 is a horizontal sectional view of the receiver, showing the reciprocatory slide-bar or actuator advanced and the cartridge-feed slide in position to permit a cartridge to be engaged by the extractor-fingers carried by the actuator, part of the water-jacket being broken away. Fig. 7 is a similar view showing the actuator in its rearmost position. Figs. 8, 9, 10, 11, and 12 are cross-sections taken on the lines VIII VIII, IX IX, X X, XI XI, and XII XII, respectively, of Fig. 4. Fig. 13 is a detail side view of the cartridge-feeding devices as shown looking into the feed-passage. Fig. 14 is a detail vertical sectional view, on a slightly-enlarged scale, through a part of the receiver, showing the cartridge depressing and rocking arm depressed with its front end pointing a car-

tridge into the cartridge-chamber or breech of the gun-barrel. Fig. 15 is a detail view, in horizontal section, through a portion of the receiver, showing a cartridge-shell in the act of being ejected. Fig. 16 represents a vertical sectional view of the water-jacket and parts connected therewith broken away from rearward integral parts. Fig. 17 is a plan view of the same partly in horizontal section. Fig. 18 is a cross-section taken on the line XVIII XVIII of Fig. 1. Figs. 19 and 20 are cross-sections taken on the lines XIX XIX and XX XX, respectively, of Fig. 16. Fig. 21 is a detail side view, partly in section, of a broken-away portion of a modification of the water-jacket and parts connected therewith. Fig. 21ª is a detail view of the detachable hand-pull shown in Fig. 21. Fig. 22 is a perspective view of the reciprocatory structure, including the actuator and parts operatively connected therewith, for actuating the cartridge-feeding and breech mechanism. Fig. 23 is a perspective view of the trigger devices and sear detached. Fig. 24 is a perspective view of the gas-operated piston, having a cover and operating handle or pull-piece thereon. Figs. 25 and 26 represent an inverted or bottom plan view and a side elevation, respectively, of the cartridge-depressing rocking arm or lever. Fig. 27 is a rear view of the cartridge-depressing arm, indicating in dotted lines a connection between the same and the actuator for maintaining the arm in a raised or horizontal position while the cartridge is being carried back to be placed in the cartridge-chamber; and Fig. 28 is a plan view of the breech-block.

In its general features and mode of operation the gun herein shown and described is similar to the gun illustrated and described in my aforesaid pending application; but its operating parts have been greatly reduced in number and the general arrangement and construction of parts simplified, thus reducing the original cost of manufacture, as well as the cost of renewal and repairs, while increasing the efficiency of the apparatus and rendering it more reliable, accurate, and certain in operation.

In the form here shown the gun is supported upon a tripod, which is denoted by the letter A in the drawings, it being pivotally mounted upon the upper end of a sleeve or hollow post *a*, Fig. 3, which is rotatably fitted upon the stem or reduced portion *a'* of the tripod. An extensible rod a^2, having a turnbuckle or other adjusting device thereon for varying the length of the rod and thereby changing the elevation of the gun, may have one end pivoted to the receiver B, while its other end is detachably connected by a suitable clamp or adjusting device a^4 with an arm a^5 projecting from the rotatable support or sleeve *a*, so that said rod may be easily and quickly extended when it is desired to tilt or rock the gun on its pivot to a considerable extent for quickly varying its inclination or elevation, the turnbuckle serving as a means for slowly changing the elevation in sighting an object.

The several parts of the gun are inclosed or housed within a casing consisting of a receiver portion B in the form of an elongated trough-like body, open at its top and rear end and adapted to receive the breech mechanism, and a water-jacket B', in which the gun-barrel C, gas-conduit, and piston-cylinder D are inclosed, said jacket being provided with a suitably-located water orifice or inlet which may be closed by a removable stopper, as shown at *b'*. The receiver may be of any suitable construction to accommodate the operating mechanism, but is preferably provided with a removable top plate or cover *b*, which may be hinged or pivoted at one end to the forward portion of the receiver and detachably secured at its other end to the wedge-block at the rear end of the receiver, so as to provide easy access to the breech mechanism contained within the receiver. The water-jacket B' is preferably formed integrally with and as a continuation or forward extension of the receiver, (see Figs. 1 and 2,) and, as will be seen, the construction is such that a space of considerable extent is provided in the upper portion of the receiver to permit a long spring to be used for impelling the actuator, thus prolonging the life of the spring, while the interior of the hollow structure or casing is suitably partitioned and divided into front and rear compartments, adapted for the attachment of the operating mechanism and to separate the water in said jacket from such mechanism.

The gun-barrel C is exteriorly screw-threaded, as shown at *c*, at its breech end and screwed home in a similarly interiorly threaded bore formed therefor in the lower solid front portion of the receiver. The forward end of the barrel protrudes through the front closed end of the water-jacket, and to effect a proper closure about the same said barrel where it passes through said jacket may be slightly enlarged and screw-threaded, and a threaded collar *c'*, tightly fitting an opening therefor in the jacket, may be applied to said threaded portion of the barrel, fitting against a shoulder c^2 thereon and secured in place by a jam-nut c^3, as shown by my pending renewed application, Serial No. 34,803, originally filed July 28, 1898. At an intermediate portion the gun-barrel passes through a socket or sleeve formed, preferably, integrally with the jacket and at the lower end of a hollow post or coupling-piece *d* making connection with the forward end of the gas-conduit D, and said barrel is provided with a port or aperture, which, when the barrel is screwed home in the receiver, registers with the bore of said post or coupling-piece *d*, thereby establishing communication between the bore of the gun-barrel and the gas-conduit. A plug or "choker" *d'* in the form of a set-screw entered through an aperture in the cas-

ing or water-jacket extends into the opening through said hollow post or coupling, so that the size of the opening through which the gases of discharge escape from the gun into the gas-conduit may be reduced or enlarged to regulate the volume of gas acting upon the plunger. A gas-conduit of any suitable form may be secured within the water-jacket; but such conduit is preferably compounded with or formed as an integral part of the water-jacket and has an elongated slit or narrow slot in the upper side thereof extending through the casing to receive a thin web or connecting portion *e*, by which a sliding cover E′ is joined to the piston E, said cover in the normal position of the parts being adapted to cover the slit or opening in the gas-conduit and being provided with a handle or pull-piece *e′* by which it may be manually operated, so that the piston may be operated by hand when it is desired to operate the gun by manual instead of automatic action. To provide means for the escape of burned powder, &c., when the gun is discharged, I preferably cut away a portion of the water-jacket or casing, as indicated in dotted lines at *x* in Figs. 16 and 17, so as to provide an outlet into the open air at a point immediately back of the reduced section d^2 of the gas-conduit in which a reduced portion e^2 of the piston E is fitted, said opening being closed by the forward portion of the cover E′ when the piston is in its foremost and normal position. The piston E preferably consists for the sake of lightness of a main hollow portion fitting the cylindrical portion proper of the gas-conduit and terminating in a reduced solid extension e^2, which in the normal position of the parts occupies the reduced portion of the forward part of said conduit, as shown more clearly in Fig. 16.

The water-jacket in addition to its usual functions may contain one or more tubes F, provided with screw-caps or other suitable covers for the outer ends thereof and adapted to receive an oiler, cleaning material, &c. In Fig. 17 I have shown one of such caps (denoted by the reference-letter I) constructed with a tubular extension *i* to form an oil-tube, in the open end of which is fitted a reversible apertured plug *i′*, having a drip-tube i^2, which extends back into the tube and may bear against a washer i^3 to prevent the escape of the oil. By removing the oil-tube from the casing or water-jacket it may be used for oiling the gun by slightly unscrewing the apertured plug *i′*, or when it is desired that the oil may exude drop by drop upon the surface to be oiled said plug is unscrewed and turned end for end, so that the tube i^2 may be utilized as the exit end of the oiler. That portion of the gas conduit or cylinder which contains the piston proper is preferably cylindrical and extends back a suitable distance to adapt the piston on its backward movement to contact with the forward end of the actuator or reciprocatory bar G for backward impulsion of the latter. The water-jacket is preferably tapered from its junction with the receiver, at which point the latter is suitably chambered to provide a passage-way for the cartridge-belt and to receive a transversely-reciprocating feed-slide and the forward portion of the longitudinally-reciprocating actuator G, the passage for the latter being a continuation of the rear portion of the gas conduit or cylinder E, which continuation is formed integrally with a web or partition dividing the water-space in said jacket from the passage-way for the feed-slide and cartridge-belt. (See Figs. 6 and 7.) A substantial wedge-block H may close the rear end of the receiver, forming the rear end of the gun-stock and adapted to be slid into place by dovetailed grooves in the sides thereof fitting similarly-shaped tongues on the inside of the receiver, or vice versa, thus adapting the wedge-block to receive the force of the blow from the backward stroke of the gas-impelled structure or actuator and breech-block, to be presently described, without danger of breaking or separation from the receiver. The rear end of the wedge-block may be conveniently provided with a handle or grip-piece *h* and socketed to receive a buffer *h′*, which is backed by a spring h^2 in said socket, so as to cushion the piston-operated structure on its backward stroke, the force exerted in compressing said spring being subsequently utilized in actuating the firing-pin.

The top plate or cover *b*, hinged or pivoted at its forward end, may be conveniently secured at its rear end in any suitable manner, but preferably by means of an apertured lug depending therefrom entering a socket in the wedge-piece H to receive a fastening-pin entered through the receiver, so as to secure the top plate, wedge-block, and receiver together. For convenience in removing the cover its forward end may be formed with a bifurcated portion or tongue b^2, fitting between upstanding apertured lugs or ears on the receiver, through which is inserted the fastening-pin b^3, the latter being flattened between said ears, so that when screwed home it is adapted to hinge and confine the cover to the casing or receiver; but when the latter is raised to a vertical position the flattened portion of the fastening-pin will pass through the slotted tongue or bifurcated portion of the cover, permitting the latter to be removed without removing the pivot-pin. The spring *g* for impelling the actuator may be secured at one end to a depending lug on the forward end of the cover, while its rear end is secured to an arm or lug at the rear end of the actuator, such connections being readily detachable, so that by disengaging the connection with the actuator the spring may be removed or turned up out of the way with the cover to afford access to other parts in the receiver. The actuator G may be conveniently braced and guided in its reciprocatory movements

by lateral projections or tongues g' thereon at its rear and intermediate portions confined in longitudinal guideways at each side of the receiver, which guideways may be conveniently formed by longitudinal strips, grooves, or ribs b^4 above and below said lateral projections or tongues. In order to strengthen the walls of the receiver and brace the same against forces from within or without, the cover is preferably provided on the under side thereof near its edges with longitudinal grooves to receive corresponding tongues or ribs on the sides or upper edges of the receiver around the top thereof, as shown more clearly in Figs. 8 to 12.

The gas-conduit through which the gases of discharge are conveyed from the muzzle end of the gun-barrel to the operating or breech mechanism preferably occupies the upper portion of the water-jacket and may be compounded therewith, though it may be formed in a separate part and otherwise located and secured therein. As shown in Figs. 16 and 17, the water-jacket and gas-conduit are formed integrally with the coupling piece or post which spans the interior of the jacket, said conduit having a reduced portion to receive the stem e^2 of the piston E and continuing thence in cylindrical form for a sufficient distance to provide a suitable cylinder for said piston, and also cut out at the top, as before stated, at the point x to provide for the escape of the spent gases and smoke and burned powder from the gas-conduit.

In Fig. 21 I have shown a water-jacket formed in different diameters or two tapered sections B^2 B^3, the latter being a continuation of the former, but of reduced diameter, and a cylinder D′ for the gas-operated piston formed integrally with the larger section B^2 and terminating at a point considerably removed from and disconnected with the gas-conduit proper, which in this instance may take the form of an elbow D^2, formed integrally with the smaller section B^3 of the water-jacket and having a horizontal portion adapted to receive the forward reduced end of the piston E^2, the conduit D^2 communicating with the bore of the gun-barrel through a tubular plug D^3, entered through one arm of the elbow-shaped gas pipe or conduit and provided with a port communicating with the latter and regulated by a valve or choker D^4, as described with reference to Fig. 16. This construction provides for the free escape of the spent gases and smoke and burned powder from the gas-conduit directly into the open air without liability of being blown into the cylinder. The piston E^2 in said modification is made solid and provided with a hand-pull or handle e^3, inserted through a mortise or slot therein and adapted to be readily inserted or withdrawn when not in use. To prevent loss in case of dropping out when the gun is in automatic action, this hand-pull may be attached to a chain e^4, one end of which is secured to the water-jacket in order that it may be kept in convenient reach for use when desired. When the piston or plunger E or E^2 is acted upon by the gases of discharge, it slides back, so that its reduced end or portion is entirely clear of the forward portion or section of the gas-conduit at the side of the cut-out or space opposite the cylinder for the gas-operated piston, and thus a free escape for the spent gases, &c., into the open air is provided, which are thus carried off from the gun instead of entering the receiver, where they would blacken and otherwise injure the operating mechanism contained therein. The slide-bar G or actuator above mentioned constitutes one member or part of the gas-impelled structure, which is impelled backwardly at each discharge of the gun and then impelled forwardly by the retractile force of a spring in which power is stored by the backwardly-impelling force, thus effecting a backward and forward or reciprocating movement of the actuator at each discharge of the gun, so as to effect the reloading and firing either automatically or by hand. It will be observed that by means of the front and rear lateral projections or tongues g' on the bar G, fitting between the longitudinal guides or grooves in the sides of the receiver, said bar is braced and supported at its intermediate portion and at a point where lateral strain thereagainst is greatest to prevent warping and bending thereof by the strains exerted against the bar at each discharge of the gun, thus obviating the necessity for additional means for bracing said slide-bar. If made in one integral structure of the required length, the slide-bar or actuator and piston under the strain to which the actuator is subjected will be liable to be injured by bending or warping at the junction of said parts, and hence they are preferably made separate or independent, which also lessens the cost of manufacture. The blow of the backward stroke of the bar G is received by the safety-block H through the medium of the cushioning device or buffer in said block, as before mentioned. Said buffer preferably consists of a reciprocatory tubular body h', backed by a spring h^2 and having a slot h^3 therein to receive a set-screw or pin h^4, by which the forward movement of the buffer is limited, though other suitable cushioning means may be employed.

A rearward stroke of the bar G is necessary for the loading of the gun, and in the present instance the manipulative means employed for effecting such stroke at the outset may consist of a simple hand-pull or handle e', Figs. 16 and 17, or e^3, Fig. 21^a, carried by the piston or plunger, as hereinbefore explained, though in some cases it may be desirable to connect such hand-pull directly with the actuator G, as in my aforesaid application, such handle extending through a slot in the side of the receiver. With this construction a rearward stroke of the bar G may be obviously effected by means of the

aforesaid handle, and hence by rapidly manipulating said handle rapid firing of the gun may be manually effected, the regulating-valve or choker d' being first screwed down to cut off the gases of discharge and prevent them from acting against the plunger.

The cartridges are fed to the gun in a belt J, to each side of which they project to a considerable extent. Said belt passes transversely through the receiver in a passage-way formed over the rear portion of the gun-barrel, as shown, suitable openings being provided in the receiver for the entrance and exit of the cartridge-containing and empty portions of the belt, respectively. At the side where the belt enters the solid lower portion of the receiver is preferably formed or provided with a lateral curved or rounded projection j, over which the belt slides smoothly into its passage-way, and above said projection with a horizontal ledge or lateral extension j', which may terminate at its forward end in the upright portion or sight j^2 and at its rear end in a downwardly-turned portion uniting with the projection j, thus forming a casing for the entrance of the belt. To support the belt so as to reduce the weight of the portion to be carried by the feed-slide and also to protect the same, said belt is preferably contained in a feed-box J', which may be supported from the projection j of the receiver, said feed-box having an internal lug or cleat engaging a supporting-lug on the projection j, as shown in Fig. 3, while its lower portion bears against the tubular socket a through the medium of an interposed friction-roller a^2, pivoted in ears or lugs on said socket, as shown in Fig. 3, the feed-box being thus readily detachable. The passage-way between the openings through the receiver-walls is suitably channeled to accommodate the cartridge-belt, while the cartridges ride upon ledges j^3, left along each side of said channel and of sufficient height to slightly raise the belt to prevent frictional contact thereof with the bottom of the passage, the forward one of said ledges being preferably higher than the other, so that the cartridge, resting with its flanged head on the rearward ledge and its ball on the other, will be held horizontal. Said ledges may merge outwardly into the curved surface of the projection j and terminate in internal stops or shoulders j^4 within the receiver, one or both of which may be provided with an outwardly-projecting portion adapted to overlie the cartridge entering beneath it to prevent the latter from rising, said shoulders and ledges thus forming a throat to receive the cartridge, as illustrated in Fig. 11. The ledges j^3 also preferably converge slightly toward their inner terminals, so that the rear stop or shoulder is left considerably forward of the flanged head of the cartridge, where it will not interfere with the action of the extractor-fingers in extracting the cartridge from the belt.

The letter K denotes the feed-slide, which is slidably supported by suitable means within a slot or recess k above the passage-way through the receiver and equipped with a spring-pressed feed-dog k', which when the slide moves outward slips past the cartridge next to be advanced, while on the inward movement said dog drops down far enough to effectively engage the belt back of the pocket containing said cartridge to shove the belt the required distance into the receiver, the said feed-dog being preferably positioned to act against the cartridge which is to be extracted. Backward movement of the cartridge-belt during outward movement of the feed-slide may be prevented by means of suitable spring-pressed pawls or catches k^2, pivoted in slots or recesses in the ledge or horizontal projection j and arranged to stand behind the cartridge next to the one being extracted.

A reciprocatory movement is imparted to the feed-slide for the purpose of feeding the belt of cartridges by the direct action of the reciprocatory actuator or slide-bar G, and to this end a forward extension or part g^2, forming a continuation of said slide-bar, may be passed through a slot in said feed-slide, so that when the actuator is advanced or moved forward the cartridge-belt will be advanced or moved so as to place a cartridge in position to be extracted by means carried by said actuator. In the form shown the continuation or extension g^2 of the actuator is in the shape of an angle-bar having a main horizontal portion and a pendent portion or flange g^3, Fig. 6, fitting a correspondingly-shaped slot or recess in the feed-slide, so as to provide a shoulder k^3 on the slide at one side of said flange, which shoulder is preferably rounded for engagement with said flange, while a friction-roller k^4 may be journaled on the opposite side to engage the opposite side of the flange or edge of the actuating-bar, said flange serving as a cam to move the feed-slide back and forth as the actuator itself is reciprocated across the path of movement of the actuator. The flange or cam portion g^3 may consist, essentially, of a part lying parallel with the actuator adapted to hold the feed-slide stationary at the limit of its inward or forward movement and an inclined portion extending from said parallel portion to nearly the end of the extension g^2, so that when the actuator is moved forward it will advance or move the slide K inward, carrying the cartridge-belt a distance into the receiver, while backward movement of the actuator will effect a reverse movement of the feed-slide. Other connections may be provided between the feed-slide and actuator for effecting a reciprocatory movement of the former across the path of the latter by the direct action of the actuator; but the construction shown is simple and may be advantageously employed. The part g^2 for the sake of lightness and strength may be made

comparatively wide and provided with a series of perforations therethrough decreasing in diameter from the wider toward the narrower portion thereof, as shown in Figs. 6 and 7. The feed-dog carried by the feed-slide is preferably provided with a finger-piece or extension, so that in case two cartridges have been fed at the same time into the throat of the passage for the cartridge-belt by improper manipulation of the hand-pull or handle on the piston or plunger said dog may be raised to permit it to ride over the second cartridge, which may then drop back to its proper place, said dog being spring-pressed and adapted to yield to permit the dog to slip easily past the cartridge next to be advanced by it.

It will be observed that the feed-dog engages the cartridge-belt on the forward movement of the feed-slide about midway the cartridge, thus obviating the necessity of using more than one feed-dog, though more than one may be employed, if desired, and said dog is also positioned out of the way of the extractor-fingers, so as not to interfere with their movement in extracting a cartridge from the belt. It will also be observed that the feed-dog is here shown positioned to act against the cartridge which is to be extracted instead of the one next to the same, such construction permitting the use of a very short feed-slide, conducing to compactness and dispensing with an abutment-piece at the tail end of the belt for the dog to engage when feeding the last cartridge into the throat. By the described construction a strong and durable connection is made between the actuator and the feed-slide, while the number of parts is reduced to a minimum. Any suitable means may be employed for extracting the cartridge from the belt; but I preferably employ extractor-fingers M, supported upon the actuator G, as shown in Fig. 11 and particularly described in my above-named application, said fingers being provided with inwardly-extending portions, which are pivoted together, as shown, and a spring m', secured at one end to one of the fingers, while its free end bears against the other finger, tending to normally press the fingers together or toward each other. Inward movement of the fingers is limited by contact with the sides of the bar G and outward movement by contact with the sides of the vertical slots or openings in the actuator, through which said fingers may extend, as shown. These fingers are so positioned with reference to the movement of the feed-slide that upon the forward stroke of the bar G a cartridge will be lodged in the throat just before being reached by said fingers and the inner oblique faces of the fingers contact with the head of the cartridge, the spring m' yielding to permit the lowermost edges thereof to pass the flange, so that upon rearward movement of the bar G the fingers will extract the cartridge from the belt and carry it to a point back of the gun-barrel to be placed in position to be shoved into the cartridge-chamber by the forward movement of the breech-lock. To this end a suitable chamber or slideway N is provided in the bottom of the receiver in alinement with the gun-barrel, but of larger bore than said barrel, said chamber being provided in its upper portion just back of the gun-barrel or breech with an opening n of sufficient size to permit the passage of the cartridge except at the rear end of said opening, where ribs or protuberances n' form a contraction thereof to prevent the flange of the cartridge from passing through when in its rearmost position, so that the cartridge may rest with its flanged head on said ribs, as indicated in Fig. 14, from which position when moved slightly forward said flanged head will clear the ribs n' and allow the cartridge to drop down into the chamber in position to be advanced by the breech-block and shoved into the cartridge-chamber n^2.

The letter O denotes the rocking arm or depressor, by means of which the cartridge is lowered from the extractor-fingers on the rearward movement of the breech-block and directed into the chamber or slideway N, said arm being pivoted a short distance back of the rear end of the opening n. In the form shown the arm is provided with a tubular portion o to receive the pivot-pin in the form of a thumb-bolt to adapt it to be easily removed, said pivot-pin entering suitable apertures in the receiver and bridging the slideway N. The arm O is arranged so that it may be held normally in substantially a horizontal position, and its lower side is preferably dished or concave to conform to the curvature of the cartridge and slightly inclined or tapered from the rear thereof. Its forward end when the arm is elevated or raised will occupy such a relation to the extractor-fingers M that the latter in moving rearward may engage the flange of the cartridge and carry it underneath the arm in position to be deposited or dropped down into the slideway or chamber directly in rear of the cartridge-chamber. To depress said arm for the purpose of directing the cartridge into the chamber or slideway N, with its front end pointed and in position to enter the cartridge-chamber, as indicated in Fig. 5, a lug or projection o' on the arm O back of its pivot is adapted to engage a longitudinal groove or slot p in the breech-block P, said groove terminating in a cam portion or incline p' at a point adapting it on the backward movement of the breech-block to engage said projection o' and depress the arm the instant the latter is released by the actuator or slide-bar G, as will be explained in a moment. A second lug or projection o^2, depending from the rocking arm in front of its pivot, is adapted to engage a slot or groove p^2 in the breech-block P, running parallel with the groove p and terminating in a cam portion or incline p^3, oppositely arranged with respect to the in-

cline p', so that on the forward movement of breech-block the projection o^2 will be engaged by said inclined portion p^3, (the projection o' meanwhile occupying the groove p,) thus elevating or raising the arm to the position indicated in Fig. 4. By these simple means the cartridge-depressing arm is positively actuated by the breech-block for the purpose of depressing said arm when the breech-block has moved rearwardly far enough to clear the space for the cartridge, and said arm is raised to a horizontal position when the breech-block advances for the purpose of shoving the cartridge into the cartridge-chamber and at the same time positioning the arm to receive another cartridge to be extracted on the backward movement of the actuator. It will be observed that when the arm is depressed by the breech-block the cartridge will be thrown into a position with its front end in line with the bore of the barrel or cartridge-chamber, said arm thus constituting a guide for pointing the cartridge and insuring its proper entrance into said chamber as the breech-block is advanced, as indicated in Fig. 14. In order to retain the arm for the proper length of time in either its raised or depressed position, so as to insure the proper manipulation of the cartridge for pointing and directing it into the cartridge-chamber, said arm is adapted to be positively engaged by the actuator and held up or in its horizontal position, and also in its depressed position, as the actuator is reciprocated. For this purpose I have devised a very simple contrivance, the construction and operation of which are illustrated more clearly in Figs. 4, 5, and 14. As shown in said figures, a depending portion g^4 of the actuator or slide G is provided with a T-shaped slot open at both ends and adapted to receive a similarly-shaped upstanding projection or cross-head o^3 on the arm o when the breech-block and actuator are moving backward and the arm is in its normal horizontal position, thus holding the arm up or in a raised position until the engaging parts between the same and the actuator are released or disconnected, whereupon the breech-block will have traveled sufficiently backward to provide a clearance in the chamber back of the breech to receive the cartridge, and the cartridge-depressing arm will then be tripped by the breech-block, pointing and directing the cartridge into the cartridge-chamber, as indicated in Fig. 5. To maintain the arm in the latter position until the fore end of the cartridge has entered the cartridge-chamber, the under side of the part g^4 of the actuator is adapted to engage a cam-like surface on the projection or cross-head o^3 when the actuator moves forward, as indicated in Fig. 14, thus preventing the arm from rising until disengaged by the actuator, at which time the breech-block will have shoved and seated the cartridge in the cartridge-chamber sufficiently to permit the arm to be raised, and thereupon the arm will be released by the actuator and raised by the breech-block into position to receive another cartridge. By this simple means the breech-block and actuator are adapted to coact in positively placing the cartridge and pointing it in position to be pushed into the cartridge-chamber and in maintaining the cartridge-depressing arm immovable in either a raised or depressed position. To prevent too sudden or violent action and consequent injury to the parts, the cam-surfaces or inclines on the breech-block will of course have such slant that the arm will be raised and lowered gradually during the movements of the breech-block, but properly and accurately and in time to be engaged by the actuator, while the latter will release the arm in proper time to be actuated by the breech-block. The extent to which the arm may be rocked may be limited by contact of its under side portions with the top plate of the chamber N, the tubular portion o being lower than said contacting portions and occupying a tubular bearing or depression in said top plate. This construction is strong and efficient and avoids the necessity for extra limiting-stops. For convenient use as a screw-driver, when needed the forward end of the rocking arm may have a screw-driver point, and when detached the projecting journal portion o will serve as a handle for the screw-driver.

The breech-block P may be of the form shown or of any suitable construction. As shown, it carries a rearward upstanding arm p^4, which projects through an elongated slot n^3 in the upper side of the chamber N and is formed at its upper end with bifurcations p^5, which loosely embrace the bar or actuator G between the rear guide or cross-head and the shoulders g^5 thereof, so that the bar G travels a certain distance in both its rearward and forward movements before the breech-block is moved, the U-shaped construction of the head of the arm p^4 permitting the breech-block to be readily detached from said bar. The breech-block is centrally bored to receive the firing-pin and stem R of the hammer, connected thereto or integral therewith, which firing-pin and stem extend through said block, forward movement of the hammer being properly limited by reason of the abutment of the forward end of its stem against a shoulder within the breech-block, and, if desired, an enlarged portion r at the rear end of said stem and which may be styled the "hammer" proper may abut the rear end of the breech-block or other suitable stop. The hammer-stem is also provided with a cross-head r', here shown formed on the enlarged portion r, said cross-head fitting the chamber N and having a lug or projection r^2, projecting through a slot or groove r^3, provided therefor in said chamber, which lug when the breech-block carries the hammer to its rearward position, Fig. 5, slips past the beveled or inclined portion s of a sear S, suitably pivoted inside of the receiver, and on the forward movement of the

breech-block is engaged and held by the sear until released. The lug r^2 also serves as a guide to prevent the hammer from turning. The hammer is normally pressed forward by means of the buffer-spring in the wedge-block H, the buffer being provided with a depending arm or lug h^5, which stands behind the cross-head r', so that said buffer-spring is held compressed so long as the hammer is restrained by the sear, this construction thus dispensing with extra parts for impelling the hammer forward when the sear is tripped and utilizing the actuator and breech-block cushioning devices for actuating the firing-pin. To each side of the arm p is pivoted an arm or bifurcation of a breech-block locking-piece T, movable with and behind the breech-block and having a depending flange or stop t to limit the downward movement of the arm and take the strain off the pivot-bolt. The part t may be slidable as a guide in the slot n^3, which slot is enlarged at a suitable point, as at n^4, to permit the rear end of said locking-piece T to drop down far enough to lock the breech-block in its foremost or firing position, as shown in Fig. 4. Said locking-piece has two forwardly-curved arms t', (though one might be used,) which when the bar G moves rearward are encountered by a releasing device t^2, carried by an arm t^3, depending from the actuator G or the rear cross-head thereof, the said arm t^3 entering between the said curved arms t' (when two arms are used) and the lugs or cams t^2 beneath them, thus lifting the locking-piece and unlocking the breech-block, which when the shoulders g^5 of the actuator encounter the upstanding arm p is slid rearward.

The sear S has a tailpiece or extension s' at the opposite side of its pivot, and said sear is normally pressed downward by means of a flat spring s^2, preferably formed integrally therewith and adjacent its pivot, said spring pressing upon a rod or trigger-piece U, which has a wedge portion u at its forward end in contact with the tailpiece s' of the sear. The trigger-piece U is entered into the receiver from a chamber in the wedge-block H, where it is attached to the trigger V, the trigger being slidable in said chamber and normally pressed forward by a suitable spring, as v. A lug or pin t^4 projects from one of the arms t' of the locking-piece T, before mentioned, so as to overlie the rod or trigger-piece U and ride against the same when the breech-block moves forward. (See Figs. 6 and 9.) While the trigger remains in its normal position the sear remains in position to prevent releasing of the hammer; but on pulling the trigger the wedge portion of the trigger-piece U is drawn toward the pivot of the sear, entering between the finger t^4 of the breech-block locking-piece and the tailpiece s' of the sear, thus rocking the sear on its pivot and releasing the hammer, so that the firing-pin may be driven against the cartridge, which operation will be repeated in automatic action each time the locking-piece T locks the breech-block until the trigger is released. It will thus be seen that very simple and effective firing mechanism is provided, while the parts are few in number and compactly arranged. The disposition of the parts above the chamber N also obviates the necessity of providing an additional chamber to house the same, reducing the size of the receiver, and said mechanism is readily accessible through the top of the receiver, thus dispensing with extra removable plates, as where the mechanism is arranged below the breech-block. When the gun works automatically, the blow of the shoulders g^4 of the bar G against the arm p^4 of the breech-block is sufficient to shove the breech-block to the limit of its rearward movement, so that the cross-head r' of the hammer R is carried behind the sear, as explained; but when the gun is manually operated said cross-head may not be carried behind the sear, and a notch s^3 is therefore preferably provided in the beveled edge of the sear to engage the lug r^2 and restrain the hammer when the gun is so operated.

The breech-block may also be provided with a spring-pressed finger or catch Q for extracting the empty cartridge-shell on the backward movement of the breech-block, and for coöperation therewith in ejecting the empty shell a set-screw q may be entered through an aperture in the side of the casing, with its inner end protruding into the chamber end in position to engage the head of the shell as the breech-block moves back, so that said shell will be ejected through a suitable opening, as at q' in the receiver, just before the breech-block reaches the limit of its rearward movement (see Fig. 15) and while the next cartridge is still above the chamber formed between the breech and breech-block.

The cartridge having been delivered by the arm O into the position shown in Fig. 5 with its point or bullet end resting upon a suitable seat or guide at the entrance to the cartridge-chamber, it will be encountered by the breech-block on the forward movement of the latter and slid along until its flanged head clears the ribs n', whereupon the cartridge will drop down in front of the breech-block, its flanged head entering the circular recess therein, and said recess will close upon said head, owing to the high speed of the breech-block. The ball end of the cartridge being properly supported upon the fixed guide or seat at the entrance to the cartridge-chamber and of suitable height to direct the cartridge into said chamber, the cartridge will be thus properly pointed and pushed into proper place to receive the impact of the firing-pin. The forward part of the breech-block on its under side may be cut away, as shown in Fig. 5, so as to ride over the guide or seat for the pointed end of the cartridge at the entrance to the cartridge-chamber. When the breech-block lock closes the breech, the catch Q will snap over the flange of the cartridge and on the

rearward movement of the block will extract the empty shell, which will be ejected, as already explained, by contact with the screw *q*, the side of the breech-block adjacent to said screw being suitably recessed or grooved to permit the passage of the breech-block without encountering the end of the screw.

In order that the firing-pin and hammer may be locked to prevent accidental or a premature discharge when the gun is not in use, I provide a safety device, which may consist of an upright arm W, having a screw *w* extending therefrom through a screw-threaded aperture in the base of the receiver and extending into the groove or slot r^3 in front of the lug or projection r^2 on the cross-head of the hammer. When the arm W is in a vertical position, as shown in Fig. 8, the end of the screw *w* will protrude into the path of the head of the hammer or the lug r^2 thereon and lock the same against forward movement; but when the arm is turned, say, a quarter-revolution the screw will be withdrawn out of the path of the hammer-head, so as to permit the latter to operate. As a convenient means for holding the arm W in a vertical or inclined position, with the hammer locked or unlocked, as may be desired, said arm may have attached thereto or formed integrally therewith a spring *w'*, having a catch w^2 thereon, adapted to engage a catch or notch formed in the side of the receiver at the limit of the forward movement of the arm or a similar catch at the limit of its backward movement, so as to lock the arm in either of the two positions mentioned, with the hammer locked or unlocked, according to the position of the arm.

The letter Y denotes an L-shaped sighting device, the shorter arm of which is horizontal and provided with a sight-notch *y*, while the upright arm thereof is fitted in a tube or tubular projection *y'* on the receiver and may be held at any desired height by the protruding end of the thumb-screw, which secures the top plate and wedge-block to the receiver, as shown in Fig. 8, the upright arm being vertically grooved, as at y^2, to receive the pointed end of the screw and prevent the arm from turning. A second groove, as at y^3, is provided, so that when desired the arm may be turned partly around to bring the sight-arm parallel with the gun-barrel, in which position it will be held by the thumb-screw engaging said slot y^3.

I thus provide a very efficient automatic rapid-fire gun composed of very few parts as compared with guns of this class heretofore in use and much simplified and improved in construction and the general arrangement of its parts, so that the waste of material and cost of manufacture is decreased, while the durability and efficiency of the apparatus is greatly improved, and the several parts of the gun are adapted to be easily and quickly assembled or taken apart without the use of tools.

It is obvious that various changes may be made in the details of construction and arrangement of parts without departing from the spirit and scope of my invention, and hence I do not desire to be restricted to the exact construction and arrangement of parts shown and described.

The operation of the gun will be readily understood from the foregoing description, taken in connection with the accompanying drawings. A belt of cartridges having been introduced into the passage-way of the receiver, so that the first cartridge is in proper position to be extracted from the belt, and the extractor-fingers having been previously retracted by manipulating the hand-pull or handle on the piston or plunger, so that said fingers may snap over the flanged head of the cartridge, the said handle is drawn back to the limit of its rearward movement, so as to extract the cartridge from the belt, and is then released, so that said cartridge may be introduced into the cartridge-chamber or breech of the gun-barrel and a second cartridge grasped by the extractor-fingers while the breech-block is locked in firing position. The gun is now ready for firing, and by pulling the trigger the wedge *u* will be drawn back between the finger t^4 on the breech-lock or locking-piece T and the tailpiece *s'* of the sear, thereby rocking the latter on its pivot and releasing the hammer, the release of which also effects the release of the cushioning device h' h^2, whereby the hammer is forcibly impelled with the firing-pin by the action of the arm h^5 on the buffer h'. When the ball passes the port in the barrel communicating with the gas-conduit, the gases of discharge will enter said conduit and operating against the plunger forcibly drive the actuating-bar and its attached parts backward against the action of the spring *g* to be advanced by the retractile force of said spring. On the rearward movement of the actuator a cartridge will be extracted from the belt by the extractor-fingers and carried back under the cartridge-depressing arm O, by means of which and the coöperation of the actuator and breech-block, as hereinbefore explained, the cartridge will be properly positioned to enter and then forced into the cartridge-chamber n^2 when the breech-block moves forward into firing position, such block being locked in the latter position by the swinging arm or locking-piece T, which is depressed by contact therewith of the depending arm or cam device t^3 of the actuator when moving forward. At the same time the feed-slide will be moved outward to permit the feed-dog to snap behind the next cartridge in the belt. As the actuator continues its backward movement the releasing device t^2, depending from its rear end or cross-head, will slide under the curved arm or arms *t'* on the locking-piece T, carried by the breech-block, and lift said lock, so as to unlock the breech-block and permit the latter to move back-

ward, which movement is effected by contact of the shoulder or shoulders g^5 on the actuator with the bifurcated portion or upper end of the arm p^4 of the breech-block, thus forcibly driving the latter backward. Before reaching the limit of its rearward movement the actuator contacts with the buffer h', compressing the buffer-spring, and just before the breech-block has reached the limit of its rearward movement it is also cushioned by contact of the rear end of the swinging locking-piece T with the said buffer or the depending arm h^5 thereon. By the rearward movement of the breech-block the empty shell is drawn out of the cartridge-chamber or breech of the gun-barrel and ejected, as previously explained, just before the limit of the rearward movement of the reciprocatory structure is reached and while the next cartridge is still above the chamber formed between the breech and breech-block. During this backward movement the hammer and firing-pin mounted in said breech-block will be backwardly impelled thereby, and the cross-head of the hammer will slip past the sear by the engagement of the lug r^2 on said head with the inclined portion of the sear, whereupon the latter being downwardly spring-pressed will drop down in front of said lug and prevent the forward movement of the hammer until released. As the breech-block nears the limit of its backward movement it rocks the cartridge-depressing arm so as to depress the latter and point the cartridge in position to be shoved into the cartridge-chamber when the breech-block advances. As before explained, the cartridge-depressing arm is held up or maintained in a horizontal position by the engagement of the cross-head o^3 thereon with the T-shaped slot in the actuator, from which it is released just an instant before the breech-block trips the depressor, and on the forward movement of the actuator the depressor is held down or maintained in its depressed position by contact of the cam-faced head of the projection o^3 with the under side of the depending portion g^4 of the actuator until the breech-block has advanced sufficiently to insure the entrance of the cartridge into the cartridge-chamber, whereupon the depressor will be raised by the breech-block and held in a raised position to receive the next cartridge extracted from the cartridge-belt and then as the actuator moves back will be engaged by the latter and held up until the cartridge has been carried to a position to be pointed for entrance into the cartridge-chamber. As the cartridge is shoved into the cartridge-chamber the breech-block is driven home, and the extractor-catch Q snaps over the flange of the cartridge, while the breech-block T locks the breech-block in firing position, the feed-slide having been moved inward in the meantime by the positive action of the actuator, so as to lodge a cartridge in the throat, where it is seized by the extractor-fingers. If the trigger V be now drawn back by the operator, the firing-pin will be released, and the above action will be repeated automatically, repeating the firing of the gun so long as the operator's finger is held against the trigger. To automatically effect the release of the firing-pin the instant the breech-block is locked, the pin t^4 on the curved arm t of the locking-piece T is adapted to ride over and pull down the front end or flexible extension of the trigger-piece U when the latter is resting with its wedge-like terminal u on the rear end of the tailpiece of the sear, and such release at the proper time is insured by the positive action of the actuator, the lower end of the depending arm t^3 of which contacts with an inclined part or shoulder on the locking-piece T, depressing the latter and locking the breech-block, and by the same movement the firing-pin is released.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with the receiver having a transverse passage-way for a belt of cartridges, the actuator for the breech mechanism, the gas-impelled piston for moving said actuator in one direction, and a spring for moving the same in the opposite direction, a slide with means for moving the cartridge-belt having a direct connection with a forward extension of the actuator; said extension having a part arranged at an angle to the line of movement of the actuator and engaging the slide, whereby the latter is reciprocated at each reciprocation of the actuator; substantially as described.

2. In combination with the reciprocatory actuator operatively connected with the breech mechanism, a passage-way through the receiver for a belt of cartridges, a reciprocatory slide having a pawl adapted to advance said belt when the slide is impelled in one direction and to recede to position for engaging another cartridge when the slide is moved in the opposite direction, said slide having a slot therein and a portion of said actuator extending through said slot having a part arranged at an angle to the line of movement of the actuator so as to move back and forth therein for directly operating the slide when the actuator is reciprocated; substantially as described.

3. In combination with the reciprocatory actuator operatively connected with the breech mechanism, a passage-way through the receiver for a belt of cartridges, a reciprocatory slide having a pawl adapted to advance said belt when the slide is impelled in one direction, and to recede to position for engaging another cartridge when the slide is moved in the opposite direction, said slide having an angular slot therein and an angular portion of said actuator extending through said slot so as to move back and forth therein and having a part arranged at an angle to the line of movement of the actuator for directly op-

erating the slide when the actuator is reciprocated; substantially as described.

4. In a rapid-fire gun, a reciprocatory breech-block, in combination with a relatively stationary cartridge-depressing rocking arm, and means on said block for engaging and depressing said arm when the block moves rearward and for raising it when the block moves forward together with a reciprocatory actuator and means carried thereby for engaging and holding said arm in its raised and depressed positions during reciprocatory movement of the actuator; substantially as described.

5. In a machine-gun, the cartridge depressing and pointing rocking arm having adjacent to its pivot, back of the cartridge-manipulating portion of the arm, a pair of pendent lugs arranged in different vertical planes, one on each side of said pivot, in combination with the reciprocatory breech-block having oppositely-inclined portions or cam-surfaces thereon; one of said lugs being arranged in the path of and adapted to contact with one of said inclines so as to depress said arm when moving in one direction, and the other lug arranged in the path of and adapted to contact with the other incline so as to raise said arm when moving in the opposite direction, substantially as described.

6. In a rapid-fire gun, the cartridge-depressing rocking arm having a pair of pendent lugs near its pivot, back of the cartridge-manipulating portion of the arm; one lug being located in front of and the other in the rear of said pivot, in combination with the reciprocatory breech-block having parallel grooves adapted to receive and guide said lugs and terminating in oppositely-inclined surfaces one of which is adapted to contact with one lug and depress said arm when moving in one direction and the other to contact with the other lug and raise said arm when moving in the opposite direction; substantially as described.

7. In a rapid-fire gun, the cartridge-depressing rocking arm having one depending lug in front of its pivot and another in the rear thereof, in combination with an underlying reciprocatory breech-block having longitudinal grooves or slots in its upper surface forming ways or guides to receive said lugs; said slots terminating at opposite ends in oppositely-inclined portions, one of which is adapted to contact with one of said lugs and depress said arm when the breech-block is moving rearward and the other incline to contact with the other lug and raise said arm when the breech-block is moving forward; substantially as described.

8. In combination with the actuator for the breech mechanism operatively connected with the breech-block for imparting a reciprocatory movement thereto, an intermediate cartridge-depressing rocking arm, and means whereby said arm is depressed by the breech-block on the backward movement thereof and raised when the breech-block is moved forward; said rocking arm having a part adapted to be engaged by the actuator on its rearward movement and positively held up until the cartridge has been carried into position for the action of the breech-block, whereupon said arm will be released by the actuator and depressed by the breech-block, for pointing the cartridge to enter the cartridge-chamber; substantially as described.

9. In combination with the actuator for the breech mechanism operatively connected with the breech-block for imparting a reciprocatory movement thereto, an intermediate cartridge-depressing rocking arm, and means whereby said arm is depressed by the breech-block on the backward movement thereof and raised when the breech-block is moved forward; said rocking arm having a part adapted to be engaged by the actuator on its forward movement and positively held down, and to be also engaged on the rearward movement of the actuator and positively held up until the cartridge has been carried into position for the action of the breech-block, whereupon said arm will be released by the actuator and depressed by the breech-block for pointing the cartridge to enter the cartridge-chamber; substantially as described.

10. In combination with the actuator for the breech mechanism and means whereby it is impelled backwardly by a force resulting from a discharge and forwardly by a spring in which power is stored by the aforesaid force, said actuator being operatively connected with the breech-block for imparting a reciprocatory movement thereto, an intermediate cartridge-depressing rocking arm, and means whereby said arm is depressed by the breech-block on the backward movement thereof and raised when the breech-block is moved forward; said rocking arm having a part adapted to be engaged by the actuator on its rearward movement and positively held up until the cartridge has been carried into position for the action of the breech-block, whereupon said arm will be released by the actuator and depressed by the breech-block for pointing the cartridge to enter the cartridge-chamber; substantially as described.

11. In a rapid-fire machine-gun, the combination with the actuator operatively connected with the breech-block, so as to impart a reciprocatory movement to the latter, of an interposed cartridge-depressing rocking arm having a depending lug thereon in front of its pivot and another lug back of its pivot for engagement with the breech-block, and means whereby the latter will engage said lugs and depress said arm when moved in one direction and raise the same when moving in the opposite direction, together with means carried by the actuator adapted to engage an element on said arm and maintain it in a horizontal or raised position until the cartridge has been carried back to a position to be dropped in front of the cartridge-chamber,

whereupon said arm will be released by the actuator and depressed by the breech-block; substantially as described.

12. In combination with the cartridge-depressing rocking arm and means whereby it is depressed by the movement of the breech-block in one direction and raised by the movement thereof in the opposite direction, a projection on said arm having a cross-head and a T-shaped slot in a portion of the actuator adapted to receive the neck and head of said projection when the actuator is moving rearwardly so as to insure a horizontal position of the arm until the cartridge has been carried back to a position to be dropped in front of the cartridge-chamber; substantially as described.

13. In a gas-operated rapid-fire gun, the combination with the receiver for the breech mechanism and the water-jacket having a gas-conduit compounded therewith, of the latter having an elongated slit therein, of a piston working in said conduit, a sliding cover having a connection with said piston through said slit, and a handle or pull-piece for manually operating the piston independently of its adaptability for automatic action; substantially as described.

14. In a rapid-fire machine-gun, the receiver for housing the breech mechanism and an actuator housed in said receiver and operatively connected with said mechanism, in combination with the water-jacket containing the gun-barrel and a gas-conduit compounded with a piston-cylinder having an elongated slit therein, together with a piston working in said cylinder carrying a sliding cover which is connected to the piston through said slit, and a handle or pull-piece connected to said cover to adapt the gun for manual as well as automatic action; substantially as described.

15. In a gas-operated rapid-fire gun, a cradle or receiver for housing the breech mechanism having a water-jacket for housing the gun and connected parts formed integrally therewith; said water-jacket having an integral gas-conduit with a cylinder adapted to receive a reciprocatory piston and a hollow post or coupling-piece connecting with the forward part of the gun-barrel coincident with an aperture in the latter to establish communication with the conduit through said post; substantially as described.

16. In a rapid-fire machine-gun, the receiver consisting of an elongated trough-like body adapted to receive the breech mechanism formed integrally with a water-jacket containing a gas-conduit and adapted to receive a gun-barrel having a port registering with a port communicating with said gas-conduit; substantially as described.

17. In a rapid-fire machine-gun, the receiver consisting of an elongated trough-like body adapted to receive the breech mechanism having a cylindrical water-jacket formed integrally therewith; the latter having a gas-conduit compounded therewith and constructed to receive a gun-barrel having a port registering with a port communicating with said gas-conduit; substantially as described.

18. In a rapid-fire machine-gun, the receiver consisting of an elongated trough-like body, adapted to receive the breech mechanism and having an open top provided with a removable cover and an open rear end provided with a vertically-slidable detachable wedge-block; said trough-like body having a tapered integral tubular extension containing a gas-conduit provided with a port adapted to register with a port in a gun-barrel also contained in said tubular extension; substantially as described.

19. In a gas-operated rapid-fire gun, the combination with a cartridge feeding, loading and firing mechanism and a reciprocatory actuator operatively connected therewith and adapted to be impelled in one direction by a force resulting from a discharge and in the opposite direction by a spring in which power is stored by said force, a gas-conduit having a port communicating with a port in the forward part of the gun-barrel and a piston independent of the actuator fitting a cylindrical portion of said conduit; said piston having a handle or pull-piece for manual operation thereof independently of its adaptability for automatic action; substantially as described.

20. In a rapid-fire gun, the actuator for the breech mechanism consisting of a longitudinally-slidable bar constructed with means for operatively engaging said mechanism and having a forward angular extension having a part arranged at an angle to the line of movement of the actuator for operative engagement with an angular slot in the feed-slide; substantially as described.

21. In combination with the actuator having the angular extension having a part arranged at an angle to the line of movement of the actuator, the feed-slide slotted to receive said extension so as to connect said actuator and slide and adapt them to reciprocate in planes at right angles to each other; substantially as described.

22. In a gas-operated rapid-fire gun, a breech-block having a firing-pin mounted therein, and mechanism for locking the same in firing position and for unlocking them in turn, in combination with an actuator having a limited movement independent of the breech-block, a power-storing cushioning device therefor adapted to first cushion the actuator and then the breech-block as each approaches the limit of its backward movement, and means for utilizing the power thus stored for impelling the firing-pin; substantially as described.

23. In combination with the breech-block and firing-pin carried thereby, and means for locking the same in firing position, the reciprocatory actuator and connections between the same and the breech-block allowing a lim-

ited movement only of one independently of the other, means for cushioning the actuator and breech-block near the limit of their rearward movement; means for imprisoning the power stored in cushioning said devices to adapt said power to be utilized in impelling the firing-pin when it is released, and means for releasing said cushioning means and firing-pin when the breech-block is locked in firing position, substantially as described.

24. In a machine-gun, the longitudinally-bored breech-block carrying a firing-pin movable freely back and forth within said bore, means for locking the breech-block in firing position, a reciprocatory actuator connected to said breech-block so as to impel the same while allowing a limited movement of the one independently of the other, a cushioning device for said actuator independent of the hammer for the firing-pin and adapted to store power when cushioning the actuator to be utilized in impelling the firing-pin when the latter is released, and means for releasing said cushioning device and firing-pin when the breech-block is locked in firing position.

25. In combination with the breech-block carrying the firing-pin and hammer, a reciprocatory actuator for impelling the breech-block having a limited movement independent thereof, means for cushioning said actuator and breech-block, and means for releasing said cushioning device, firing-pin and hammer when the breech-block is locked in firing position; said cushioning means being independent of the hammer but adapted to store power which is utilized in impelling said hammer when the latter is released.

26. In combination with the reciprocatory actuator and breech-block and connections between the same allowing a limited movement only of one independently of the other, a cushioning device adapted to first cushion the actuator and then the breech-block as each of said parts approaches the limit of its rearward movement.

27. In combination with the reciprocatory actuator and breech-block connected together in such manner that one may move independently of the other to a limited extent only, and means for successively cushioning said actuator and breech-block as each nears the limit of its rearward movement and storing the power used in cushioning said parts, means for releasing and utilizing the power stored by said cushioning means in impelling the firing-pin, substantially as described.

28. In combination with the reciprocatory breech-block and the actuator therefor, the firing-pin carrying a hammer and slidable longitudinally in a bore through said block, means for cushioning said actuator near the limit of its rearward movement, and means for utilizing the power stored by said cushioning means for impelling the firing-pin when the actuator and breech-block move forward and the firing-pin is released; said cushioning means being independent of the hammer and adapted to act indirectly thereon only when the latter is released by the forward movement of the breech-block.

29. In a machine-gun, the combination with the receiver, and the actuator and breech-block slidably arranged therein, of the breech-block lock comprising a slideway having an abutment and a swinging trailing arm or locking-piece carried by the breech-block adapted to engage said abutment and lock the breech-block when in firing position, said arm having an upwardly and forwardly extending projection, and a coacting cam device carried by the actuator adapted to positively engage and depress said swinging arm on the forward movement and to engage said projection and lift the said arm on the backward movement of the actuator, substantially as described.

30. In a machine-gun, the combination with the receiver, and the actuator and breech-block slidably arranged therein, of the breech-block lock comprising a slideway having an abutment and a swinging locking-piece carried by the breech-block and having its trailing portion provided with an upward forwardly-curved arm or projection, the free end of said locking-piece being adapted to engage said abutment and lock the breech-block when in firing position, and a coöperating cam member carried by the actuator adapted to engage said curved arm and lift the locking-piece on rearward movement of the actuator, thereby unlocking the breech-block; substantially as described.

31. In combination with the actuator and breech-block, the breech-block lock consisting of a swinging arm carried by the breech-block having its free end arranged to drop down and engage a stop in a guideway therefor when the breech-block is in firing position; said arm having an upturned forwardly curved or inclined finger or cam device, and means carried by the actuator adapted to contact with said cam device and unlock the breech-block on the rearward movement of the actuator, together with a firing-pin and trigger and sear devices arranged to effect the release of the firing-pin by interfering with said swinging arm; substantially as described.

32. In a rapid-fire gun, the reciprocatory actuator and the breech-block impelled thereby, in combination with a cushioning device for said actuator adapted to store power when cushioning the same, means for imprisoning said device when power is stored therein, means for impelling the actuator to and fro, a firing-pin, a hammer independent of said cushioning device, and means for utilizing the power thus stored for impelling said firing-pin when the actuator is advanced; substantially as described.

33. In a rapid-fire machine-gun, the combination with the longitudinally-reciprocatory actuator for operating the breech mechanism, of the transversely-reciprocatory feed-slide for feeding a belt of cartridges transversely

through the gun, said actuator having a cam portion thereon engaging a slot in the feed-slide, whereby the latter is reciprocated across the line of movement of the former at each reciprocation of said actuator; substantially as described.

34. In an automatic rapid-fire gun, the combination with the actuator and breech-block impelled thereby carrying a firing-pin, the swinging locking-piece carried by and pivotally connected with the breech-block, and means carried by the actuator for positively actuating said locking-piece to lock the breech, together with trigger and sear devices arranged to effect the release of the firing-pin by interfering with said swinging arm; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

VICTOR P. DE KNIGHT.

Witnesses:
CHAS. E. RIORDON,
JULIAN C. DOWELL.