

No. 709,882.

Patented Sept. 30, 1902.

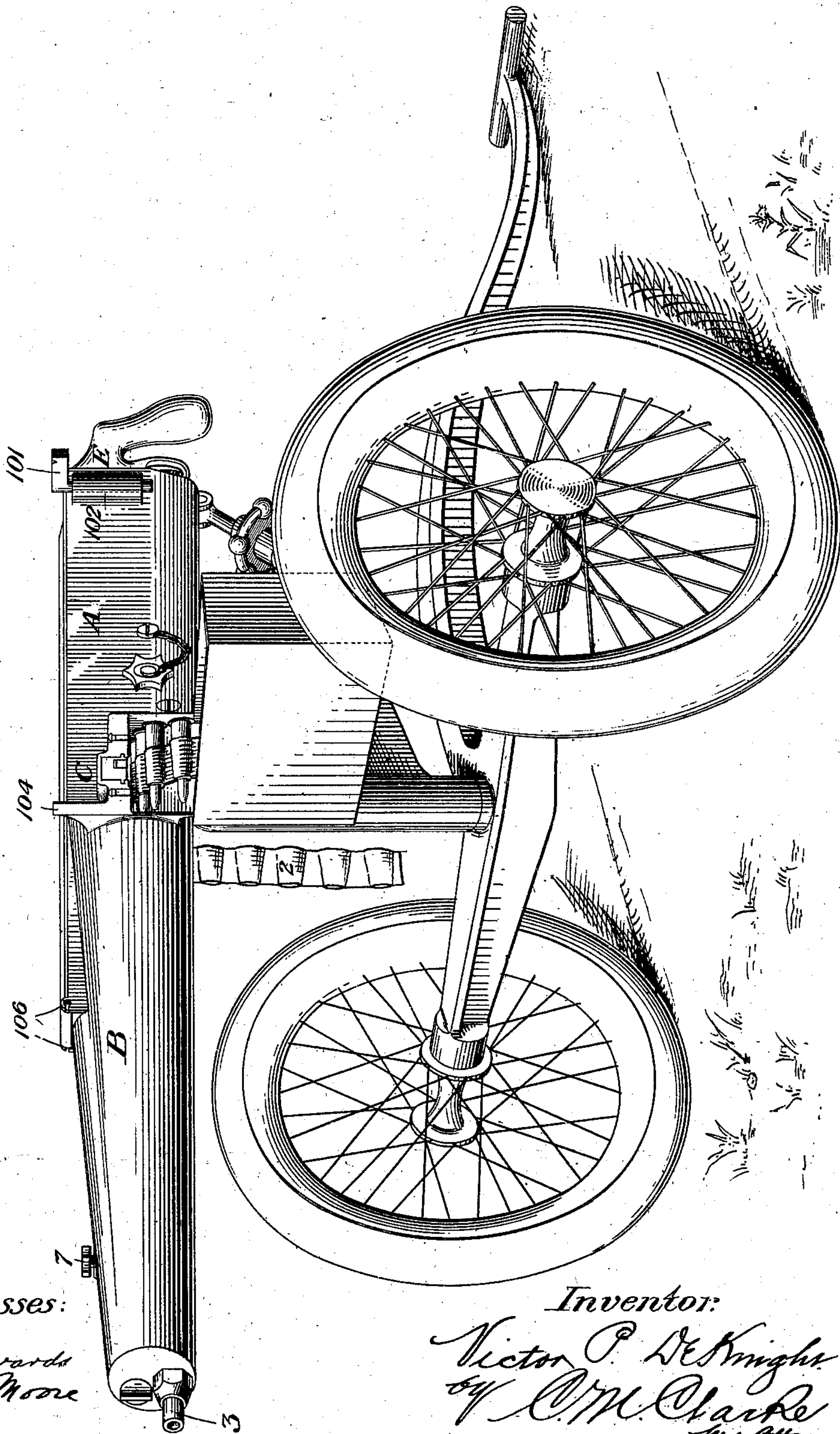
V. P. DE KNIGHT.  
RAPID FIRE GUN.

(Application filed Oct. 18, 1900.)

(No Model.)

9 Sheets—Sheet 1.

Fig. 1.



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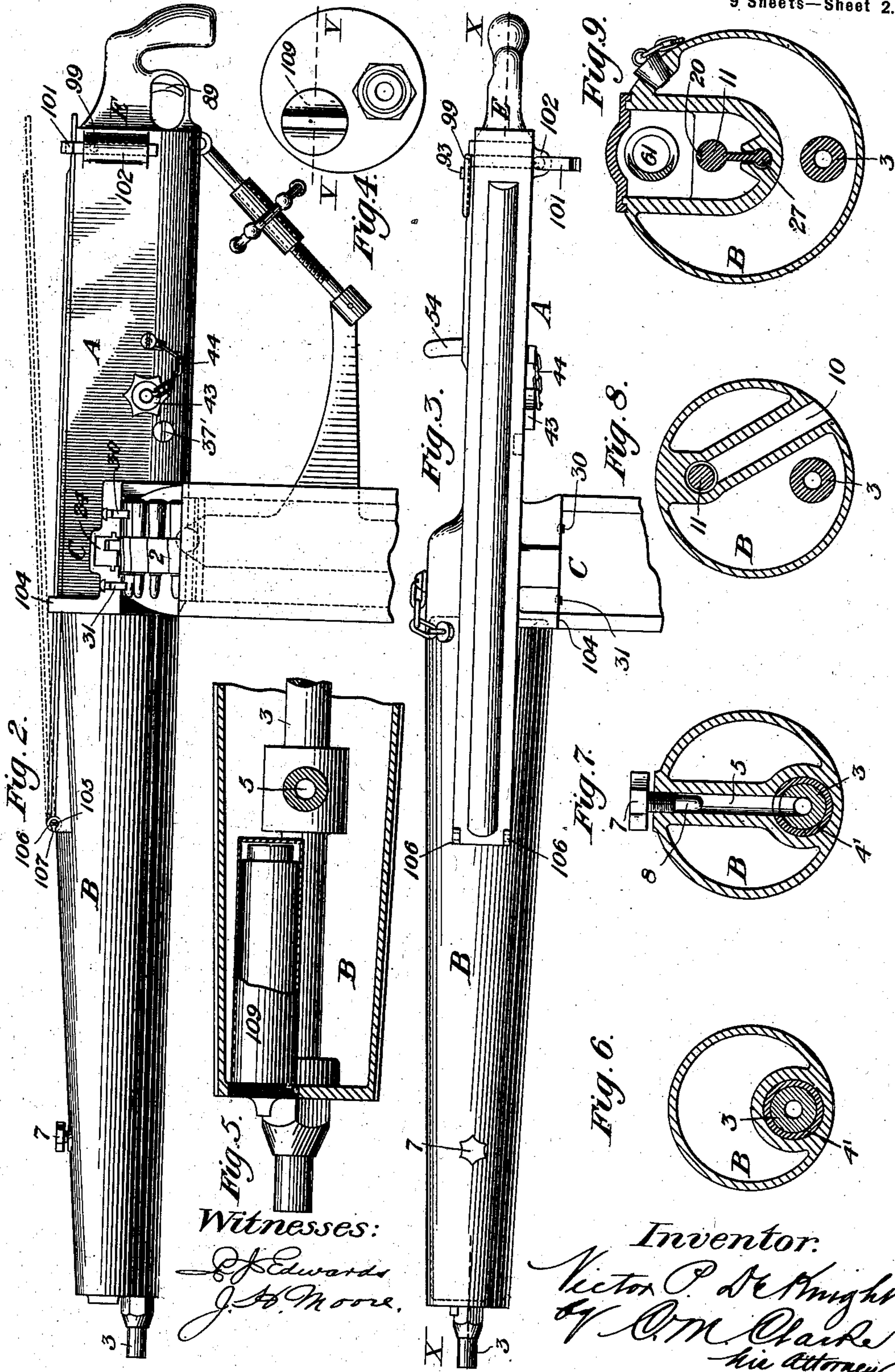
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Fig. 10.

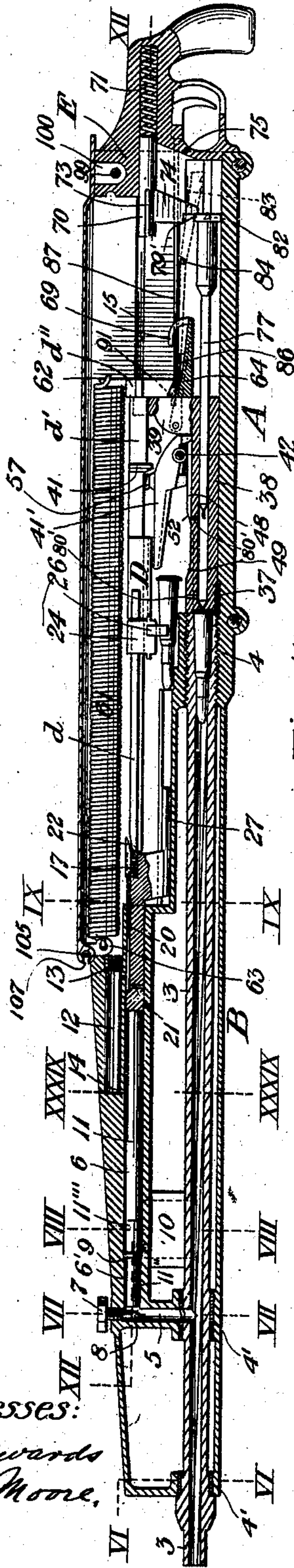


Fig. 11.

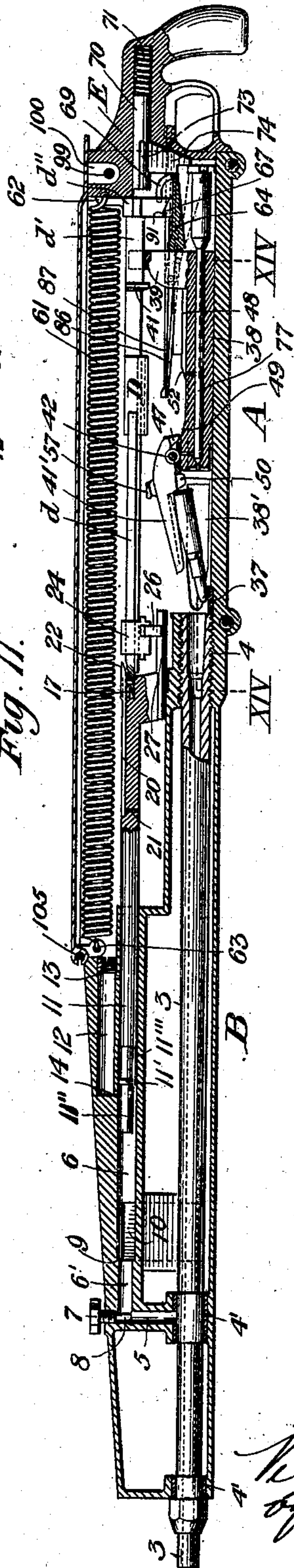
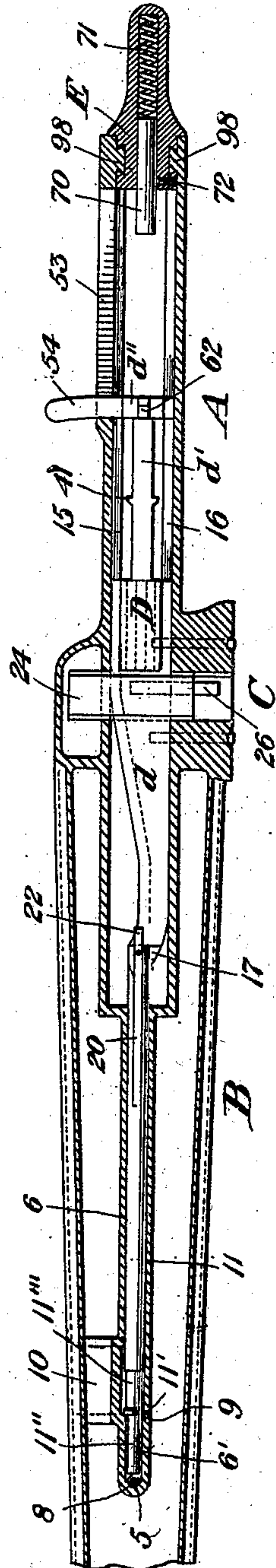


Fig. 12.



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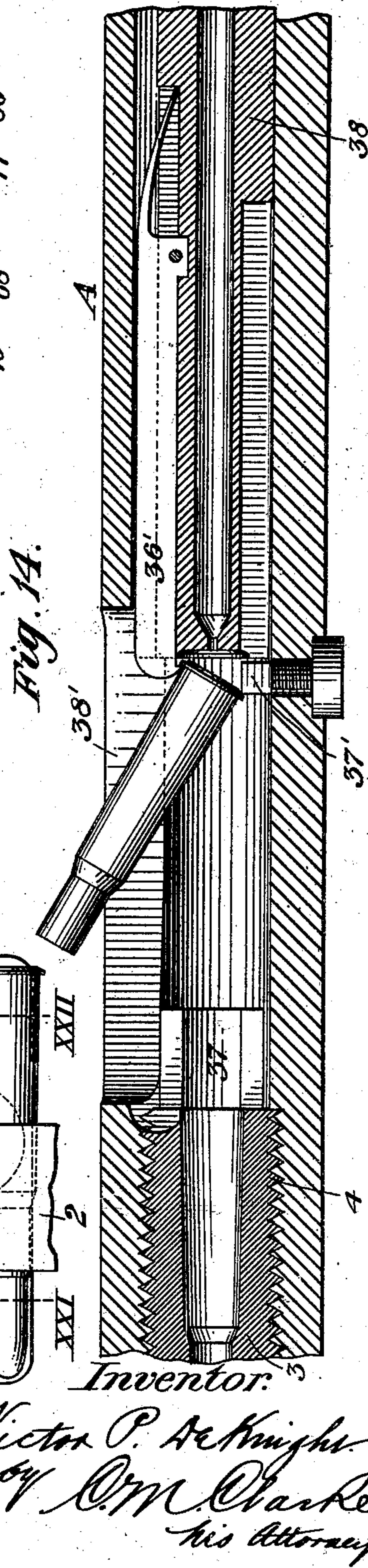
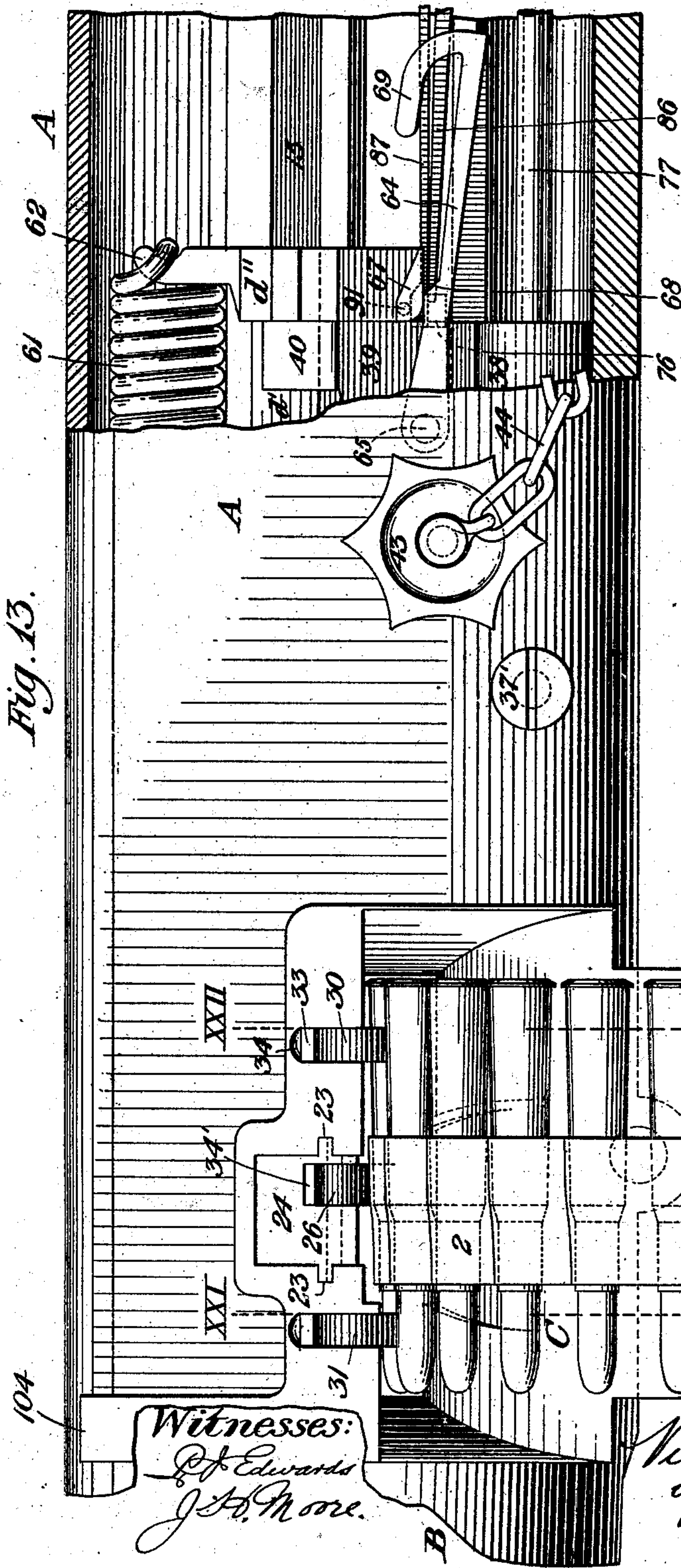
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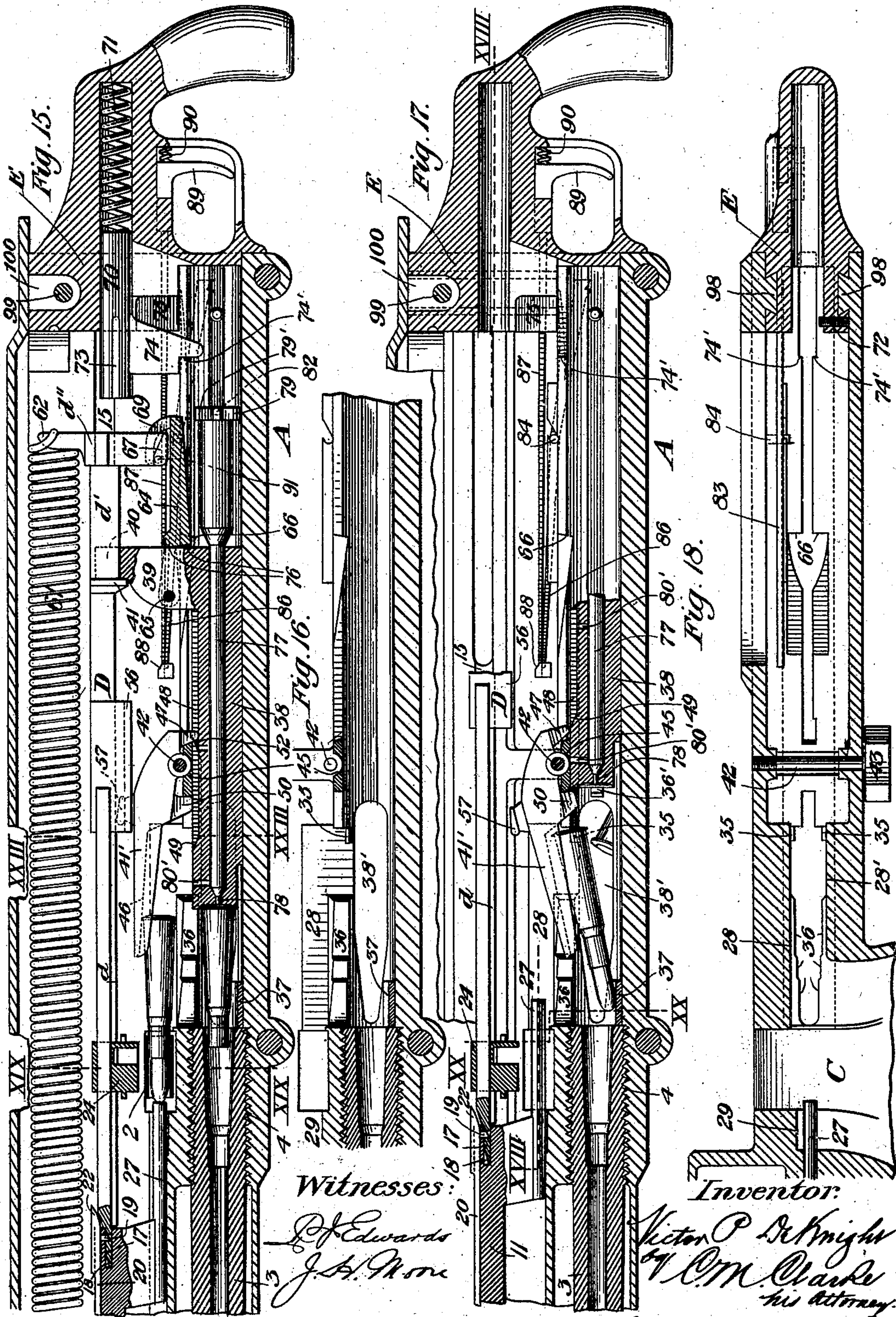
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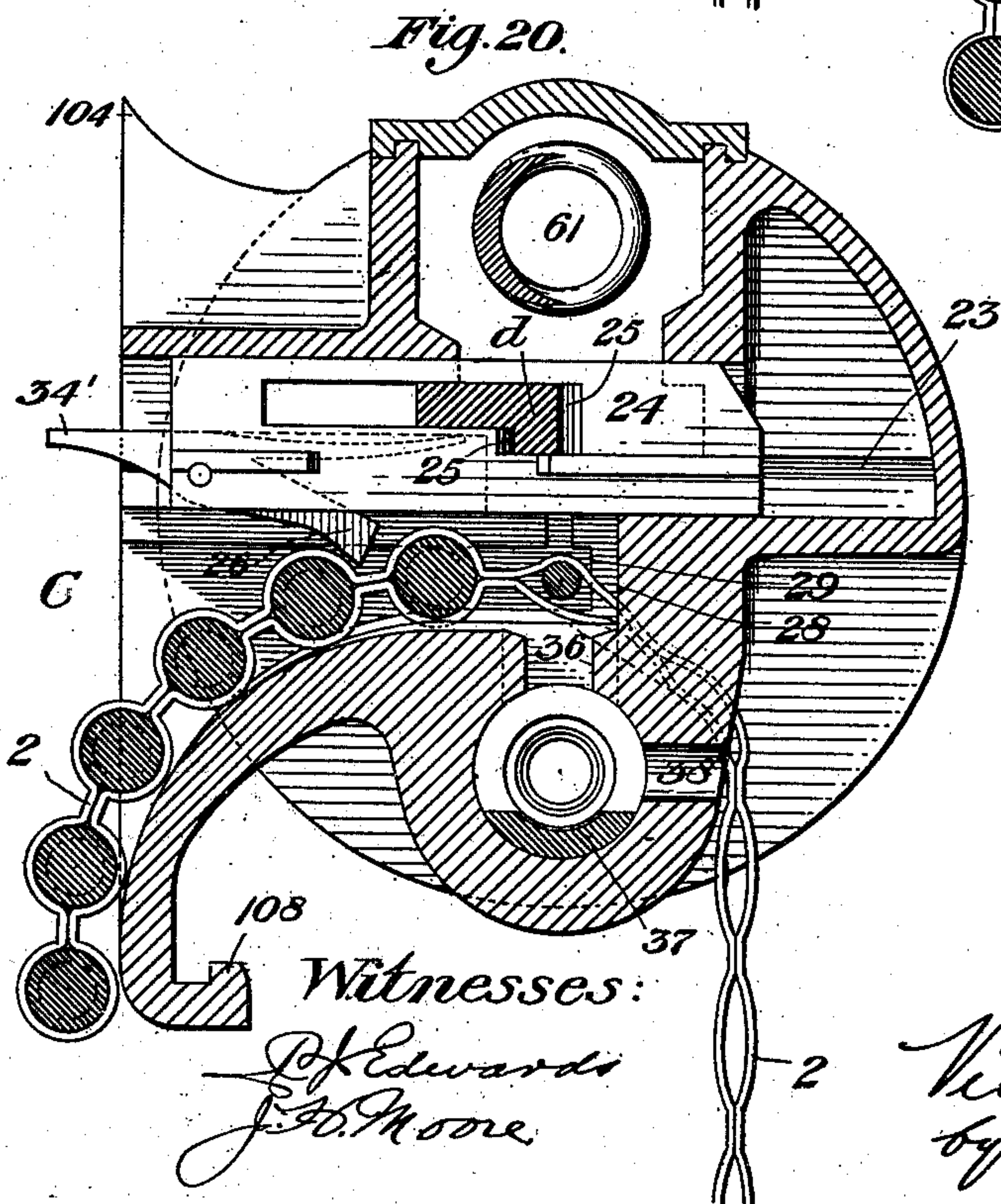
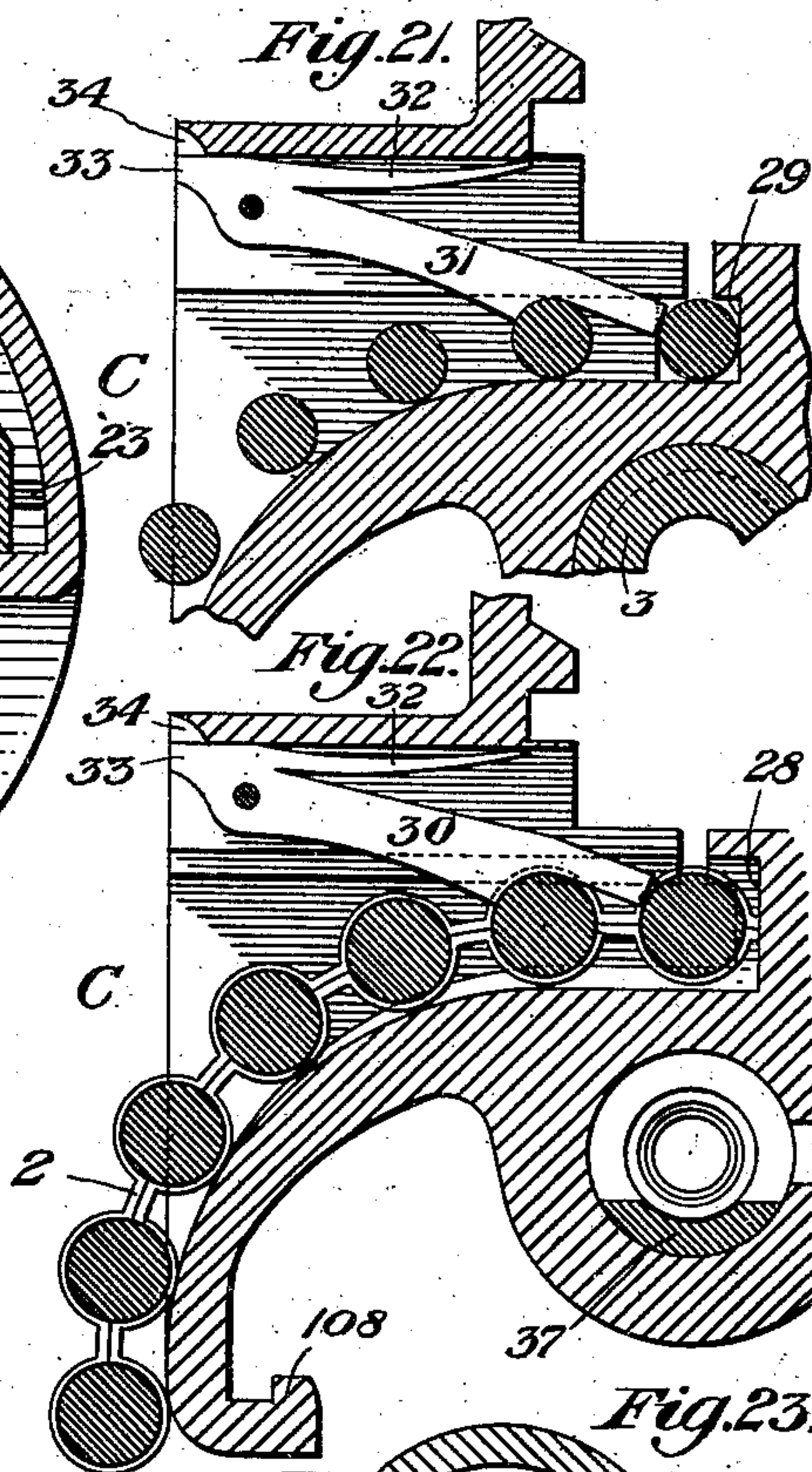
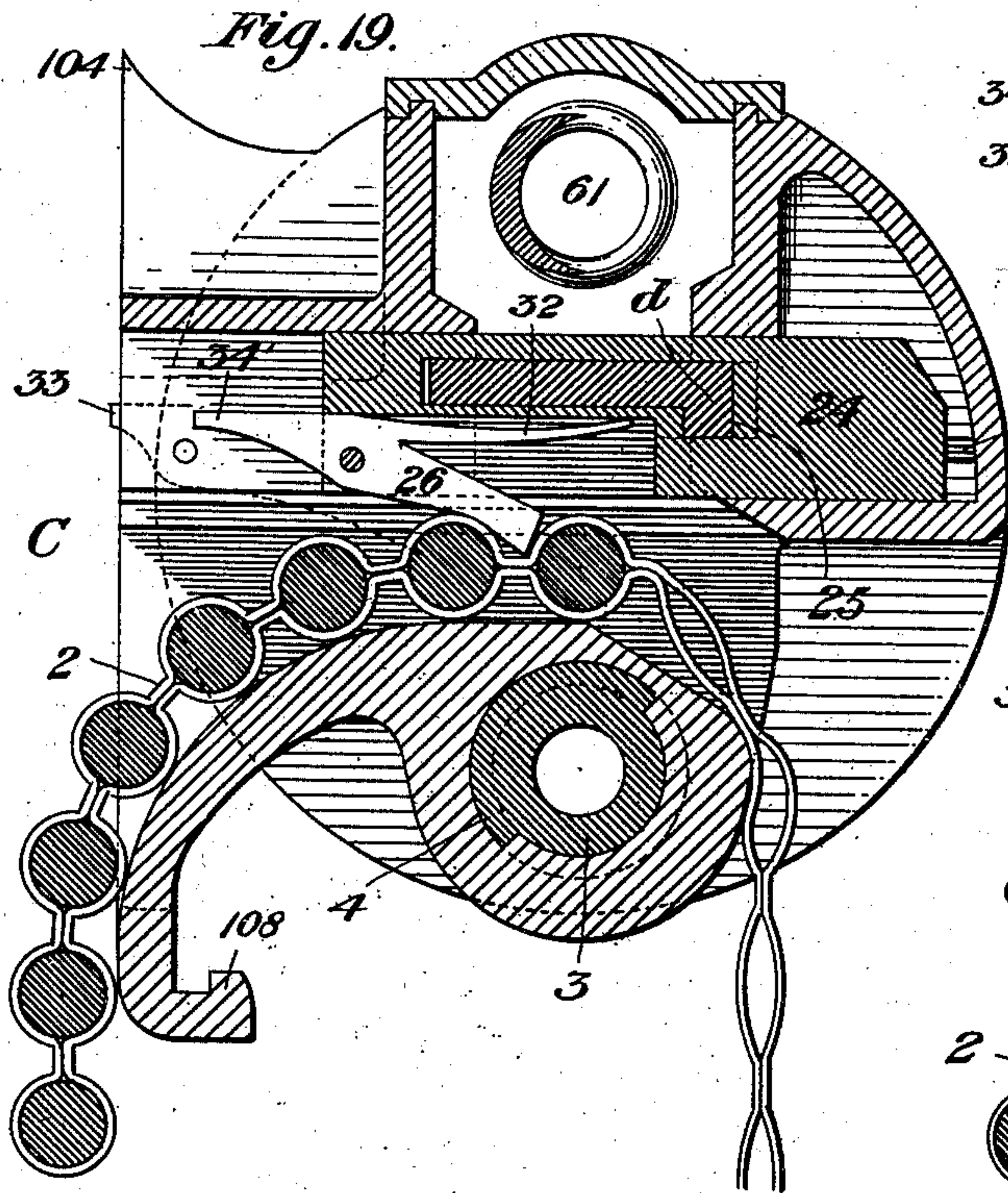


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9 Sheets—Sheet 6.



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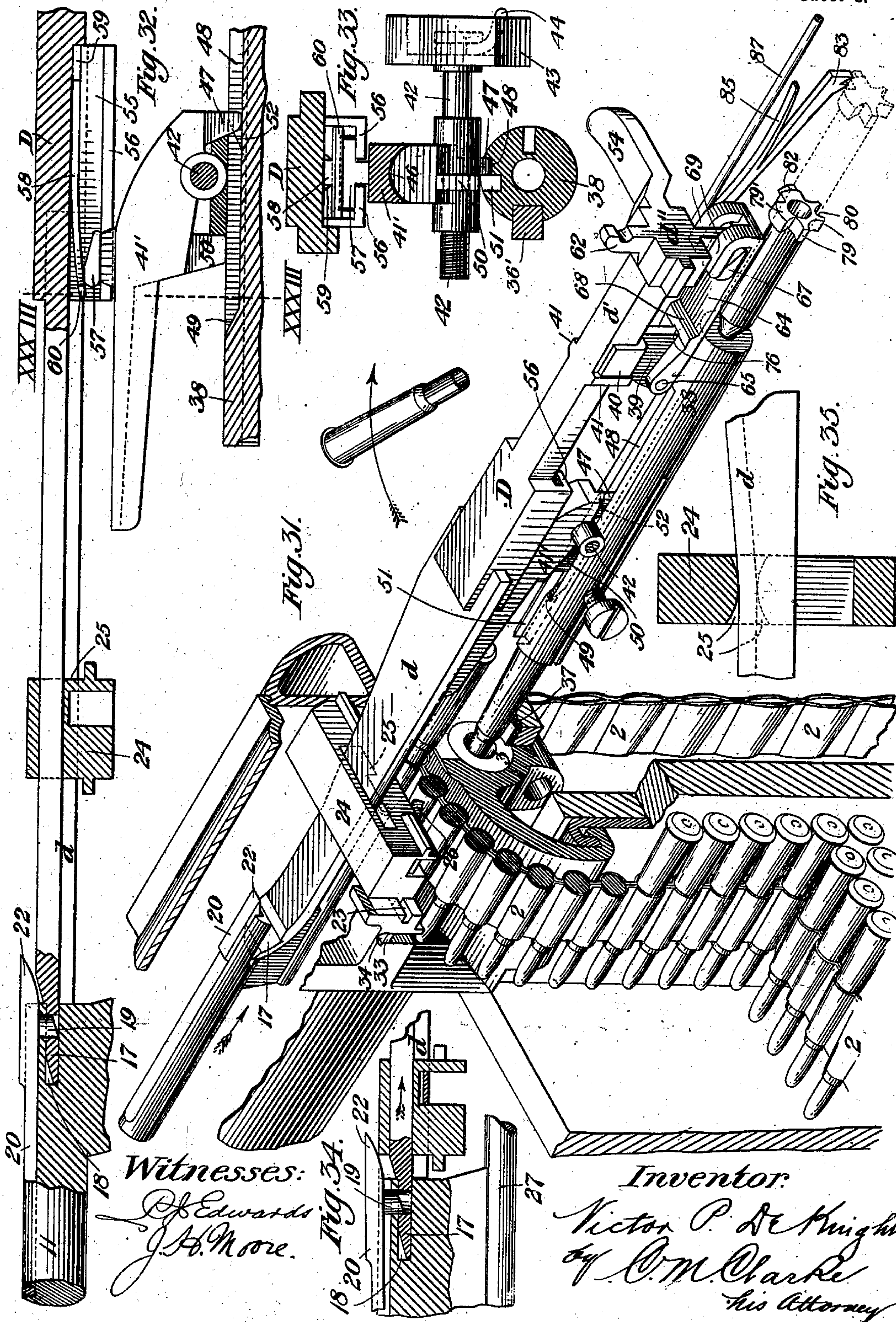
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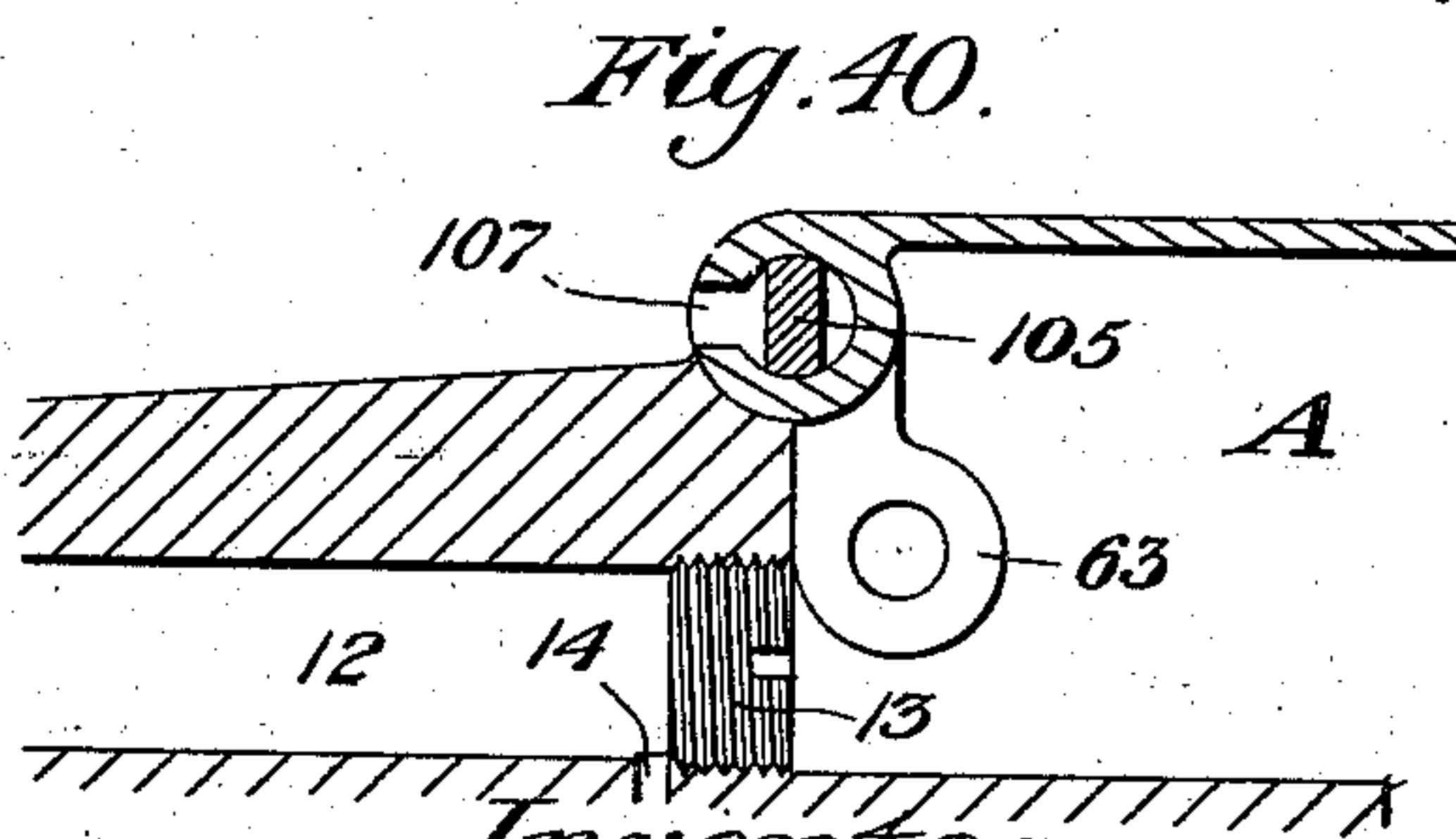
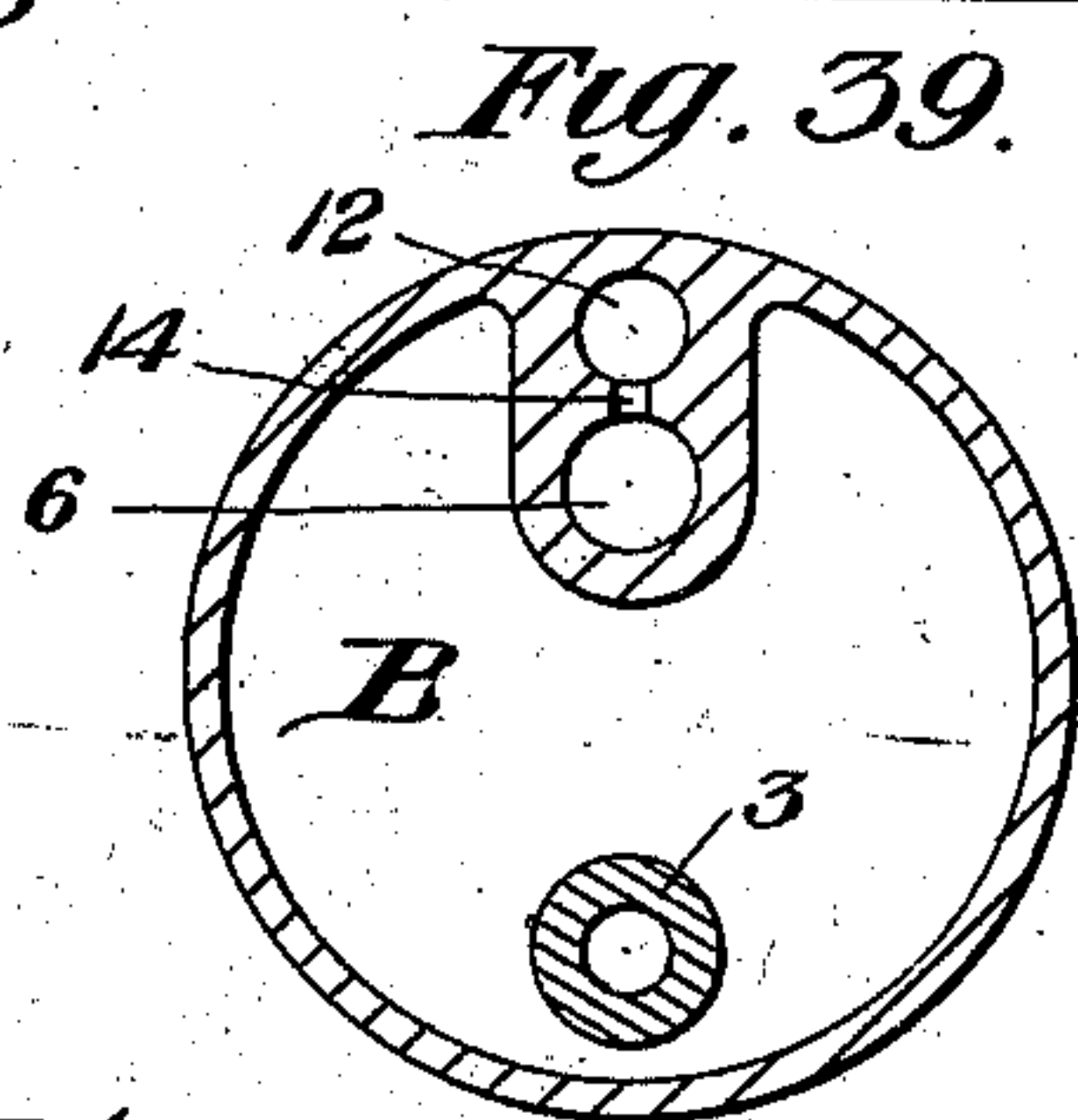
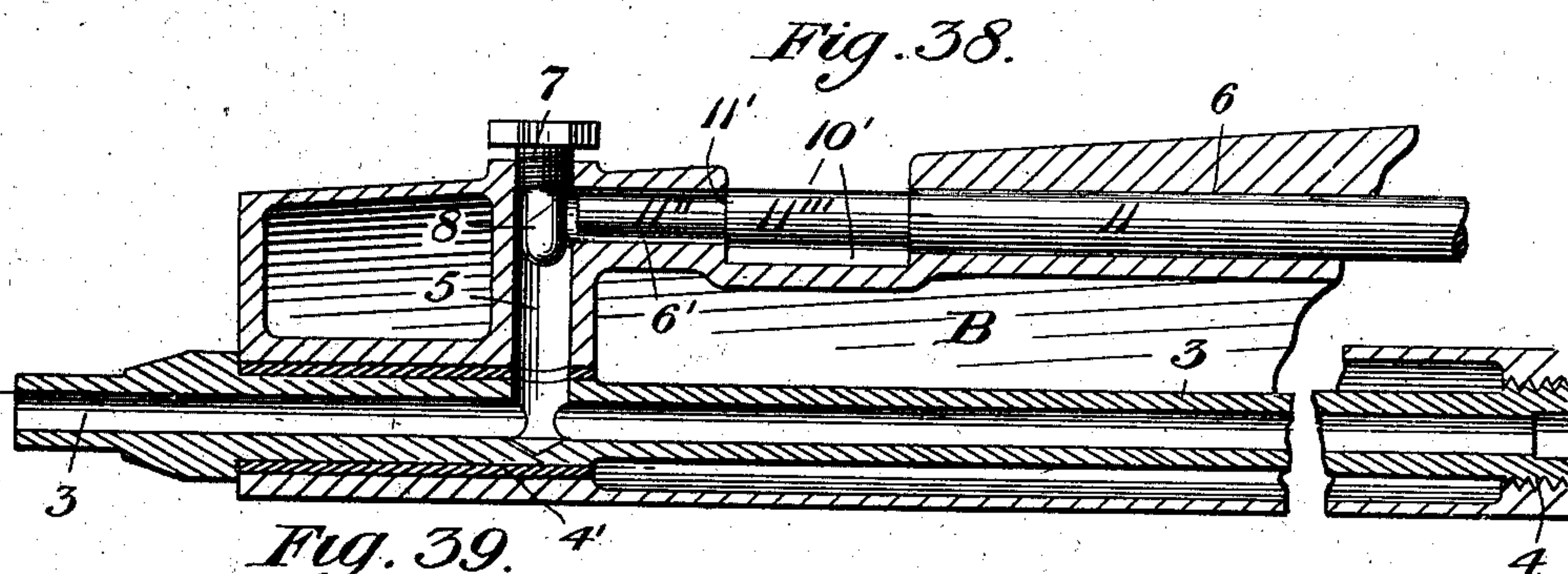
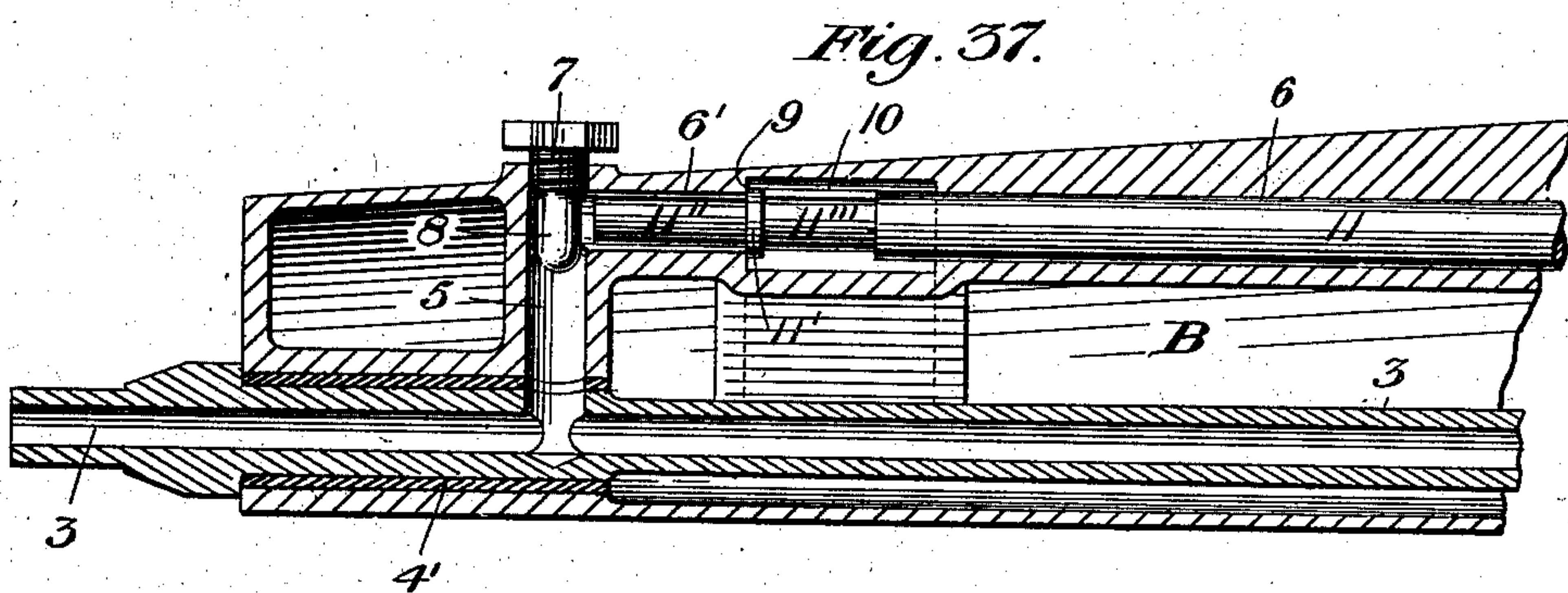
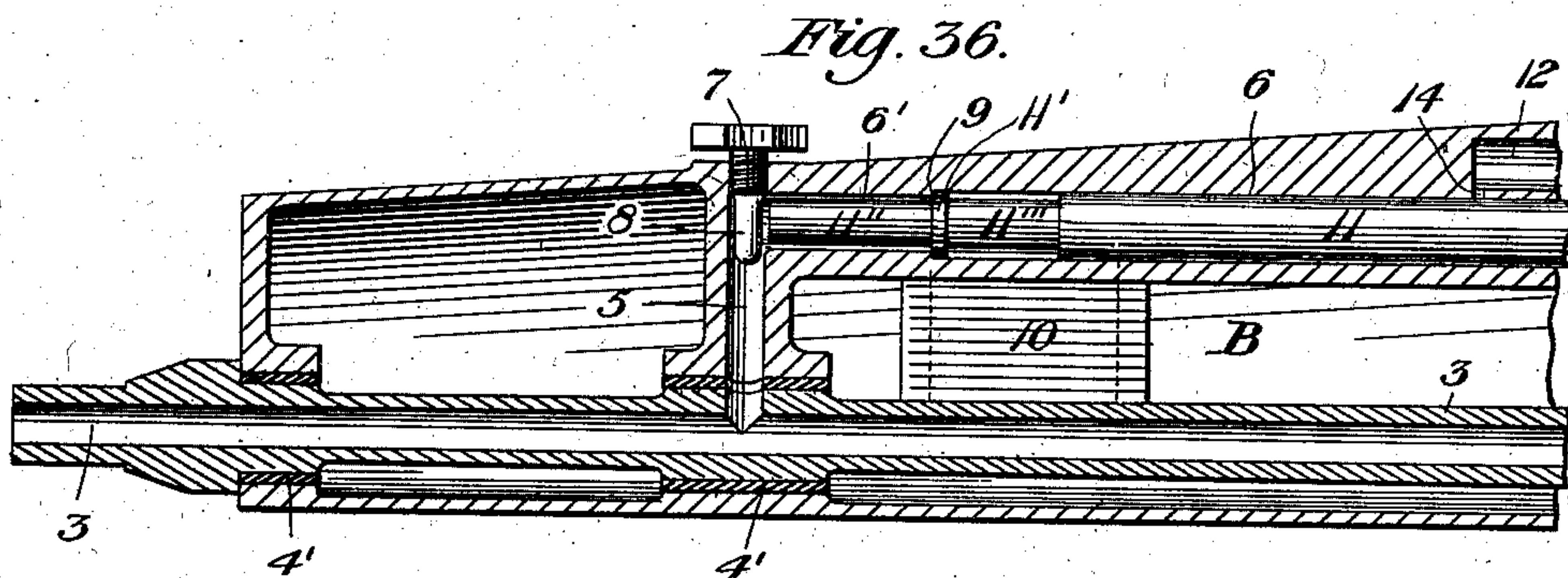
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**9 Sheets—Sheet 9.**



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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.

## RAPID-FIRE GUN.

SPECIFICATION forming part of Letters Patent No. 709,882, dated September 30, 1902.

Application filed October 18, 1900. Serial No. 33,472. (No model.)

*To all whom it may concern:*

Be it known that I, VICTOR P. DE KNIGHT, a citizen of the United States of America, and a resident of Washington, District of Columbia, have invented certain new and useful Improvements in Rapid-Fire Guns, of which the following is a specification, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a perspective view of my improved machine-gun mounted on its carriage. Fig. 2 is a view of the gun in side elevation. Fig. 3 is a plan view of Fig. 2. Fig. 4 is a front end view. Fig. 5 is a partial horizontal sectional view, on an enlarged scale, through the water-jacket, indicated by the line V V of Fig. 4, and showing an oil-can, also partially in section. Figs. 6, 7, 8, and 9 are cross-sections indicated by the lines VI  
20 VI, VII VII, VIII VIII, and IX IX, respectively, of Fig. 10. Fig. 10 is a central longitudinal vertical section of the gun, indicated by the line X X of Fig. 3, showing the parts in position immediately before firing, the firing-pin just having been released. Fig. 11 is a similar view showing the breech-block and firing-pin retracted and a cartridge about to be inserted in the breech. Fig. 12 is a horizontal longitudinal section indicated by  
30 the line XII XII of Fig. 10. Fig. 13 is a full-size view in side elevation, partly in section, of the middle portion or receiver of the gun, illustrating the feed of the cartridge to the throat. Fig. 14 is a full-size horizontal section indicated by the line XIV XIV of Fig. 11, showing the shell extractor and ejector in operation. Fig. 15 is a longitudinal vertical sectional view through the rear portion of the gun, showing the extraction of a fired shell  
40 and the removal of the next cartridge from the belt. Fig. 16 is a partial longitudinal vertical sectional view of the receiver-case, the working parts having been removed. Fig. 17 is a view similar to Fig. 15, some of the parts having been removed and showing the depressor in the act of placing a cartridge in position for insertion in the breech. Fig. 18 is a horizontal sectional view through

the receiver portion of the case, the working parts having been removed, indicated by the  
50 line XVIII XVIII of Fig. 17. Fig. 19 is full-size cross-sectional view indicated by the line XIX XIX of Fig. 15. Fig. 20 is a similar view indicated by the line XX XX of Fig. 17. Figs. 21 and 22 are fragmentary cross-sectional views indicated by the lines XXI  
55 XXI and XXII XXII of Fig. 13. Fig. 23 is a cross-sectional view, indicated by the line XXIII XXIII of Fig. 15. Fig. 24 is a perspective detail view of the cross-head trigger, sear, and firing-pin assembled in operative position ready to fire. Fig. 25 is a perspective detail view of the firing-pin, partly broken away. Fig. 26 is a similar view in vertical longitudinal section, showing the  
65 hollow head. Fig. 27 is a perspective detail view of the "safety" thumb-piece and screw. Fig. 28 is a fragmentary view, in side elevation, of the back end of the receiver, the grip being broken away. Fig. 29 is a cross-sectional view on the line XXIX XXIX of  
70 Fig. 28. Fig. 30 is a fragmentary view of a portion of the side of the receiver, showing the safety in interfering position. Fig. 31 is a perspective view, partly in section, of a portion of the gun and its parts assembled in operative position, illustrating the feed-  
75 ing, removing, extracting, and firing mechanism. Fig. 32 is a view in side elevation, partly in section, of the push-bar and its connected piston-rod, feed-block, the depressor, and a portion of the breech-block in their relative positions. Fig. 33 is a cross-sectional view indicated by the line XXXIII XXXIII  
80 of Fig. 32. Fig. 34 is a detail sectional view showing the manner of disconnecting the cam-bar from the piston-rod. Fig. 35 is a sectional plan view of a portion of the cam-bar in engagement with the feed-block. Fig. 36 is a vertical sectional view of the forward  
90 end of the gun through the water-jacket, barrel-port, &c. Figs. 37 and 38 are similar views illustrating modified constructions of the exhaust-port. Fig. 39 is a cross-section on the line XXXIX XXXIX of Fig. 10. Fig. 40 is  
95 a detail view of the hinge-joint of the lid.



My invention relates to machine - guns, and more particularly to the class known as "gas-actuated," wherein a portion of the gas evolved at each discharge is utilized as a motive force to actuate the operative mechanism of the gun.

It consists of the various parts assembled and operating to such end, as shown and described, and of means whereby the gun is subject to the control and manipulation of the operator, together with certain other details of construction, as shall be more fully hereinafter set forth.

The objects in view throughout the present invention have been to improve the construction of guns of this class as at present made and as exemplified by the literature illustrating the state of the art, to strengthen, lighten, and simplify the gun in general, reduce the number of parts, secure more direct action, and generally to greatly improve upon such prior and other types of this class of ordnance.

Referring now to the drawings, the main case of the gun is made in one continuous homogeneous piece of metal, consisting generally of a rear compartment or receiver A for the operative mechanism and a forward surrounding water-jacket portion B, containing the barrel, gas-port, piston-chamber, &c. Intermediate of such divisions of the gun is located a transverse throat C, through which passes the cartridge-belt 2 from side to side, the walls on the entering side being flared laterally and rounded downwardly to admit of the cartridges and facilitate their travel and that of the belt, while the extended top portion provides a convenient base in which to mount the belt feeding and holding devices. The barrel 3 is located in the lower portion of the water-chamber and is rigidly incorporated with the shell of the case by means of external threaded portions 4, screwed into a corresponding threaded socket at the breech, and at an intermediate point near to and back of the muzzle the barrel is inserted through bearings in the case, provided with any suitable packing 4'. Such intermediate bearing, as are the others, is cast integral with the shell and extends upwardly across the area, constituting a short stem through which is drilled centrally the gas-port 5 from the outside into and communicating with the bore of the barrel. Parallel with the barrel and somewhat above it, also bored through a suitable downwardly-projecting longitudinal extension of the case, is the piston-cylinder 6, communicating at its forward end with the gas-port 5, extending backwardly into the open chamber of the receiver A. By this construction communication is established after the ball has passed the port 5 between the bore of the barrel 3 and the interior of the cylinder 6, and for the purpose of accurately controlling and regulating the admission of gas to the cylinder a threaded screw 7 is tapped into the upper end of the gas-port 5,

the screw having an extended valve 8, rounded or tapered at the end, which by adjustment will accurately control the flow of gas from the port into the cylinder.

For a short distance back of the port 5 the cylinder is reduced in diameter, as at 6', to a diameter slightly less than that of its main portion 6, which thus terminates in an inner peripheral shoulder 9. Back of such shoulder and of the reduced cylinder extension 6' is a downwardly-extending vent-opening 10, passing through a suitable hollow cross extension of the shell and opening downwardly into the atmosphere underneath the water-jacket, by which construction the vent-opening is protected from the elements. The piston 11 is mounted in the cylinder 6, making a neat fit therein, and having a collar 11', adapted to abut against the shoulder 9, beyond which collar the piston is reduced in diameter, providing an extension 11'', which makes a loose fit in the portion 6' of the cylinder. Back of the collar 11' the piston is likewise reduced in diameter for a short distance, as at 11''', by which means any excess of gas past the collar 11' will escape to the vent-opening 10 and immediately to the atmosphere, thus preventing its entrance to the main cylinder and piston and preventing fouling of these parts by burned powder. By making the extension 11'' of the piston of slightly less diameter than the cylinder extension 6' these coacting parts are also rendered independent of fouling action, so that the pressure of the gas is against the end of the piston and also against the shoulder 11'. By this construction the full pressure past the tip 8 is utilized to actuate the piston, while a free release is provided for the gas immediately after such pressure has been exerted, and pressure of gas through the restricted opening around the extension 11'' produces a sustained effect on the piston, while the meeting parts are maintained in practically clean condition. This is a valuable and important feature in guns of this class and insures continuous operation. In Fig. 37 I have shown a modified construction wherein the opening 10 around the piston is increased in size, facilitating the escape of the gases outwardly through the port and preventing fouling or clogging of the piston. In Fig. 38 the escape-opening 10' is likewise of increased area around the piston-stem, which in this case opens upwardly and outwardly into the atmosphere, allowing free expansion and exhaust. With this construction of outlet-port the portion 11''' of the piston, which is exposed to the effects of the gas and weather and is liable to rust or become foul, is reduced in diameter so that it will freely enter the piston-cylinder backwardly, and the forward end terminates in the shoulder 11', adapted to abut against and close the port leading from the barrel, while at the same time providing a pressure area for expansive action of the gas. This piston



terminates in the reduced extension 11', which freely enters the portion 6', in this instance constituting a lateral channel leading outwardly from the port 5, adapted to receive with considerable clearance the reduced extension of the piston. In both of these latter constructions the forward threaded portion 4 of the barrel is elongated sufficiently to include the perforating port 5, which is in consequence thus brought nearer to the muzzle of the gun, and as the gas-pressure is proportionately reduced the area of the port 5 is increased to permit a large volume of gas to pass to the piston to produce the necessary pressure.

By elongating the forward threaded portion of the barrel, and thus dispense with the intermediate threaded portion, the construction is simplified and strengthened, the threaded portions of the barrel being reduced to two, as shown in Fig. 38, and it is obvious that such arrangement may be adopted with good results.

Immediately above the cylinder 6 an oil-chamber 12 is made in the downward extension of the shell, opening inwardly into the receiver-cavity and closed by a screw-plug 13, ports 14 opening downwardly into the cylinder 6, by which means the piston is kept lubricated.

Slidingly mounted longitudinally with the receiver-cavity in ways or grooves 15 16 in Fig. 23 in the vertical side walls is the reciprocating actuator, consisting of the cam-bar D, made in one piece and which constitutes the main moving element by which all of the operative parts within the receiver-cavity are actuated.

The forward end of the cam-bar D terminates in a flattened tip 17, which is inserted within a horizontal slot 18 in the end of the piston 11 and is held therein by a key 19, extending downwardly through the piston end from a spring-bar 20, laid in a groove in the top of the piston and held in position by a pin 21 at the other end inserted downwardly into the piston. The key is provided with a beveled face on its under side to permit of the insertion of the tip 17, which is provided with a hole for insertion therethrough of the key 19, while the inner end 22 of the spring-bar is extended slightly beyond the end of the piston and tapered or beveled upwardly on the under side, so that when the bar D is drawn backward beyond its normal range of travel until the tip of the spring comes into contact with the slide-block the spring will rise automatically, disconnecting the bar from the piston, so that it may be entirely withdrawn from the gun.

Ordinarily in the operation of the gun the joint will remain connected without interference with the reciprocating slide or feed block; but when the gun is taken apart it will be released, as has been described.

Mounted by lateral slides in slideways 23 in a suitably-arranged extension of the case

above the throat transversely of the gun is the reciprocating slide or feed block 24, the function of which is to feed the cartridge-belt through the gun in intermittent conformity with the other operations. The block is provided with a cross-opening through which the cam-bar extension  $d$  of the main bar D passes, and at the back of the block the opening is extended downwardly, forming a narrow recess or groove 25, the inner edges of which are rounded, and into such groove projects the cam extension  $d$  of the bar D. This cam extension is of the same depth as the lateral slide, which bears in the slideways 15 and tapers inwardly toward the end of the cam-bar for a length approximating the travel of the bar and in width an amount equaling the reciprocating travel of the feed-block. It will be noted that the back bearing-face of the block is of the full depth of the cam-bar, giving good bearing for the work of feeding in the belt, and also that the action of the cam is very free by reason of the long taper of its bearing side, while positive movement of the block forward and back is insured by engagement of the cam extension  $d$  on both sides of the groove 25.

The cartridges are closely assembled in suitable openings in the belt, reducing the intermittent travel to a minimum, and a spring-depressed feeding-pawl 26 is pivotally mounted in the slide-block, adapted to engage each cartridge successively in the operation of the gun and feed it forward in the throat into exact alinement with a removing push-bolt 27. Limiting walls or faces 28 29 on the interior of the case beyond the center and at positions corresponding to the diameter of the cartridge also limit and control its movement, checking momentum by contacting with the flange and end of the shell, respectively. This push-bolt 27 constitutes a downward and backward extension of the piston, and in its backward travel due to the action of the gas immediately after a cartridge is fired the push-bolt, which is slightly concave on its tip, comes into contact with the end of the ball of the cartridge and forces it out of the belt backwardly underneath the depressor. This operation is clearly shown in Figs. 15, 17, and 31. The longitudinal opening of the throat immediately in front of the center is of just sufficient length to admit of the passage of the cartridges, while the opening for the empty belt on the other side is correspondingly narrowed, and for these reasons, and also on account of the fact that movement of the belt is further prevented by its binding action on the tapered shell of the cartridge, it will be seen that the cartridges will be successively discharged from the belt without binding or imparting movement to it.

On each side of the feed-block, pivotally mounted in suitable bearing-openings in the case, are front and back spring-actuated limiting-pawls 30 31, which engage and bear down against the central cartridge and the



next adjacent one, holding them positively in position when released by the feed-pawl 26. It will be noted that these limiting-pawls abut against the forward cartridge and have 5 concavely-rounded shoulders, which fall over and partly embrace the next one, as clearly shown in Figs. 21 and 22. Their springs 32 are made integral with the pawls, which also have outward extensions 33, bearing up- 10 wardly against limiting-stops of the bearing-cavities, and openings 34 are provided by which the pawls may be depressed by the thumb, raising their inner ends from engagement with the cartridge to permit withdrawal 15 of the belt. The feed-pawl 26 is likewise limited as to downward movement by bearing upwardly against the bearing-cavity and is provided with an extension 34' to raise it from engagement with the belt, as shown in 20 Fig. 20.

Upon being discharged clear from the belt the cartridge passes back between the faces 28 and 28', which are of a distance apart to just provide clearance, the flange of the car- 25 tridge striking underneath the depressor and falling downwardly upon short inwardly-projecting beveled lugs 35, Fig. 23, adapted to momentarily arrest the downward movement of the flange, permitting the tip to fall down 30 between guiding projections 36, beveled on the top, as shown in Fig. 23, facilitating the central travel of the cartridge under action of the depressor, the cartridges assuming the position shown in Fig. 17, with the forward 35 end of the bullet resting on a concave bearing-face 37, of hardened metal, immediately back of the barrel-breech.

The breech-block 38 is mounted in the lower side of the receiver in alinement with the 40 barrel and in its forward travel engages the cartridge, shoving it forwardly off of the lugs 35 underneath the downwardly-slanting depressor and driving it home into the breech of the barrel, as shown in Fig. 10. A spring- 45 controlled extractor 36' of well-known form is mounted in the side of the breech-block and engages the flange of the cartridge on its inward travel and withdraws the empty shell from the breech after firing immediately be- 50 fore the next cartridge is thrown downwardly into loading position, as shown in Fig. 15, and in its backward movement the flange of the shell comes into contact with a stationary screw extension 37' on the side opposite the 55 extractor, when continued backward movement of the breech-block and extractor will throw the shell outwardly through opening 38' in the side of the case, as shown in Fig. 14.

At the rear end the breech-block is pro- 60 vided with an upwardly-extending heel 39, terminating in fork extremities 40, which embrace the stem  $d'$  of the bar D, with which forks the side and under lugs 41 on the stem come into contact on backward travel of the 65 bar, carrying with it the breech-block, as shown in Fig. 15. The depressor 41' is pivotally mounted upon a pivotal pin 42, pass-

ing through the case and screwed into the opposite side. The pin is provided with a thumb-piece 43 and is swivelly attached by a 70 chain 44 to the case to prevent loss, while additional bearing-surfaces 45 are formed for the hub of the depressor in the cross-web of the receiver. The depressor extends forwardly from its bearing, is provided with an 75 under sloping concave face 46, against which the flange of the cartridge is projected, and is provided at the back with a downwardly-extending lug 47, which in the horizontal position of the depressor projects into a groove 80 48 in the upper side of the breech-block. This groove terminates in a beveled shoulder 49, which in the backward travel of the breech-block rides under the lug 47, depressing the forward end of the depressor and 85 throwing down the cartridge, as already described. The depressor will remain in such position until the breech-block comes forward and is provided at the front with another 90 downwardly-projecting lug 50, which will enter a groove 51 alongside of groove 48 in the breech-block and terminating in a beveled shoulder 52, which in the forward movement of the breech-block will ride under lug 50 and throw the depressor into erected position, as 95 shown in Fig. 10.

Backward movement is imparted to the breech-block, as has been described, by engagement of the lugs 41 with forks 40 of the heel, which projects beyond the lugs 41, with 100 intervening space to permit of independent forward movement of the bar D with relation to the forks. The bar terminates in a cross-head  $d''$ , having slides bearing in the grooves 15 16, one of which slides is extended out- 105 wardly through a downwardly-inclined groove 53 and terminates in a handle 54, by which the gun may be manipulated manually ready to fire. By slanting the groove 53 downwardly the interior of the gun is effectually 110 protected from the weather.

The bar D immediately back of its cam-blade  $d$  is provided with an under central groove 55, formed by downwardly and inwardly projecting flanges 56, adapted on the 115 back motion of the bar D to engage lug 57 on the upper side of the depressor and hold it erect after the cam-face 52 has passed back of lug 50, leaving it unsupported, and the depressor will thus be held in erect position un- 120 til the lugs 57 are released from groove 55, when it will be thrown down by the cam-face 49, as described.

In the operation of setting the gun by hand in case the bar D should not at first be pulled 125 entirely back, so that cam-face 49 will engage lug 47, and if for any reason the depressor should remain erect I have provided a flat spring 58, secured in the under side of the bar by dovetail 59 and provided with a T- 130 shaped free extremity 60, adapted to bear downwardly and close the front of the groove, so as to positively prevent reëtrance of the lugs 57 and also to throw the depressor



down. The bar D under action of gas upon the piston 11 is thrown backwardly for the full extent of its travel against wedge-block E, when under the reactionary effect of a coiled spring 61, connected to an upward extension 62 of the cross-head and to a downwardly-extended projection 63 of the hinged top, it is immediately thrown forward, and between the beginning and the end of such continuous back-and-forward movement all of the motions and functions of the various parts take place, resulting in the extraction of an empty shell, removing from the belt of a cartridge, placing in position in the breech, firing, and feeding of the belt. When in firing position, the breech-block is positively locked by the bifurcated locking-dog 64, pivoted on both sides at 65 to the heel 39, projecting backwardly and engaging shoulder 66 in the case and positively held down in engagement therewith by the forward end of shoes 67, which extend laterally at both sides of the termination of a downward extension of the cross-head and which ride over inclined faces of a cam-lug 68 on the upper side of the locking-dog 65, as shown in Fig. 10. The locking-dog is provided with upwardly and forwardly extending horns 69, while the shoes 67 are beveled downwardly on their upper faces and in the back travel of the cross-head engage and swing the locking-dog upwardly, releasing the breech-block just before the lugs 41 engage forks 40, as shown in Fig. 15.

Mounted in the wedge-block E in alinement with the cross-head  $d''$  is a buffer-block 70, normally held extended by a spring 71 and limited as to forward travel by a screw 72, engaging a groove 73 in the side of the arm, while a downwardly-extended central bracket 74 terminates in a projection adapted to engage and throw forward the firing-pin when released. This buffer-bolt is violently thrown backwardly by the cross-head, while at the same time the breech-block continues to slide back, leaving the lug 41 and jamming the end of the locking-dog against the forward face 75 of the wedge-block, which thus absorbs the shock of impact both of the breech block and through spring 71 of the cross-head  $d''$ . In order to release the strain from the pivotal pin 65, the inner shoulders 76 of the locking-dog are adapted to abut against the forward edge of heel 39 in either the raised or lowered position of the dog, as shown.

Mounted centrally of the breech-block is the hammer 77, terminating in a forward reduced firing-pin 78, perforating the end of the breech-block and adapted to fire the cap or primer of the cartridge, while the rear end of the hammer is enlarged and provided at the inner end with flanged projections 79, having a bearing in the breech-block cylinder, with intervening open spaces 80 to permit passage of the air, reducing its resistance and facilitating travel of the hammer. The pin is also grooved, as at 81, for the same purpose. The hammer is hollowed out at its rear end for

lightness, and the interior cavity may be partially or entirely filled with lead if it is desired to increase its weight.

For the purpose of permitting the escape of air under forward action of the firing-pin vent-openings 80', Fig. 17, are made upwardly through the block, thus giving easy release and preventing compression or suction on inward or outward motion. Centrally of the pin is an upwardly-projecting flange 79', adapted to be engaged by the extremity of arm 74, and on one side is a locking projection 82, adapted to make a hair-trigger engagement with the notched end of the sear 83, pivoted at 84 in the side of the frame, depressed by integral spring extension 85 and prevented against further downward movement by bearing against the metal of the case, as shown in Fig. 28, by which bearing excessive downward travel to make full engagement of the locking-notches is prevented. The sear is provided with a forwardly-extending arm 86, Fig. 24, above which and resting upon it is the flexible trigger-rod 87, flattened at the end, provided with downwardly-extending lips embracing the end of the sear and terminating in an abruptly-rising enlargement having a beveled face 88.

The flexible trigger pull-rod extends backwardly through a bearing in the side of the wedge-block E and is inserted in the trigger 89, mounted in a suitable socket in the grip, so as to permit longitudinal movement, and is provided with a compression-spring 90, which normally holds the trigger and the rod in a forward position.

Extending outwardly over the trigger-rod from the side of shoe 67 is a pin 91, which in the forward travel of the cross-head and shoe stops immediately in front of the bevel-face 88, but which when the trigger-rod is retracted to fire rides over and depresses the enlarged end of the trigger-rod and with it the outer end of the sear, thus raising the inner end from engagement with the lateral projection 82, releasing the firing-pin and with it the arm 74 of the buffer-rod, which under the action of spring 71 throws the firing-pin forward, discharging the cartridge, the arm 74 being limited at the end of its travel by shoulder 74'. It will be noted that by action on the bevel-face 68 the locking-dog 64 will have been depressed to locking position simultaneously with the insertion of the cartridge in the breech and immediately before the pin 91 depresses the end of the trigger-rod upon the sear extension, so that the breech-block is thus securely in place before the cartridge can be fired, whereby premature discharge is effectually prevented. This feature is important and extremely efficient.

For the purpose of preventing accidental discharge and rendering the gun temporarily inoperative a screw 92, Fig. 29, is introduced through the side of the receiver-chamber in front of the projection 82, effectually preventing its forward travel, and the inner end of



the screw is preferably tapered, so that in its inward travel the head of the firing-pin will be wedged back sufficiently far to take the strain off of the sear. The screw is provided with a thumb-lever 93, and a stop 94 projects out into its path of movement to limit its rotation at the end of a forward or back turn to either the "safe" or "fire" position, as indicated in Figs. 28 and 30. A supplementary integral spring 95, provided with a wedge projection 96, bears against the outside face of the case, providing friction, while correspondingly-shaped recesses 97 are formed in the face corresponding to the two positions into which the projection enters, thus preventing accidental rotation of the safety-screw. The thread of this screw is preferably made left-handed to facilitate operation by the thumb, although, as is obvious, either thread may be used.

The wedge-block E is held between the sides of the receiver in engagement with dovetail extension 98 thereof, Figs. 12 and 18, and a bolt 99 passes through from side to side, holding the parts securely together and also holding the hinged top securely down in position by passing through a downwardly-extending lug 100, which enters a central cavity in the top of the grip-block.

A sight 101, Fig. 29, is inserted in a socket 102 on the side of the case by stem 103, provided with V-grooves along its inner and front sides, into which the tip of screw 99 bears, so as to rigidly hold the sight at any desired height in an extended position or when folded inwardly when out of use. The V of the sight is in longitudinal alinement with a forward knife-edge projection 104, extending upwardly from the throat extension, and the line of the sight is parallel to the bore of the barrel. Upon withdrawal of the screw-bolt 99 the top may be raised on its hinged pin 105, supported in lugs 106, and by raising the lid to an upright position, so as to bring a slot 107, Fig. 40, into register with the edges of a narrow intermediate portion of the pin, the top may be raised entirely off of the hinge for cleaning or removal of the parts, or it may be thrown entirely back beyond such position. It will be seen also that in such raising operation the lugs 63 will be thrown backwardly, releasing the strain on the spring 61, and thus rendering its removal or replacement easy. When the bolt 99 is withdrawn, the wedge-block E may be entirely withdrawn upwardly and with it the trigger and rod and buffer 70, with its spring, the buffer being retained against loss by the screw 72.

In guns of this class it is desirable to provide a box for the cartridges and belt, and for the purpose of supporting the box below and beyond the throat its lower edge is turned inwardly and upwardly, as at 108, providing a supporting-lip, upon which the box may be rigidly hung, as shown in Figs. 1 and 30, and from which it may be quickly and easily detached when empty.

The interior space of the water-jacket may be utilized for storage-receptacles of various kinds, and in Figs. 4 and 5 I have shown an oil-can 109, screwed into the end of the water-jacket, and it is obvious that various other chambers, receptacles, or utensils may be stored in a similar manner to advantage.

From the foregoing description the operation of the gun will be readily understood, and it will be seen that the functions of the parts are performed in systematic sequence without loss of time and in a most positive and accurate manner, while the extreme simplicity of construction, few number of parts, and their non-liability to disarrangement or to get out of order will commend the gun to all users of this class of ordnance.

Various changes and modifications may be made by the skilled mechanic in the design, arrangement of the parts, or in their construction without departing from my invention, or portions of the gun may be used interchangeably with other constructions for which I have already filed other applications, and all such changes or adaptations are to be considered strictly as within the scope of the following claims.

What I claim, and desire to secure by Letters Patent, is—

1. In a gas-actuated gun, a piston-chamber formed in the casing having a reduced terminal in communication with the bore of the barrel, an exhaust-port leading outwardly from the chamber through the casing back of such reduced terminal and a piston mounted in the chamber provided with a reduced extension and shoulder adapted to interfit with the reduced terminal of the chamber and its shoulder, substantially as set forth.

2. In a gas-actuated gun, a piston-chamber formed in the casing comprising the water-jacket, an exhaust-port leading outwardly and downwardly therefrom through the casing, a reduced extension of the piston-chamber beyond such exhaust-port in communication with the bore of the barrel, an intervening pressure-regulating device, and a piston mounted in the chamber provided with a reduced extension loosely fitting into the extension of the chamber, and provided with a shoulder adapted to abut against the shoulder formed by such reduced extensions, and to receive the gas-pressure, substantially as set forth.

3. In a gas-actuated gun, a piston-chamber formed in the casing comprising the water-jacket, an exhaust-port leading outwardly and downwardly therefrom through the casing, a reduced extension of the piston-chamber, beyond such exhaust-port in communication with the bore of the barrel, an intervening pressure-regulating device, and a piston mounted in the chamber provided with a reduced extension loosely fitting into the extension of the chamber provided with a shoulder of the full diameter of the piston-chamber adapted to abut against the shoulder



formed by such reduced extension, and having a reduced neck back of such shoulder to permit clearance, substantially as set forth.

4. In a gas-actuated gun, a piston-chamber, the forward portion of which communicates with the barrel and the rear portion of which is of larger diameter than the forward portion and communicates with an exhaust-opening, and a piston mounted in said rear portion, and provided with a reduced extension, projecting into said forward portion.

5. In a gas-actuated gun, a piston-chamber, the forward portion of which communicates with the barrel and the rear portion of which is of larger diameter than the forward portion and communicates with an exhaust-opening, and a piston consisting of a collar portion and a plunger portion, the collar portion fitting against the rear of the front portion and the plunger extending thereinto.

6. In a gas-actuated gun, a piston-chamber, the forward portion of which communicates with the barrel with an intervening pressure-regulating device, and the rear portion of which is of larger diameter than the forward portion and communicates with an exhaust-opening, and a piston, consisting of a collar portion fitting against the rear of the front portion and a plunger extending thereinto.

7. In a gas-actuated gun, the combination with a piston-chamber formed in the casing and communicating with the bore of the barrel, of an enlargement of the chamber communicating with an exhaust-opening, and a piston mounted in the chamber through the enlargement, provided with a reduced extension freely fitting in the forward terminal of the chamber and having a shoulder adapted to abut against the shoulder formed by the reduced terminal of the chamber, beyond the enlargement, substantially as set forth.

8. In a gas-actuated gun, the combination with the piston, of a reciprocating actuator, a spring-controlled pin, said pin being beveled on its lower end, the actuator being provided with a beveled tip adapted to engage the beveled face of the pin and lift the pin to automatically effect connection of the actuator and piston.

9. In a gas-actuated gun, the combination with a piston mounted in a chamber having a port communicating with the bore of the barrel, of a reciprocating actuator, and a device for automatically connecting the piston and actuator, and for automatically disconnecting such parts by drawing the actuator backward and bringing the connecting device into contact with a stationary abutment, substantially as set forth.

10. In a gas-actuated gun, the combination with a piston mounted in a chamber having a port communicating with the bore of the barrel, of a reciprocating actuator having a reduced extension fitting into the end of the piston and a pin passing through the extension of the actuator extending downwardly from a tapered spring-bar laid in the top of

the piston, and adapted to withdraw the pin to detach the actuator, by lifting action of an interfering abutment, substantially as set forth.

11. In a gas-actuated gun, the combination with a piston mounted in a chamber having a port communicating with the bore of the barrel, of a reciprocating actuator having a reduced extension fitting into the end of the piston and a spring secured to the piston, provided with a beveled pin projecting through the piston and actuator extension, and having an extended undersloping lifting tip, substantially as set forth.

12. In a gas-actuated gun adapted to use belt-carried cartridges, the combination of a piston-chamber communicating with the bore of the barrel, a piston mounted in the chamber and provided with a push-bolt extension, and a rearwardly-removable actuator detachably connected with the piston.

13. In a gas-actuated gun provided with means for feeding a cartridge-belt transversely through the gun, the combination of a piston-chamber communicating with the bore of the barrel, a piston mounted in the chamber provided with a push-bolt extension adapted to push the cartridge from the belt, and rearwardly-removable means for feeding the cartridge-belt detachably connected with the piston.

14. In a machine-gun having a piston-chamber formed in the casing communicating with the bore of the barrel, and a piston mounted in the chamber, the combination with a cartridge-filled belt and a rearwardly-removable actuator detachably connected with the piston, actuated by the discharge of the gun for feeding the belt through the gun, of a push-bolt extending below and beyond the piston, operating in conformity with the belt and adapted to discharge the cartridge therefrom by impact against the tip of the ball.

15. In a gas-actuated gun, the combination with a cartridge-filled belt and a reciprocating feed-block provided with means for engaging the belt, of a cam-bar adapted to reciprocate the feed-block and a piston connected with the cam-bar and mounted in a piston-chamber communicating with the bore of the barrel.

16. In a gas-actuated gun, the combination with a cartridge-filled belt, means for limiting the movement of the belt and a reciprocating feed-block provided with means for engaging the belt, of a cam-bar adapted to reciprocate the feed-block, and a piston detachably connected with the cam-bar and mounted in a piston-chamber communicating with the bore of the barrel.

17. In a gas-actuated gun, the combination of a piston mounted in a chamber having a port communicating with the bore of the barrel, a push-bolt extension of the piston adapted to push the cartridge from the belt, a rearwardly-removable reciprocating actuator detachably connected to the piston, and means



connected with the actuator for manipulating and firing the ammunition, substantially as set forth.

18. In a rapid-fire gun, the combination with the cartridge-depressing arm, of the actuator-bar provided with means for supporting the depressing-arm erect and means for positively forcing the depressing-arm downwardly from such support when released therefrom, substantially as set forth.

19. In a rapid-fire gun, the combination with the cartridge-depressing arm provided with a supporting-button, of the actuator-bar provided with slotted ways for engaging and supporting the depressing-arm in one direction and a pressure-spring adapted to close the opening to the ways against reëtrance of the supporting-button, substantially as set forth.

20. In a rapid-fire gun, the combination with means for discharging a cartridge from a belt, of vertical guiding-faces corresponding to the sides of the cartridge adapted to facilitate its vertical fall, supporting-lugs for the rim of the cartridge, a pivoted depressor adapted to point the cartridge, and a reciprocating breech-block adapted to manipulate the depressor and to insert the cartridge in the breech of the barrel, substantially as set forth.

21. In a rapid-fire gun, the combination of a piston mounted in a piston-chamber in communication with the barrel, an actuator connected with the piston, a reciprocating breech-block in engagement with the actuator and provided with a locking device operated by the actuator, a central firing-pin mounted in the breech-block, a sear and trigger, and means incorporated with the actuator for disengaging the sear to release the firing-pin, substantially as set forth.

22. In a rapid-fire gun, the combination of a piston mounted in a piston-chamber, in communication with the barrel, an actuator detachably connected with the piston, a reciprocating breech-block in engagement with the actuator and provided with a locking device operated by the actuator, a central firing-pin mounted in the breech-block, a sear and trigger, and means incorporated with the actuator for disengaging the sear to release the firing-pin, substantially as set forth.

23. In a rapid-fire gun, the combination of a piston mounted in a piston-chamber in communication with the barrel, an actuator detachably connected with the piston, a reciprocating breech-block in engagement with the actuator and provided with a locking device operated by the actuator, a central firing-pin mounted in the breech-block having a lateral lug, a pivoted sear adapted to engage the lug, and means incorporated with the actuator for disengaging the sear to release the firing-pin, substantially as set forth.

24. In a rapid-fire gun, the combination of a piston mounted in a piston-chamber in communication with the barrel, an actuator de-

tachably connected with the piston, a reciprocating breech-block in engagement with the actuator and provided with a locking device, operated by the actuator, a central firing-pin mounted in the breech-block having a lateral lug, a pivoted sear adapted to engage the lug, a trigger-rod having an enlarged end resting on the opposite end of the sear, and a pin connected with the actuator adapted to engage the enlargement of the trigger-rod to depress the sear and release the firing-pin, substantially as set forth.

25. In a rapid-fire gun the combination with a reciprocating actuator connected with a piston mounted in a chamber having a port communicating with the bore of the barrel, and a spring-actuated buffer-block having an impelling-bracket, adapted to be engaged by the firing-pin and retracted, and to exert a forward impulse thereto; of a firing-pin provided with an enlarged hollow head for the purpose set forth, and having lateral bearings with intervening air-passages, substantially as set forth.

26. In a rapid-fire gun, the combination of a pivotally-mounted spring-actuated locking-sear in engagement with a firing-pin, provided with an extension extending beyond the pivot bearing, a trigger-rod extending over the extension and provided with a beveled enlargement, and a reciprocating shoe secured to the actuator provided with a lateral pin adapted to ride over the enlargement of the trigger-rod and to depress it and the sear extension, to release the firing-pin, substantially as set forth.

27. In a rapid-fire gun, in combination with a reciprocating breech-block and a locking-sear for the firing-pin, a lock pivotally secured to the breech-block and bearing against it, a reciprocating shoe traveling with the actuator adapted to raise and support the lock and to depress it into locking position, and provided with a lateral pin adapted to depress the end of the sear to release the firing-pin, substantially as set forth.

28. In a rapid-fire gun, provided with a reciprocating actuator; a slot in the side of the inclosing case projecting downwardly and outwardly to prevent entrance of the elements, and similarly-shaped pull-bar extending from the actuator outwardly through the slot, substantially as set forth.

29. In a gun provided with a tension-storage spring and having a hinged lid for the case; a securing-eye on the lid for one end of the spring, projecting below the hinge whereby when the lid is raised the eye is thrown rearwardly to release the tension on the spring, substantially as set forth.

30. In a gas-actuated gun, the combination of an integral receiver and water-jacket; a piston-chamber in the water-jacket communicating with the barrel; a piston therein provided with a push-bolt, a reciprocating actuator connected with the piston and adapted to be retracted thereby, a tension-spring,



a slide-block transversely arranged across the throat of the gun operated by the actuator; a sear, a buffer-block and spring, and means for releasing the sear, substantially as set forth.

31. In a rapid-fire gun, the combination of a reciprocating actuator provided with a downwardly-projecting beveled shoe extension having a lateral pin, a reciprocating breech-block in engagement with the actuator, a lock pivotally secured to the breech-block provided with shoulders adapted to bear against it in a raised or lowered position, and having a horn adapted to be engaged by the shoe extension, a firing-pin mounted in the breech-block provided with a locking-lug, a pivoted sear adapted to engage the locking-lug, and a trigger-rod having an enlarged end resting on the sear extremity, adapted to be depressed by the pin on the shoe extension, substantially as set forth.

32. In a rapid-fire gun, the combination of a reciprocating actuator, a spring-actuated buffer-bar adapted to be retracted thereby and provided with an impelling-bracket, a breech-block operating in conformity with the reciprocating actuator provided with a central opening for the firing-pin and air-outlet opening through the breech-block; of a firing-pin centrally mounted in the breech-block, adapted to be retracted thereby for the full travel of the breech-block, and provided with a head adapted to be engaged by the impelling-bracket, substantially as set forth.

33. In a rapid-fire gun, the combination of a reciprocating actuator, a spring-actuated buffer-bar adapted to be retracted thereby and provided with an impelling-bracket, a breech-block operating in conformity with the reciprocating actuator provided with a central opening for the firing-pin and air-outlet openings through the breech-block; of a firing-pin centrally mounted in the breech-block, adapted to be retracted thereby for the full travel of the breech-block, and provided with a head adapted to be engaged by the impelling-bracket, such head providing lateral bearings for the pin and having air-passages therein, substantially as set forth.

34. In a rapid-fire gun, the combination of a reciprocating actuator, a spring-actuated buffer-bar adapted to be retracted thereby and provided with an impelling-bracket, a breech-block operating in conformity with the reciprocating actuator provided with a central opening for the firing-pin, and air-outlet openings through the breech-block; of a firing-pin centrally mounted in the breech-block, adapted to be retracted thereby for the full travel of the breech-block and provided with a head to hold it in a retracted position and for releasing it to fire, substantially as set forth.

Signed at Washington, District of Columbia, this 15th day of October, 1900.

VICTOR P. DE KNIGHT.

Witnesses:

CHAPMAN W. FOWLER,  
HOWELL BARTLE.