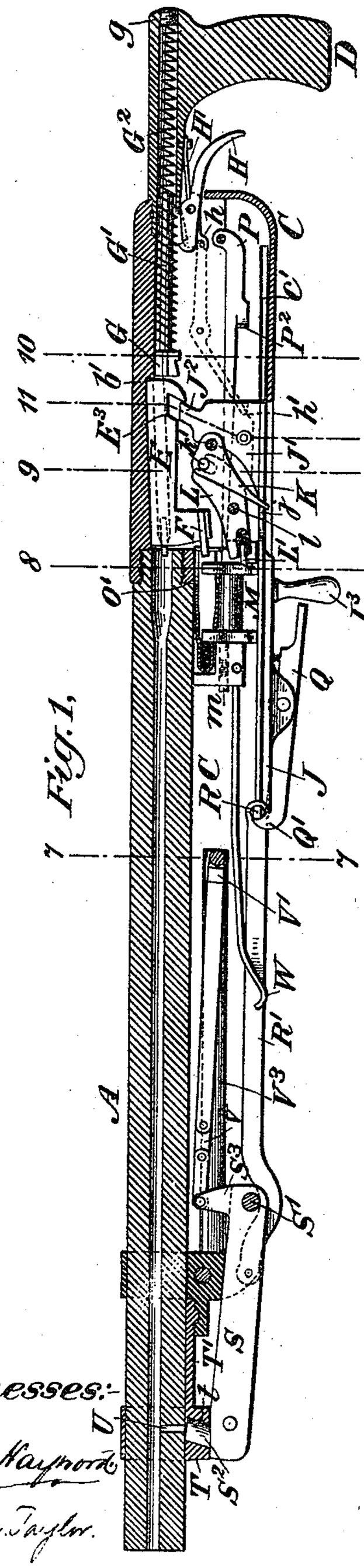
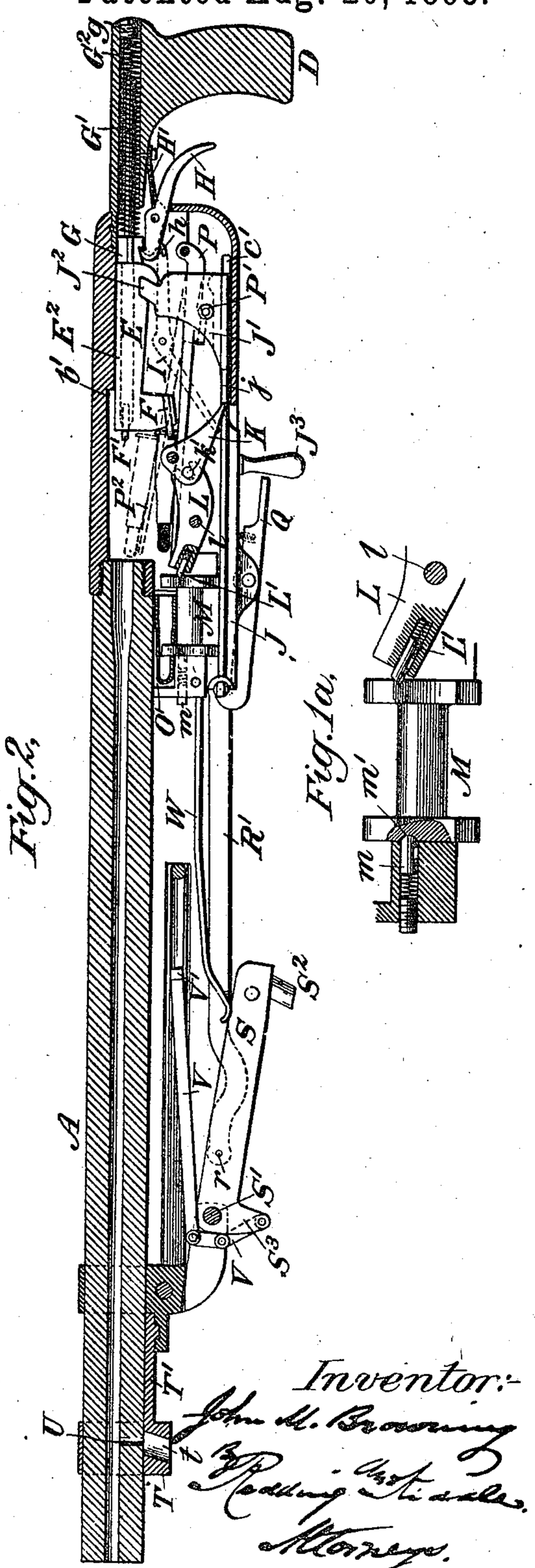
(No Model.) 3 Sheets—Sheet 1.

J. M. BROWNING.

GAS OPERATED MACHINE GUN.

No. 544,659. Patented Aug. 20, 1895.





(No Model.) 3 Sheets—Sheet 2.

J. M. BROWNING.

GAS OPERATED MACHINE GUN.

No. 544,659. Patented Aug. 20, 1895.

Fig. 1b,

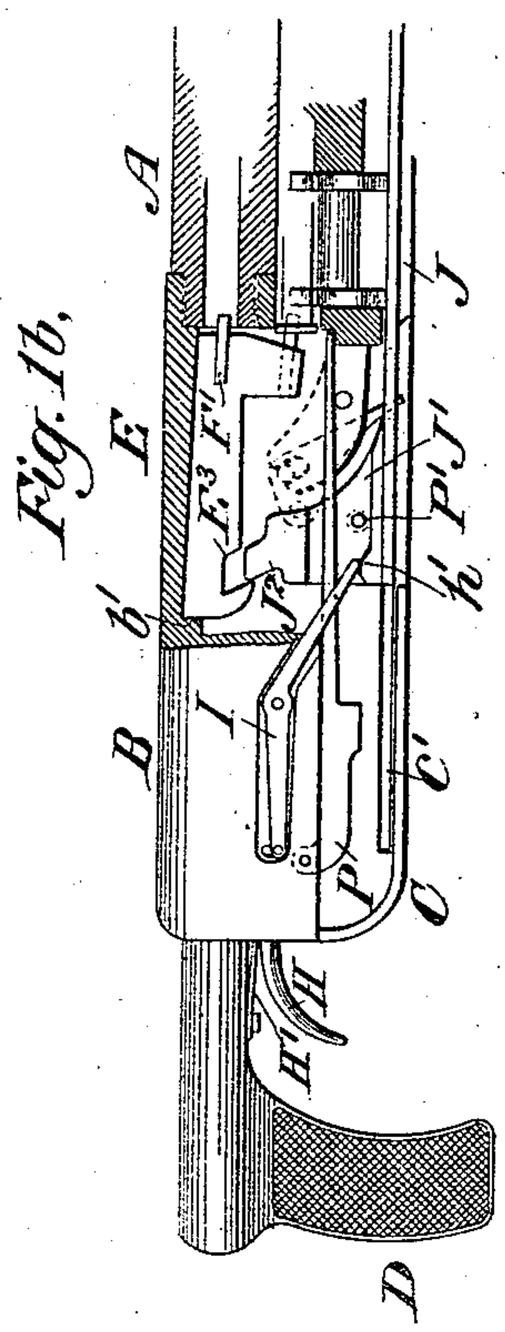


Fig. 5,

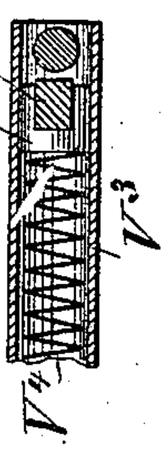


Fig. 6.

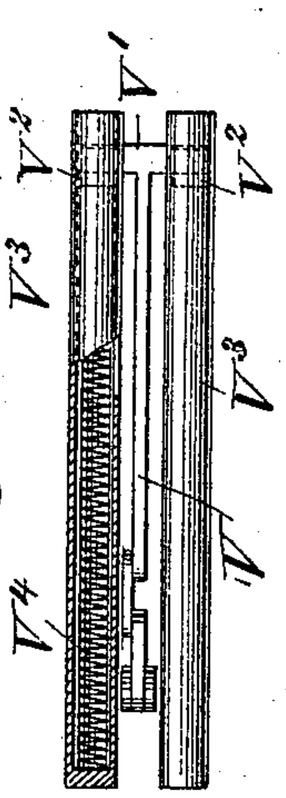


Fig. 4,

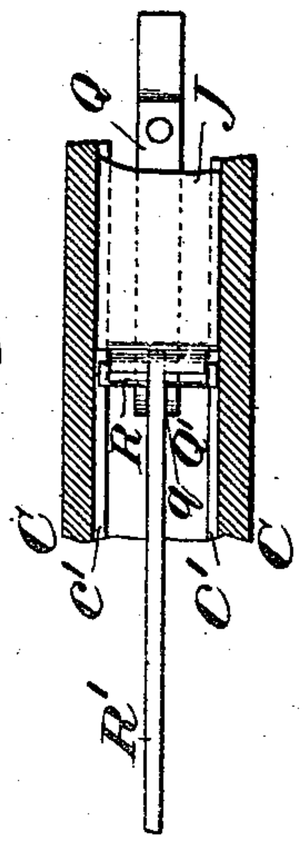
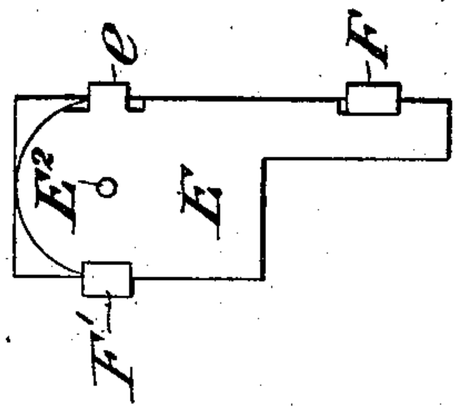


Fig. 3,



Witnesses:-

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Inventor:-

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Attorneys.

(No Model.) 3 Sheets—Sheet 3.

J. M. BROWNING.

GAS OPERATED MACHINE GUN.

No. 544,659. Patented Aug. 20, 1895.

Fig. 10.

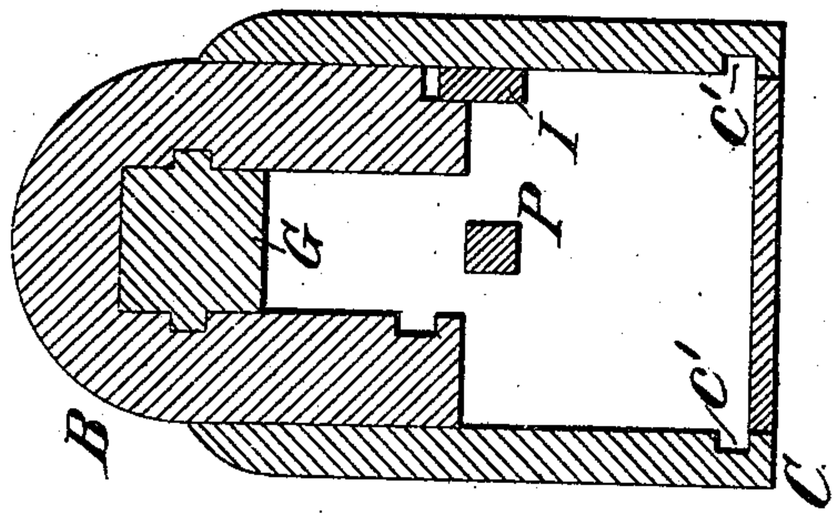


Fig. 9.

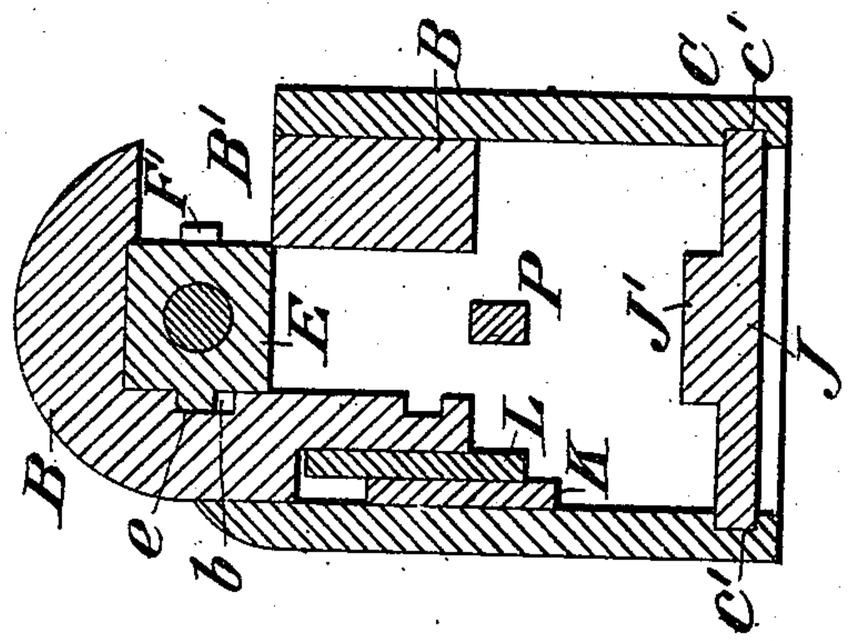


Fig. 8.

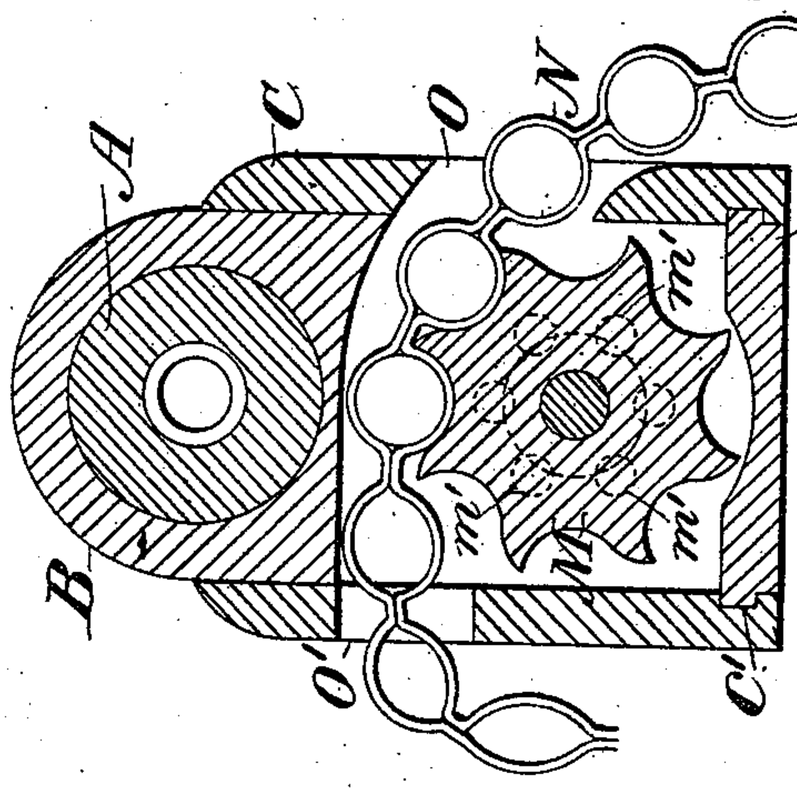


Fig. 11.

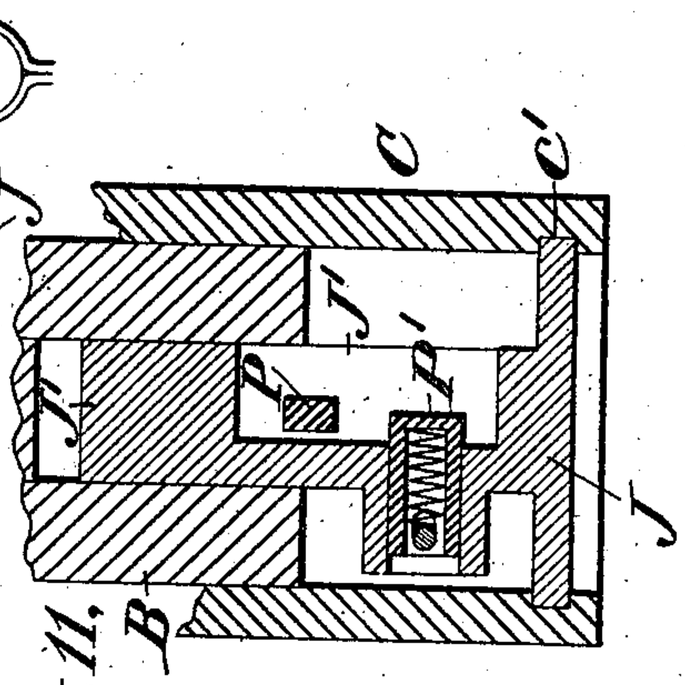
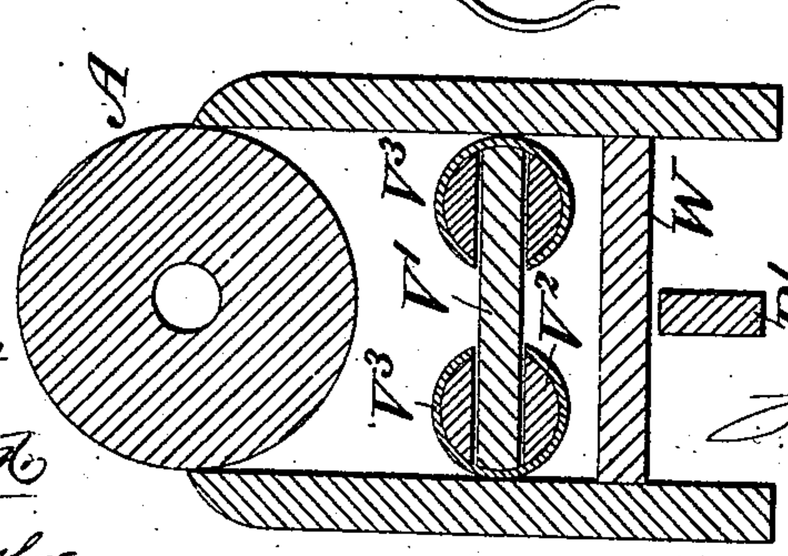


Fig. 7.



Witnesses:-
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E. W. Taylor

Inventor:-
John M. Browning
By Redding & Riddle
Attorneys

UNITED STATES PATENT OFFICE.

JOHN M. BROWNING, OF OGDEN, UTAH TERRITORY.

GAS-OPERATED MACHINE-GUN.

SPECIFICATION forming part of Letters Patent No. 544,659, dated August 20, 1895.

Application filed June 17, 1893. Serial No. 477,942. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. BROWNING, of Ogden, in the county of Weber and Territory of Utah, have invented a new Improvement in Machine-Guns; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view partly in side elevation and partly in vertical central longitudinal section of a machine-gun constructed in accordance with my invention, showing its breech-block closed and its other parts in corresponding positions; Fig 2, a similar view of the gun, showing its breech-block open and other parts in proper positions relatively to the open breech-block; Fig. 1ª, an enlarged side elevation, partly in section, of the feed-wheel and actuating spring-dog and holding spring stud; Fig. 1ᵇ, a view partly in side elevation and partly in section of the portion of the gun in proximity to and in rear of the breech and looking toward the opposite side of the gun from that shown in front in Figs. 1 and 2, but with the parts in the same relative positions as in Fig. 1; Fig. 3, an enlarged detached front elevation of the breech-block; Fig. 4, a detached plan view of a portion of the slide and connecting-link and means for detaching the slide and link with the sides of the frame in section; Fig. 5, an enlarged broken view, in vertical longitudinal section, of one of the tubes containing the restoring-springs of the automatic operating mechanism; Fig. 6, a detached plan view, partly in horizontal section, of the said tubes, together with the cross-bar and links by which they are connected with the operating-lever; Fig. 7, an enlarged view of the gun in transverse section on the line 7 7 of Fig. 1; Fig. 8, a similar view on the line 8 8 of the same figure; Fig. 9, a similar view on the line 9 9 of the same figure; Fig. 10, a similar view on the line 10 10 of the same figure; Fig. 11, a similar view on the line 11 11 of the same figure, but with the upper part broken away.

My invention relates to an improvement in machine-guns of that class in which the gases of explosion are employed to make the gun continuously operative, the cartridges being automatically fed, exploded, and ejected.

The object of my present invention is to produce a comparatively simple gun, not liable to derangement, effective and convenient in use, and adapted to be adjusted for continuous or intermittent firing, as may be desired.

With these ends in view my invention is herein illustrated and described as embodied in a machine-gun having certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claim.

My improved gun, as herein shown, has a barrel A, a receiver B, a frame C extending forward therefrom, and a handle D, all of ordinary form and construction. The breech-block E is located within the receiver B, in which it is arranged for longitudinal reciprocation, being guided therein by a rib *e*, Fig. 3, which fits into a horizontal groove *b*, Fig. 9, formed in one of the side walls of the same. The breech-block is also constructed and arranged to have a slight vertical movement, whereby its rear end is engaged with a locking-shoulder *b'*, formed in the upper wall of the receiver at a point above the bore of the barrel A. When the breech-block is in its closed position its rear end is lifted for engagement with the said shoulder, whereby the block is locked above the bore, the said shoulder forming an abutment to resist the recoil of the exploding cartridges. The said breech-block is provided at its forward end with a depending arm, carrying the primary extractor or feed-hook F, the function whereof is to successively extract cartridges from the feeding mechanism, which will be described at another time. The breech-block is also provided with a secondary extractor F', located on its opposite side and near its upper edge, and adapted to extract the spent cartridges from the bore of the gun for their ejection through the opening B', thereto provided in the right-hand side of the receiver B, as clearly shown in Fig. 9 of the drawings. The breech-block is further provided with a firing-pin E², Figs. 2 and 3, which may be of any approved construction. A hammer G, located in the receiver to the rear of but in line with the breech-block, is constructed

with a stem G′, which is encircled by a spiral hammer-spring G², which extends into an opening formed for it in the handle D, into which opening the said stem enters when the hammer is cocked. A screw-plug *g*, located at the outer end of the opening in the handle, confines the spring in place, the forward end of the handle being fastened in the rear end of the receiver. A trigger H, pivoted in the rear end of the receiver, has its inner end notched to engage with the notched lower face of the hammer in the usual manner. A trigger-spring H′, secured to the handle and engaging with the upper edge of the trigger in the rear of the pivot thereof, exerts a constant effort to engage the trigger with the hammer. Upon the same pivot-pin as the trigger H is also provided a notched sear *h*, which also engages with the hammer, and is movable independently of the trigger, and is normally held in engagement with the hammer by a portion of the trigger-spring H′, which is divided in its free forward portion longitudinally in two parts for its entire length, except at the hub which unites the two parts, and where a screw serves for fastening, or two narrow springs fastened alongside each other may be substituted; and this sear *h* has a projection or finger at its end which is engaged by a pin projecting from the rear end of a firing-lever I, the forward end whereof extends downward into position for engagement by a firing projection *h′*, carried by the slide J. The operation of this firing-lever and its coaction with the sear will be set forth at another time. The said slide J is adapted to have longitudinal movement back and forth in the lower portion of the frame C of the gun, and is shown as guided in the longitudinal grooves *c′ c′* in the sides of the frame, and is provided near its rear end with a block J′, which is inclosed by the receiver, and furnished at its upper end with an inclined operating-finger J², which enters a notch E³ formed in the lower face of the rear end of the breech-block, which is in this manner connected directly with the slide. A secondary feed-lever K, pivotally hung upon the left side wall of the frame, is furnished near its upper end with a pin *k′*, which enters an open slot formed in the rear end of the primary feed-lever L, which feed-lever L is hung on a pin *l* in the left side wall of the frame, and is provided at its lower forward end with a spring-actuated dog L′, having a beveled nose which co-operates with the feed-wheel M, Fig. 8, of the cartridge-feeding mechanism. The lower end of the secondary feed-lever K enters an opening *j*, formed in the slide just in front of the block J′, the end walls of the said opening engaging with the said end of the feed-lever to turn the same on its pivot. Thus when the slide is moved forward the rear end wall of the opening engages with the lower end of the secondary lever and carries the same forward, whereby the pin *k′* of the secondary lever, working in the open slot of the primary lever, raises the rear end, and thus depresses the forward end of the primary lever, and the spring-dog L′ moves downward in engagement with a tooth of the feed-wheel, thereby rotating the feed-wheel. On the other hand, when the slide moves rearward the front wall of the opening engages with the lower end of the secondary feed-lever, and carries the same rearward, whereby the pin *k′* lowers the rear end and raises the front end of the primary feed-lever, and the dog L′ is thus lifted into position for engaging a new tooth of the feed-wheel, the beveled nose of the dog causing the same to be retired during its upward movement.

The feeding mechanism of my improved gun comprises a notched feed-wheel M, which is arranged directly below the butt-end of the barrel A and above the slide J. This feed-wheel engages a feed-belt N, provided with a series of transverse pockets, each of which is adapted to receive a cartridge, the belt entering the receiver through an opening O, formed in the right-hand side thereof, and emerging therefrom through the opening O′ formed in the left-hand side thereof, as shown by Fig. 8 of the drawings. This belt may be of any approved construction, and does not need detailed description. A spring-actuated stud *m*, located in front of the wheel, is employed to prevent the same from retrograde movement, said stud entering one of a series of depressions *m′* in the feed-wheel (see Figs. 1ª and 8) at the conclusion of each downstroke of the dog *k′*. It will be understood that the wheel is arranged and the primary extractor or feed-hook F of the breech-block constructed so that the primary extractor F will engage with the heads of the cartridges in the belt M when the breech-block is in its closed position. Then as the breech-block is moved into its open position the cartridge thus engaged by the primary extractor or feed-hook will be drawn out upon the carrier P, which carrier is hung at its rear end within the receiver. The carrier is operated by means of a spring-stud P′, mounted transversely in the lower portion of the block J′, carried by the slide, (see Fig. 11,) and the spring-stud P′ is arranged to engage with the beveled shoulder P², depending from the rear of the carrier. When the slide is moved rearward, the stud P′ engages with the said beveled shoulder P², of the carrier, and the stud P′ is temporarily retired thereby. As soon, however, as the stud has been carried beyond the rear end of the said shoulder, it is ejected by its spring, taking a place back of the shoulder. Then when the slide is moved forward the stud engages with the lower edge of the shoulder and lifts the carrier quickly into its elevated position, in which it is shown by broken lines P² in Fig. 2 of the drawings. Then after the stud has passed beyond the forward end of the shoulder in the forward

movement of the slide, the carrier is allowed to drop back into its normal or receiving position by the action of gravity.

For the manual operation of the slide, I provide it with a depending handle J^3, which is located just forward of its longitudinal center. In front of this handle I pivot to the slide a spring-actuated hand lever or latch Q, the forward end of which is constructed with a hook Q′, having a central vertical notch or slot *q*. The extreme forward end of the slide J is constructed with a horizontal semicircular bearing arranged transversely to the slide and adapted to receive a transverse pin R, located in the rear end of the connecting or operating rod or link R′, the said end of the link entering the slot *q*, formed in the hook Q′ of the latch, and the hook Q′ extending upwardly in front of the pin R of the link, so that said pin R is held between said hook Q′ and the semicircular bearing at the end of the slide J. The extreme ends of the transverse pin R work in the guides or grooves *c′ c′* for the slide J above referred to as formed in the sides of the frame, whereby the rear end of the link R′ is guided when the link is disconnected from the slide, and the link and slide may be at any time disconnected by lifting the rear end of the lever or latch Q, whereby the hook Q′ at the forward end of said lever is moved down from in front of the transverse pin R. When the slide is thus disconnected it may be operated back and forth, and thereby the breech mechanism may be actuated without disturbing the automatic operating mechanism of the gun, and the slide and link may be readily again connected at any time by releasing the latch Q and pushing the slide forward until the parts re-engage. Thus the slide is detachably as well as flexibly connected with the link R′. Under this construction, when the slide and link are connected and the slide is moved rearward, the thrust of the link is taken by the semicircular bearing at the forward end of the slide, while, on the other hand, when the slide is being moved forward the draft of the link falls upon the hook of the latch or lever Q. This statement is made on the assumption that the mechanism of the gun is being operated automatically by the gases of explosion.

The link R′ is pivotally connected at its forward end by a pin *r* with the operating-lever S, which operating-lever is hung on a horizontal transverse pivot S′, mounted in the forward end of the frame C. The forward end of this lever is provided with a pin S^2, which enters an opening *t*, formed to receive it in a housing T, applied to the gun-barrel, and connected with the frame C thereof by means of a band T′. The opening *t* of the housing registers with a radial opening U, formed in the gun-barrel A. The gases of explosion escaping through this opening U impinge against the pin S^2, and thus swing the operating-lever S on its pivot S′. If desired, the pin S^2 may be pivotally mounted in the forward end of the lever S, as in the construction covered by application for Letters Patent of myself and M. S. Browning, Serial No. 485,215, filed September 11, 1893.

It is not broadly new with me to utilize the gases of explosion for the purpose of automatically actuating mechanism for operating the gun, and I do not limit myself to the particular construction and arrangement shown and described. I wish to call attention to the fact, however, that the housing T is connected with the frame C of the gun, so that as the gun-barrel heats and lengthens it will do so independently of the housing, which will therefore be preserved in its right relation to the operating-lever, which, as before explained, is carried by the frame of the gun.

When the operating-lever is acted upon by the gases of explosion it will be thrown into the position in which it is shown by Fig. 2 of the drawings, whereby the link R′ and hence the slide will be moved backward. The said slide, link, and lever are then restored to their normal positions by means of a chain V, connected at its forward end with an arm S^8, formed at the inner end of the lever, and having its rear link or rod, at the rear end thereof, provided with or connected to a transverse bar V′, the ends of which engage with plugs V^2 V^2, located in the rear ends of two parallel tubes V^8 V^8, situated in the same horizontal plane and containing spiral springs V^4 V^4, which thus exert a constant effort through the medium of the chain V to maintain the operating-lever S and the other operating parts of the device in their normal positions, in which they are shown in Fig. 1. In this construction I thus employ two restoring-springs in the place of one, as heretofore, and am enabled to place the gas-operated mechanism close to the barrel of the gun, as the arrangement of the springs on each side of the link or links connecting the springs and gas-lever enables the gas-lever to be placed directly under the spring-containing tubes. It will also be observed that in this construction the links connecting the springs and gas-lever have no sliding bearings except at the cross-piece V′, which cross-piece is guided by the walls of slots in the spring-containing tubes V^3, and that this entire retracting mechanism is symmetrical and perfectly balanced laterally as to both weight and stress.

The cushion-spring W (shown in Fig. 1) is of ordinary construction and operation.

Having now described my improved gun in detail I will proceed to set forth the method of its operation. Assuming that a cartridge has just been fired, the gases of its explosion issuing through the opening U in the gun-barrel will act upon the pin S^2, so as to turn the operating-lever S upon its pivot until the said lever is almost reversed in position, as shown by Fig. 2 of the drawings. This movement of the lever S causes the connecting-link R′ to be moved rearward and in turn to rearwardly move the slide J, which we will as-

ne to be now coupled with the link or rod the latch or hand-lever Q. Almost immetely after the slide J has begun its rearrd movement the inclined rear wall of the erating-finger J^2 of the block J′ of the slide gages with the inclined rear wall of the ch E^3, formed in the rear end of the breechck, whereby the said inclined walls coact draw the rear end of the breech-block wnward out of engagement with the lock- shoulder or abutment b', formed in the per wall of the receiver. The breech-block thus left free to be moved by the slide o its open position. As it moves rearrdly it engages with the hammer, which forces into its cocked position, in which it engaged and held by the trigger H. Furermore, as the block is moved rearward its imary extractor or feed-hook F, which is in gagement with a cartridge in the belt encling the feed-wheel, draws the said cardge out upon the carrier, which carrier is en in its depressed position. Furthermore, e rearward movement of the slide operates e primary and secondary feed-levers, as bere described, and brings the spring-dog L′ to position for engaging the next tooth of the ed-wheel. Again, the spring-stud mounted the block J′ of the carrier moves into posin behind the depending shoulder thereof. ie slide having now moved to the limit of its arward movement is automatically moved rward by the action of the springs V^4 V^4 of e operating-lever S through the medium of e chain V. As soon as the slide begins to ove forward, the spring-stud P′ engages with e depending shoulder of the carrier and ts the same and the cartridge upon it into s elevated position. The forward end of the eech-block now engages with the cartridge, id the cartridge is forced into the bore of e gun-barrel. The forward movement of e slide also operates the primary and secidary feed-levers and causes the rotation of ie feed-wheel, so as to bring another caridge into position to be engaged by the priary extractor. Just before the slide reaches ie limit of its forward movement the inined forward edge or wall of the operatingnger J^2 engages with the correspondingly-iclined forward wall of the notch E^3 in the reech-block, whereby the rear end of the reech-block is lifted for the engagement of s extreme rear end with the shoulder b', ormed in the upper wall of the receiver, hereby the breech-block is locked in its losed position at a point above the bore of ie barrel. It will be understood that at this ime the operating-lever S has assumed its ormal position with reference to the radial perture formed in the barrel for the escape f the gases of explosion. Then, just as the lide is completing its forward movement the ring projection h', carried by the slide, enages with the downwardly-extending forard end of the firing-lever, whereby the ear end thereof is depressed against the finger of the sear h, which sear is in turn depressed, so that if the trigger is held in pulled position the hammer will be released. The cartridge in the barrel is thus fired, and the gases of explosion thus developed operate to put the mechanisms of the gun through the movements just above described, and these operations will be repeated continuously as long as cartridges are fed to the gun. It will be observed that the sear h is in position to engage with the hammer at all times except when the slide is in extreme forward position with the breech-block fully locked, and that the slide in its forward movement fully locks the breech-block before the firing projection h' of the slide actuates the firing-lever to release the hammer, so that the locking of the breech-block is insured before the hammer is released, and the hammer cannot be released from the sear except when the breech-block is fully locked in closed position. If it is desired, however, to operate the gun manually instead of automatically, that may be done by grasping the handle J^3 of the slide and lifting the hand-lever or latch at its rear end, whereby its forward end is disconnected from the pin carried by the operating rod or link R′, and the slide is thus disconnected from the gas-operated lever S. The hand-lever or latch also enables the gun to be loaded or unloaded without operating the operating-lever, as it permits the slide to be disconnected from the automatic operating mechanism. When the slide is operated manually back and forth it will when in forward position be automatically connected with the connecting-link by means of its hand-lever or latch, the hook of which will snap over the pin at the rear end of the link whenever the slide is pushed forward with the hand-lever Q released.

I would have it understood that I do not limit myself to the particular automatic operating mechanism herein shown and described, nor to the feeding or firing mechanism, for all of the mechanisms mentioned may be varied in construction without departing from my invention.

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

1. In a machine gun, the combination with the barrel and the receiver thereof, of a longitudinally and vertically movable breech-block having an inclined slot formed in the rear end of its lower edge, a slide having an inclined finger adapted to enter the said notch for reciprocating the block and raising the rear end of the same into its locked position, and drawing it down out of such position, cartridge feeding mechanism, automatic operating mechanism constructed to be operated by the gases of explosion, and connections between the said operating mechanism and the breech-block and feeding mechanism, substantially as described.

2. In a machine gun, the combination with the barrel and receiver thereof, of a breech-

block, cartridge feeding mechanism, a slide, a primary feed-lever pivoted in the frame, and carrying a spring-actuated dog which engages with the feeding mechanism, a secondary feed-lever connected with the primary lever and also pivoted in the frame and entering an opening in the slide for operation thereby, and automatic operating mechanism constructed to be operated by the gases of explosion, and connected with the slide which slide also operates the breech-block, substantially as described.

3. In a machine gun, the combination with the barrel and frame, of a breech-block, cartridge feeding mechanism, a slide operating said block and mechanism, and a gas operated device, a rod extending from the gas operated device to the forward end of the slide, and a hand lever or latch connecting the slide and rod and adapted to be operated at will to connect or disconnect the breech mechanism and gas operated device, and guides for said rod whereby said rod when disconnected is held in the path of said slide, substantially as set forth.

4. In a machine gun the combination with the barrel and the receiver thereof, of a breech-block, cartridge feeding mechanism, a slide connected with the said block and mechanism, automatic operating mechanism constructed to be actuated by the gases of explosion, and a hand lever or latch for connecting the slide and operating mechanism, whereby the said slide and mechanism may be readily disconnected, substantially as described.

5. In a machine gun, the combination with the barrel and frame, of a breech block, cartridge feeding mechanism, a longitudinally moving slide operating the said block and mechanism, a gas operated lever, a rod extending therefrom to the forward end of the slide, said slide having an open bearing at said forward end and said rod having a cross pin to enter said open bearing, and guides in the frame for said cross pin, and a spring latch pivoted upon said slide and having a hook fitting over said pin of the rod when said pin is within the open bearing of the slide, whereby said slide and rod may be connected or disconnected at will, substantially as set forth.

6. In a machine gun, the combination with a barrel provided with a radial gas opening, of a receiver, a frame connected with the receiver, a housing encircling the barrel and connected with the said frame, and provided with an opening aligned with the said gas opening, an operating lever pivotally attached to the frame, and provided with a pin which enters the opening in the housing, a spring connected with the said lever for restoring it to its normal position, a breech-block, cartridge feeding and firing mechanisms, and connection between the said operating lever and the said block and mechanisms, whereby the lengthening of the gun barrel as it heats does not change the position of the housing with reference to the operating lever, substantially as described.

7. In a machine gun, the combination with the operating lever thereof, of two spiral springs and slotted tubes inclosing the same, a cross bar for compressing said springs, said cross bar being located at the rear ends of springs and working in the slots of the tubes, and links connected to said cross bar between said springs and also connected to the operating lever, substantially as set forth.

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

JOHN M. BROWNING.

Witnesses:
KATE LINEHAN,
T. S. BROWNING.