

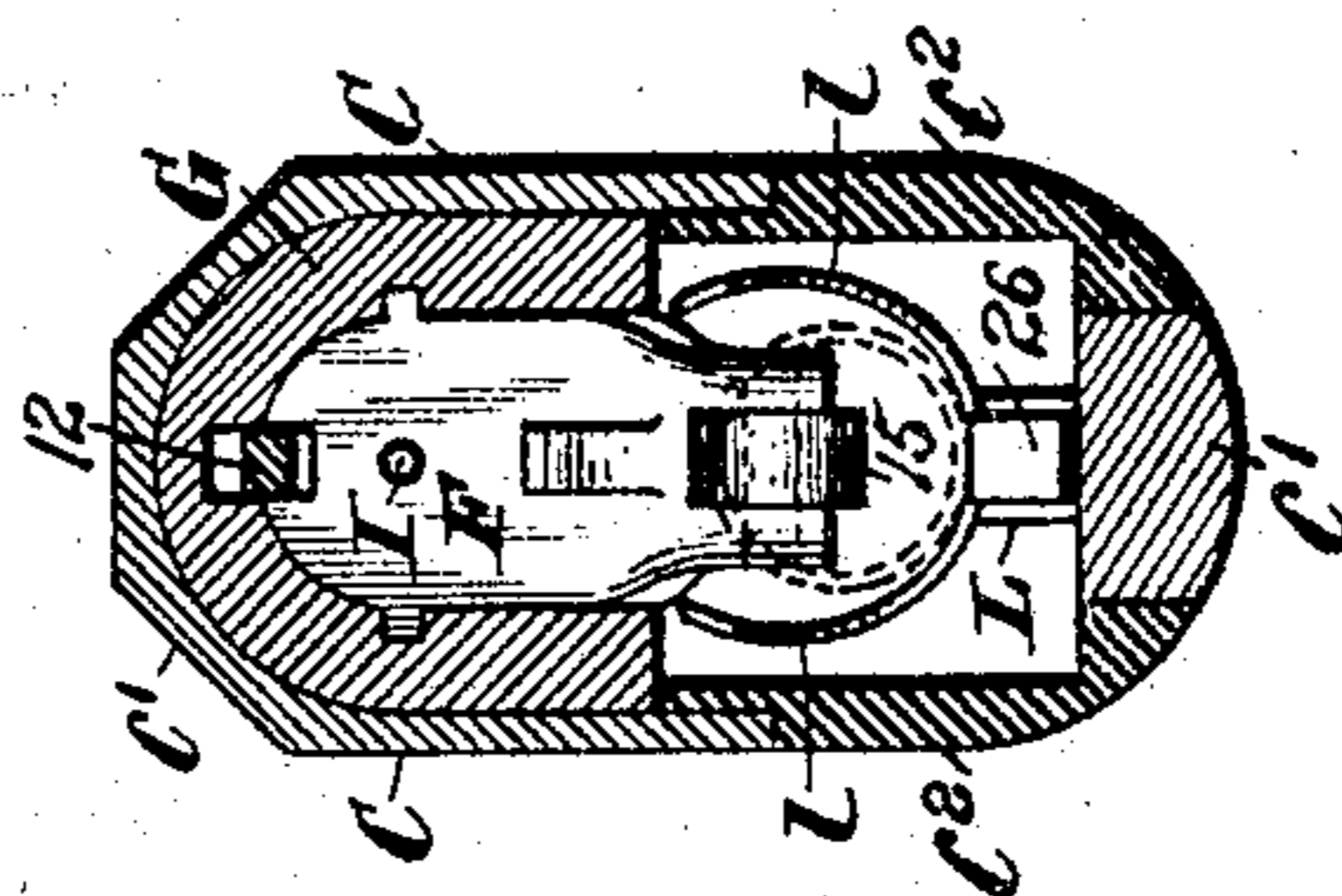
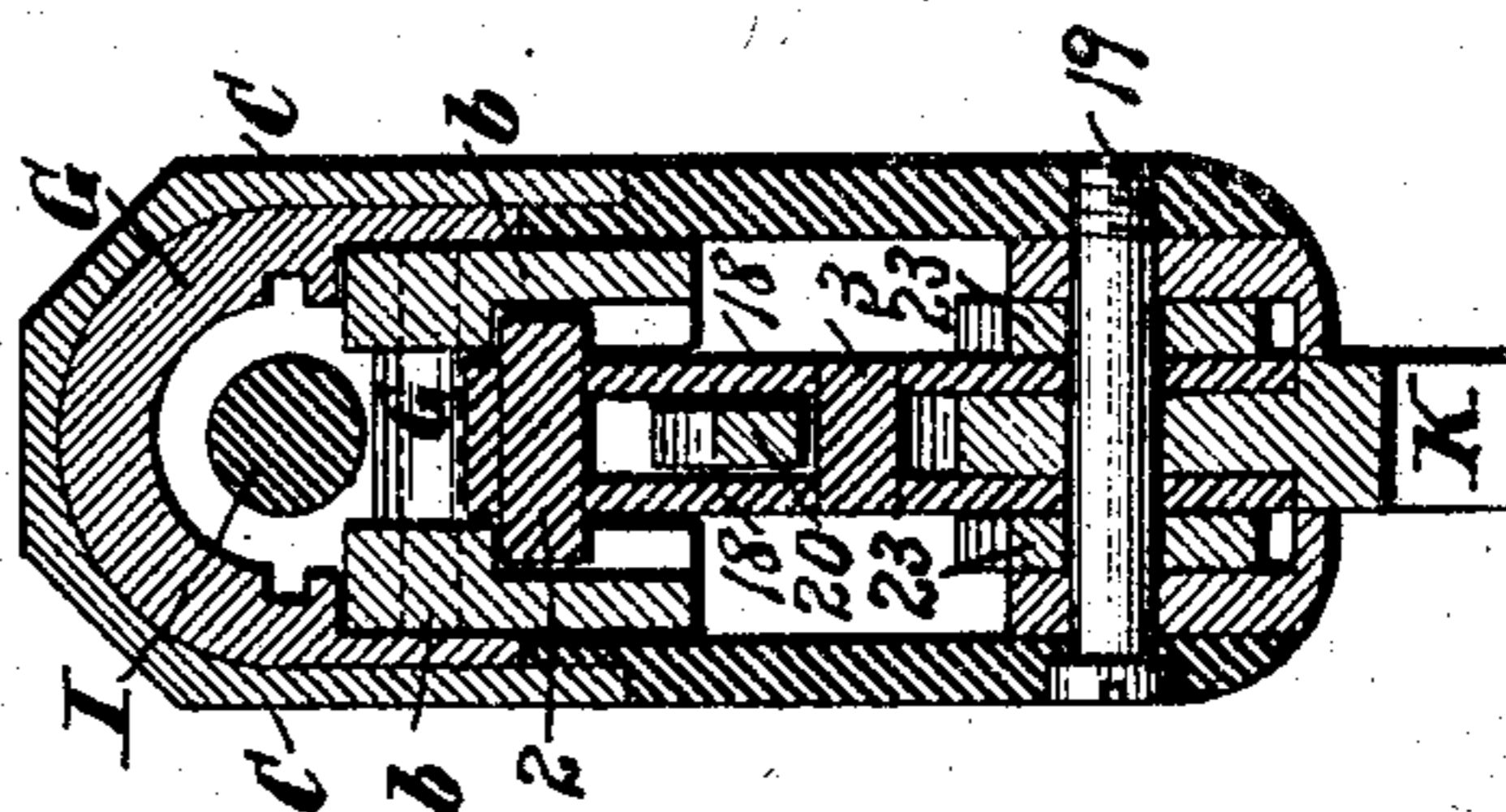
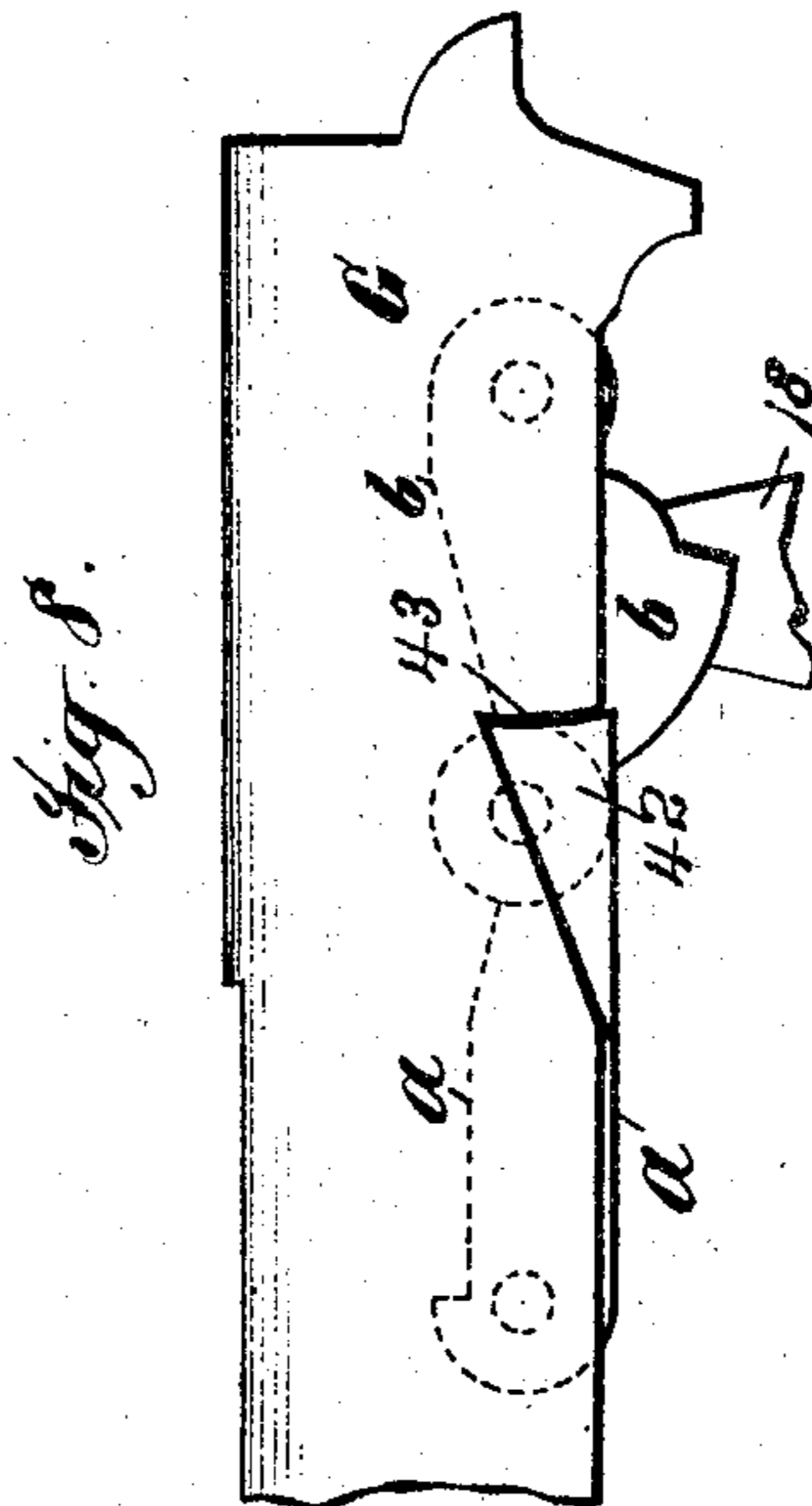
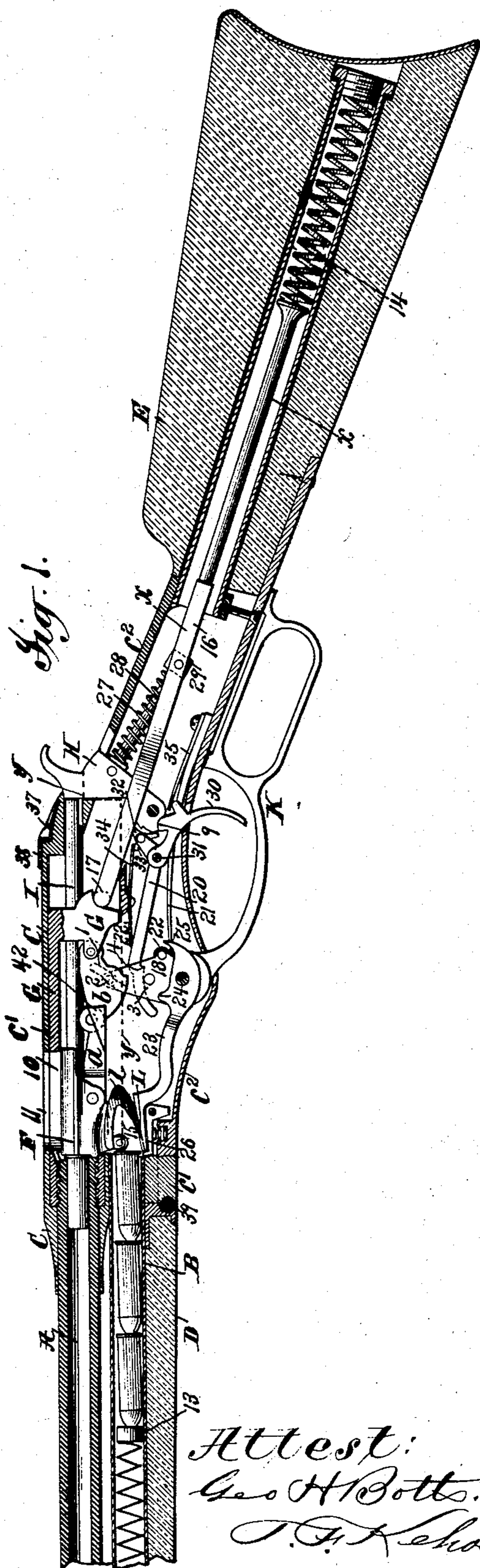
(No Model.)

3 Sheets—Sheet 1.

R. M. CATLIN.
RECOIL OPERATED FIREARM.

No. 574,350.

Patented Dec. 29, 1896.



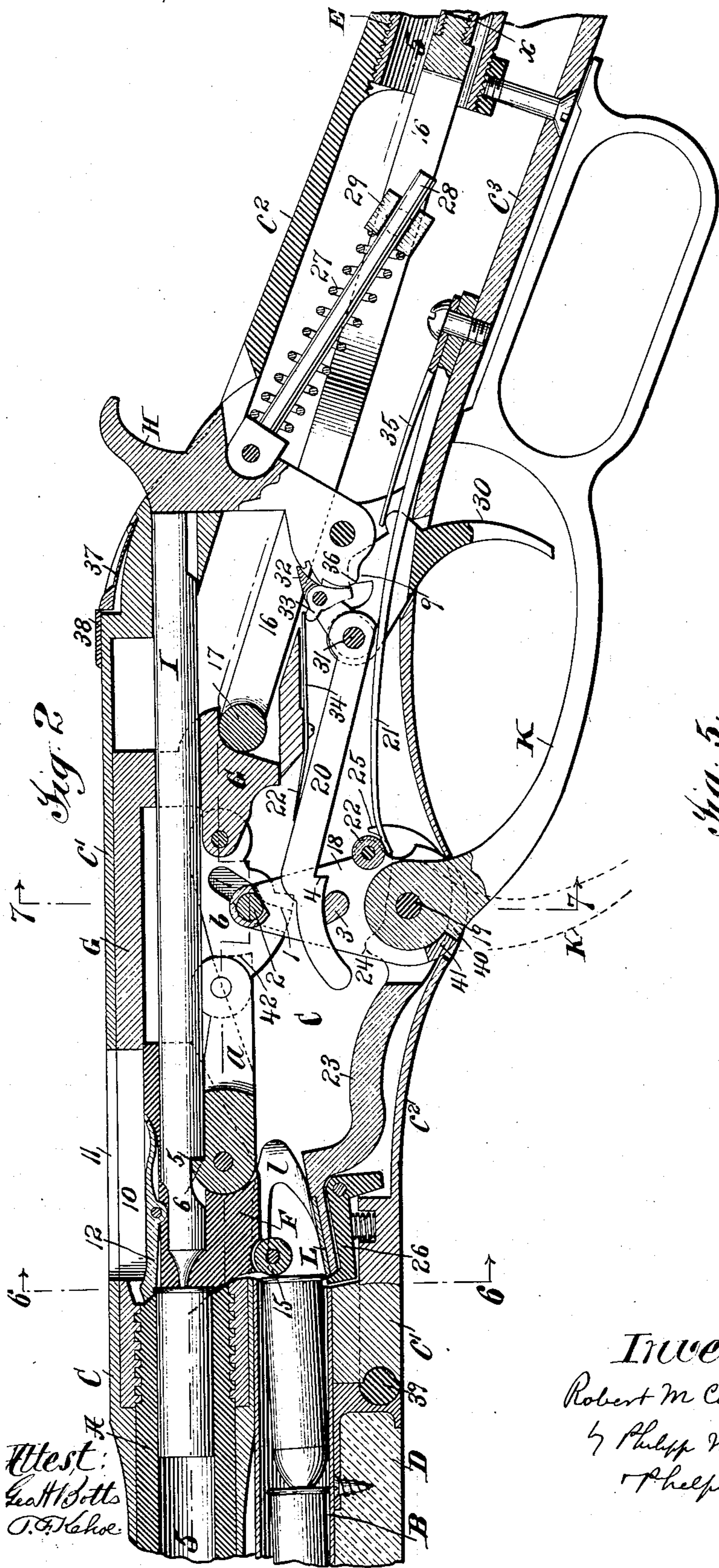
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T. F. Kehoe.

Inventor:
Robert M. Catlin
By Philip Munn Phelps
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R. M. CATLIN.
RECOIL OPERATED FIREARM.

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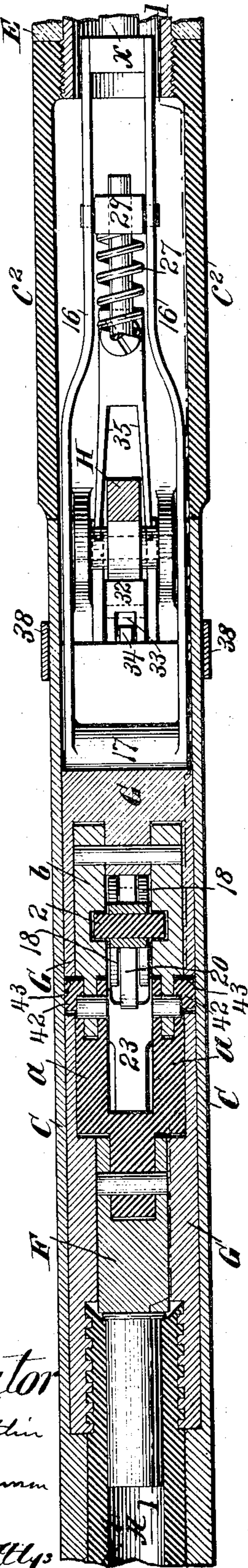
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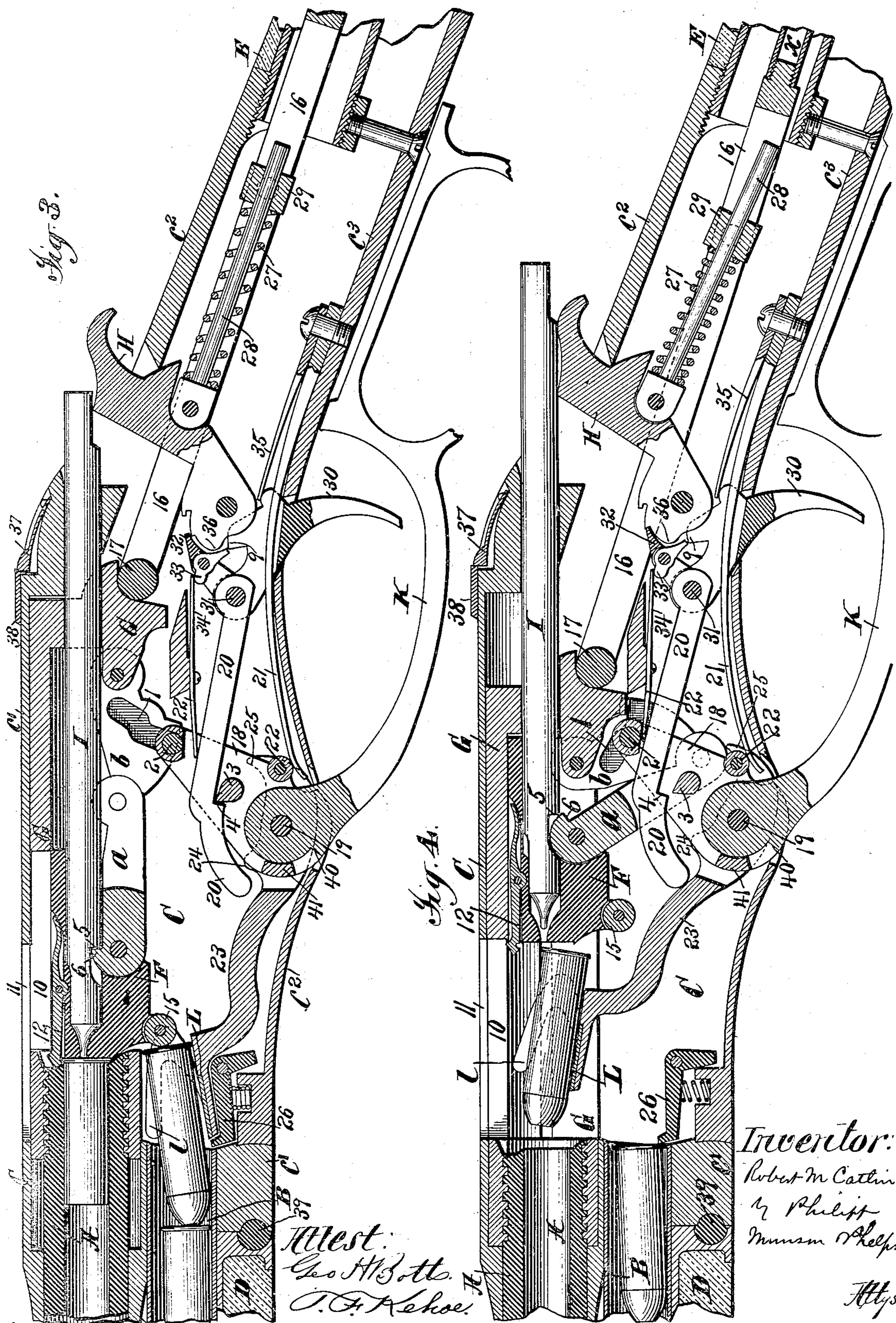
Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT M. CATLIN, OF TUSCARORA, NEVADA, ASSIGNOR TO THE SAN FRANCISCO ARMS COMPANY, OF SAN FRANCISCO, CALIFORNIA.

RECOIL-OPERATED FIREARM.

SPECIFICATION forming part of Letters Patent No. 574,350, dated December 29, 1896.

Application filed September 20, 1894. Serial No. 523,602. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. CATLIN, a citizen of the United States, residing at Tuscarora, county of Elko, and State of Nevada, have invented certain new and useful Improvements in Recoil-Operated Firearms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The object of the present invention is to provide an improved magazine-firearm, and especially to provide an improved construction of firearm of that particular class known as "recoil-operated," in which the energy developed by the recoil is utilized in retracting the breech-bolt from the barrel to open the breech and performing the other operations required for the next discharge. The invention is intended especially for use in shoulder-arms, either rifles or shotguns, but it is applicable also to all other classes of firearms, including light and heavy guns.

20 The present invention relates especially to firearms employing a longitudinally-movable barrel and a breech-bolt connected to the barrel by a pair of links pivoted together, with means for returning the barrel to position after recoil and actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, the breech-bolt preferably being withdrawn during the return movement of the barrel.

35 The especial object of the invention is to provide an improved breech movement of this class; and the invention includes various features of construction and combinations of parts in a firearm of this general organization and certain specific features combined with the breech movement to form a complete firearm, some of which may be applied also in other classes of firearms employing a different breech movement.

45 In the construction embodying the various features of the invention in their preferred form I use a breech movement in which the links are open and lie substantially in a straight line in their normal position and are locked in such position during the recoil movement, so as to lock the breech-bolt to the barrel while the links are unlocked for

the return movement of the barrel, and during this return movement the link connected to the barrel is operated as a lever to retract the breech-bolt and open the breech, the breech-bolt being released at the proper time and returned to position by the opening or straightening of the links and the empty shell being meanwhile ejected and the live cartridge inserted and carried into the barrel by the returning breech-bolt.

For a full understanding of the invention a detailed description of a construction of this general organization embodying all the improvements as applied in their preferred form will now be given in connection with the accompanying drawings, forming a part of this specification, and the features forming the invention will then be specifically pointed out in the claims.

Referring to the drawings, Figure 1 is a longitudinal vertical section of the breech portion of the gun, taken on line 1 of Fig. 5, the gun being shown as loaded with the hammer resting upon the firing-pin. Fig. 2 is an enlarged central section showing the same position. Fig. 3 is a view similar to Fig. 2, showing the parts in the position they occupy after the recoil with the barrel in its rearward position. Fig. 4 is a similar view showing the barrel returned to its normal position and the breech-bolt fully withdrawn and about to be returned to position to carry the cartridge from the carrier into the barrel and close the breech. Fig. 5 is a longitudinal horizontal section on the line 5 of Fig. 2. Figs. 6 and 7 are cross-sections on, respectively, the lines 6 7 of Fig. 2. Fig. 8 is a detail side view of the barrel-extension and links.

In the drawings, A is the barrel; B, the magazine below the barrel; C, the frame in which the barrel and magazine are mounted and in which the operating parts of the gun are carried; D, the fore-arm; E, the butt or stock of the gun; F, the breech-bolt; G, the barrel extension, inclosing the breech-bolt and formed integral with or rigidly connected to the barrel so as to form a part thereof, being shown as screwed thereto; H, the hammer; I, the firing-pin; K, the hand-lever, and L the carrier.

The barrel A with its rearward extension

G are free to move longitudinally for a limited distance independently of the frame C and magazine B, and the magazine B may be supported at its forward end from the barrel, as usual, by rings carried by the barrel and sliding on the magazine or in any other suitable manner, the barrel and barrel extension sliding in the frame C, which is formed so as to guide and hold them against turning, the guiding-surfaces being preferably angular, as shown, a tongue and groove being used.

The breech-bolt F reciprocates in the barrel extension G, and the latter is mortised vertically the length of a cartridge, as shown at 10, and this mortise registers with similar mortises in the frame C above and below the barrel extension, the mortise below the breech-piece communicating with the rear end of the magazine B and containing a movable carrier L, and the empty cartridge-shell being ejected from the top of the gun through the mortise 11 in the frame, as usual in such constructions, the breech-bolt being provided with an extractor 12 of any suitable form for withdrawing the shell from the barrel as the breech-bolt is retracted. The magazine may be filled from its rear end in the usual manner, as through an opening in the side of the frame C, and is provided with the usual spring-follower 13 for moving the cartridge rearward.

The barrel A and barrel extension G are held in their normal forward position, as shown in Figs. 1 and 2, in which the breech is closed by the breech-bolt F, by a spring which in the preferred construction shown is a coiled spring 14, placed in the stock of the gun, the pressure of which spring is conveyed to the barrel extension by the pressure-rod x, the forward end of which is formed by two side plates 16, which terminate in a round knuckle 17, pressing against a suitable surface on the rear lower end of the barrel extension, this spring 14 being compressed by the recoil and reacting to return the barrel and barrel extension to normal position. This loose connection between the rod x and barrel extension is preferred, as it permits these two parts to be separated in taking the gun apart.

The breech-bolt F is connected to the barrel extension G by a pair of links a b, pivoted together, the forward end of the front link a being pivoted to the breech-bolt F and the rear end of the rear link b to the barrel extension G. The front link a is shown with a single bearing-surface at its forward end, but at its rear end is forked and forms two knuckle-joints with the two side plates, by which the link b is formed in the construction shown. It will be understood, however, that these links may be constructed in any other suitable manner.

The two side plates forming the link b are provided with grooves 1, forming a slot in which works a pin 2, carried by a lever 18, having the pivot 19 at the base of the frame C. This lever 18 carries a lug 3, which is adapted to be engaged by a catch 4 on a catch-arm 20, so

as to hold the lever 18 and pin 2 during the return movement of the barrel, the rear link b thus forming a lever having its fulcrum on the pin 2 and being rocked thereon by the returning barrel, so as to carry its forward end downward and rearward, thus retracting the breech-bolt to open the breech. The hand-lever K operates the lever 18 to open the breech, being provided with a shoulder 40, which engages a lug 41, carried by the lever 18 when the hand-lever is thrown forward. Any suitable construction for the lever 18 and catch-arm 20 may be used, but in the construction shown the lever 18 is formed of two side plates and between which the lug 3 is carried, and the catch-arm 20 passes between these plates.

The lever 18 is normally held in a vertical position, as shown in Figs. 1 and 2, by the strong flat spring 21, engaging a roll 22 on the rear side of the lever, and in that position the pin 2 is in the central horizontal portion of the slot 1, so that the link b cannot rotate downward, and it is held from rotating upward by contact with the shoulders formed on the barrel extension G, as shown in Fig. 7, the spring 21 pressing upward, so as to hold it firmly in place against the barrel extension. By this construction, therefore, the links a b are locked against downward or closing movement in the normal position of the parts and during the recoil movement of the barrel, the breech-bolt F being thus securely locked to the barrel extension G and barrel, so that the full force of the recoil is transmitted from the breech-bolt through the links a b to the barrel extension G and through the rod x to the spring 14. During this recoil movement, however, the lever 18 is rotated on its pivot 19, so as to carry the pin 2 to the position shown in Fig. 3, and at the end of this movement the catch 4 on the catch-arm 20, depressed by its spring 22, engages the lug 3 on the lever 18, so as to hold the latter, and, through the pin 2, the rear link b, as stated above.

The recoil-pressure may be transmitted from the breech-bolt F to the barrel extension G and barrel wholly through the links and pivot connecting them, but I prefer to transmit this pressure wholly or partially by means independent of this pivot and the rear link, and in the preferred construction shown I attain this result by providing the forward link a with a pressure lug or lugs 42, a lug at the rear end of each fork of the link being shown, these lugs being shown as of substantially triangular form with a shoulder at the rear end and entering correspondingly-shaped recesses on the opposite side walls of the barrel extension G, so as to engage corresponding lugs 43 on the barrel extension formed by the shoulders at the rear end of the recesses, the engaging surfaces of the lugs 42 43 being cut on such a curve as to permit the breaking down and return to position of the links. By this construction the recoil-pressure upon the breech-bolt F is transmitted to the barrel ex-

tension G partially through the lugs 42 43, thus reducing the pressure required to be transmitted by the pivot connecting the links and by the rear link *b*. The links may thus be made of smaller size and thickness than otherwise, while securing the requisite strength. This is an important feature in that it admits of a material reduction in the size and width of the barrel extension, and consequently of the frame of the gun. It will be understood that these lugs may be formed in any other manner and placed in any other position suitable for securing the result desired.

The carrier *L* is carried by the carrier-arm 23, pivoted concentrically with the lever 18, this carrier-arm being provided with the forward and rear projections 24 25, by which the rear end of the link *b* actuates the carrier, and slotted or formed of side plates to permit the passage of the lever 18 and spring 21 in the center of the gun. The carrier *L* has the spring-wings *l*, between which the cartridge is received and by which it is held when carried upward, and below the carrier is the spring-pressed dog 26, of any suitable construction, for holding the cartridges in the magazine during the operation of the carrier, this dog being shown as pivoted and spring-pressed upward by a coiled spring seated in the frame under it, the carrier pressing the dog downward as it descends. The catch-arm 29 is extended forward sufficiently and is constructed to lie in the path of the carrier-arm 23 as the latter rises, and the arm is thus raised to trip the catch 4 off the lug 3 for the return of the breech-bolt. The bolt *F* preferably carries a roller 15, which lies between the wings *l* and forms a stop for the cartridge as it is fed rearward from the magazine into the carrier.

The hammer-spring is shown as consisting of a coiled spring 27 on a rod 28, pivoted to the hammer and sliding in a block 29, pivoted in the plates 16. As shown, the hammer is partially cocked by the firing-pin during the recoil movement of the barrel and fully cocked by a shoulder on the firing-pin as the breech-bolt is fully retracted. It will be understood, however, that the parts may be so constructed and arranged that the hammer will be brought to full-cock by the recoil movement of the barrel, this depending upon the angle through which the hammer is constructed to move.

It is important that some safety device should be provided to prevent the firing of the gun except when the parts are fully returned to their normal position, and in the construction shown the firing-pin *I* and link *a* are so constructed as to coact and form a safety device, which is preferably used and in itself forms a part of the invention, although it will be understood that it may be omitted. In this construction the firing-pin *I* is provided with a curved notch 5 on its under side, in which a curved shouldered projection 6 on the front end of the link *a* takes, the projec-

tion 6 and notch 5 being so formed that the firing-pin is locked when the link *a* is broken down, and can be advanced only when the link *a* is fully returned to normal position and the links straightened out, so that the breech-bolt is locked securely. The action of this safety device will be understood from an examination of the drawings, Fig. 4 showing the firing-pin locked against movement and the other figures showing the normal position of the parts.

Any suitable construction of sear and trigger mechanism may be used, but that shown will be found simple and efficient. In this construction the trigger 30 is split to accommodate the spring 21, and rotates on the pivot 31 of the catch-arm 20. The sear 32 rotates on the same center and is slotted to admit the pawl 33, pivoted thereon and spring-pressed by the spring 34, and by which the sear is held against the hammer, 35 being the trigger-spring. When the hammer is cocked, the sear engages a notch therein and the pawl 33 takes a position above a projection 9 on the top of the trigger. On pulling the trigger the projection 9 engages the lower end of the pawl 33 and raises it, rotating the sear 32 against the pressure of the spring 34, thus disengaging the hammer, and as the hammer falls a lug 36 thereon wipes the pawl 33 off the projection 9, leaving the sear 32 free to engage the hammer-notch again, even though the trigger remain in its rear position.

The gun is preferably constructed so that it may be separated into two parts, as is usual with present shotguns, but it will be understood that this is not essential. In the construction shown the frame *C* is in three pieces *c'* *c²* *c³*, the barrel *A*, magazine *B*, breech-bolt *F*, barrel extension *G*, firing-pin *I*, and the links *a b* being in the part *c'*, which may be separated from the parts of the frame *c² c³* and the stock, which is secured to the latter, the dividing line being on the dotted line *y* in Fig. 1. The separation of the parts is effected by removing the fore-arm *D*, which is fastened to the magazine *B* by any suitable means, such as a spring-catch, as usual, this catch not being shown, as it may be any well-known construction; then pressing down the spring-catch 37, so that the clamping-strap 38 may be rotated rearward about its axis 31. The whole forward part of the gun can then be rotated about the pin 39 in the part *c²* as a center until the band at the forward end of the part *c'* is freed from the pin 39, the barrel extension *G* coming off the knuckle 17 and the pin 2 being drawn out of the slot 1 in the link *b*, which is open at its lower end for this purpose. In connecting the gun the operation is reversed, the slot 1 in the link *b* being introduced onto the pin 2 and the groove in the barrel extension over the knuckle 17 as the parts are brought into position, and the parts secured together by returning the clamping-strap 38 to the position shown in the drawings, where it is secured by the spring-

catch 37. The pin 2 may be moved by the hand-lever K into proper position to enter the slot 1.

Assuming that the parts are in the position shown in Figs. 1 and 2, except that the gun is cocked, pressure is applied to the trigger 30, so as to raise the sear from the notch in the hammer by engagement of the projection 9 with the lower end of the pawl 33, thus releasing the hammer and allowing it to strike the firing-pin and explode the cartridge. As soon as the explosion takes place the force of the recoil will cause the breech-bolt F, with the barrel extension G and the barrel A, to recoil against the tension of spring 14 and compress the same. The extent of the rearward movement of the barrel will depend upon the strength of the spring, the size of the charge, and the length of the cartridge, and may be adjusted as desired within the limits embraced by the available recoil-power, but a comparatively small movement of the barrel will be found sufficient. As the barrel and breech-bolt both move rearward, the links *a b* are held pressed upward against the barrel extension G by the spring 21 acting on the lever 18 and pin 2 in the slot 1, and the breech-bolt is thus held locked to the barrel until the latter is at or near the limit of its rearward movement, thus utilizing the full force of the recoil and preventing the escape of gases at the breech. The position of the parts with the barrel in its rear position is shown in Fig. 3. The effect of the recoil having been spent, the barrel returns to normal position under the pressure of spring 14, acting through the rod *x*, and the lever 18 being held by the catch 4 the rear link is rotated downward on the pin 2 as a pivot by the forwardly-moving barrel extension to which the rear end of this link is pivoted, and thus draws backward the breech-bolt by the forward link *a* acting as a connecting link between the forward end of the rear link *b*, now acting as a lever, and the breech-bolt is fully retracted to open the breech. As the knuckle at the joints of the links *a b* swings downward and rearward it engages the projection 25 at the rear end of the carrier-arm 23 and throws the carrier upward, so as to carry a cartridge in front of the breech-bolt, the empty shell, if any, being forced out at the top mortise 11 by the carrier as it rises, the ejector 12 having withdrawn the shell from the barrel with the breech-bolt. The position of the parts with the breech fully opened and a cartridge in position to be carried into the barrel by the breech-bolt is shown in Fig. 4. The spring 21 has been compressed by the rearward movement of the lever 18, and the carrier-arm 23 in its upward movement to deliver the cartridge strikes the forward end of the catch-arm 20 and raises it so as to release the hook 4 from the lug 3 on the lever 18, when the spring 21, acting upon the roll 22 on the lever 18, rocks the latter forward and moves it from the position shown in Fig. 4 to that shown in

Fig. 2, thus returning the links and breech-bolt to their normal positions and closing the breech. As the breech-bolt returns to position it passes between the wings *l* on the carrier L, opening them at the same time that it forces the cartridge into the barrel, and this movement also, by the pressure of the breech-bolt upon the wings of the carrier, tends to move the carrier downward. As the links are returned to their normal position, also, the striking of the knuckle at the joint between the links *a b* upon the front projection 24 of the carrier assures the return of the latter after the cartridge has been pushed into the barrel sufficiently by the breech-bolt so that it requires no further guiding from the carrier. As the carrier reaches its lowest position it forces downward the dog 26, which has sprung up when released by the carrier, and thus releases the next cartridge, so that upon the withdrawal of the breech-bolt, it will be moved rearward between the wings *l* into the carrier. The wings *l* are shaped, as shown, to permit the magazine to be loaded from the side of the gun.

The hammer has been partially cocked by the end of the firing-pin as the barrel recoils and fully cocked as the breech-bolt is withdrawn from the barrel. As the hammer falls in firing the shot, the lug 36 on the hammer strikes the pawl 33 and wipes it off the projection 9, so that the sear is free to catch the hammer as it is cocked, and the parts are now in position for firing another shot. If an automatic gun be desired, by which the entire contents of the magazine may be fired at one pull of the trigger, it is necessary only to omit the lug 36 on the hammer, when the sear will be held out of position to engage the hammer as long as the trigger is held back, or it is obvious that adjustable means may be used, so that the gun may be either a single-firing or automatic gun.

When the gun is to be loaded by hand, the hand-lever K is thrown forward from the position shown in full lines in the figures to that shown in dotted lines in Fig. 2, and the shoulder 40 on the hand-lever strikes the lug 41 on the lever 18 and breaks down the links *a b*, carrying the link *b* downward and backward, thus drawing the breech-bolt back by closing the links together, as shown in Fig. 4, and cocking the hammer by the firing-pin, and on reversing the lever the parts are returned to their normal positions, as shown in Figs. 1 and 2, by the spring 21, the carrier being actuated as in the automatic operation of the gun, previously described.

If the magazine is not to be used, it will be understood that the gun may be loaded by inserting a cartridge into the carrier from the rear through an opening in the side of the frame C, as usual in magazine-guns, prior to withdrawing the breech-bolt, or the cartridge may be inserted from the top of the gun when the breech-bolt is fully withdrawn.

It will be understood that the invention may be applied to guns of other general construction than that shown, and that it may be embodied in devices of widely-different forms. The invention therefore is not to be limited to the particular arrangement and form of the devices shown, as these may be varied by those skilled in the art without departing from the invention.

What I claim is—

1. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to position after recoil, a catch and connections between said catch and one of the links, whereby said link is actuated as a lever by the returning barrel to withdraw the breech-bolt and open the breech, a carrier tripping said catch, and means for returning the breech-bolt to normal position, substantially as described.

2. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, a spring put under tension by the recoil of the barrel and by which the barrel is returned to normal position, mechanism operated by said spring for actuating the links to withdraw the breech-bolt and open the breech, and a spring put under tension by the withdrawal of the breech-bolt and reacting upon the links to return the breech-bolt to normal position, substantially as described.

3. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to normal position, a catch and connections between said catch and the rear link between its points of connection to the other link and the barrel for holding said link by the catch, whereby the rear link is actuated as a lever during the return movement of the barrel to withdraw the breech-bolt, means for tripping said catch for the return of the breech-bolt, and a spring put under tension by the withdrawal of the breech-bolt and actuating the links to return the breech-bolt to normal position, substantially as described.

4. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to normal position, a catch acting during the return of the barrel and tripped for the return of the breech-bolt, a member having a sliding connection with the rear link, and devices whereby said member is held by the catch during the return movement of the barrel and actuated on the tripping of the catch to return the breech-bolt to normal position, substantially as described.

5. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to

normal position, a catch acting during the return of the barrel and tripped for the return of the breech-bolt, a member having a pin-and-slot connection with the rear link, said slot being formed to lock the links in their normal position for the recoil movement, and devices whereby said member is held by the catch during the return movement of the barrel and actuated on the tripping of the catch to return the breech-bolt to normal position, substantially as described.

6. The combination with a longitudinally-movable barrel, actuated by the recoil of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel and breech-bolt to normal position, a catch and connections between said catch and the rear link between its points of connection to the other link and the barrel for holding said link by the catch, whereby the rear link is actuated as a lever during the return movement of the barrel to withdraw the breech-bolt, an extractor, a magazine, and a carrier actuated by the links and tripping the catch for the return movement of the breech-bolt, substantially as described.

7. The combination with a longitudinally-movable barrel, actuated by the recoil of a breech-bolt, links connecting said breech-bolt and barrel, means for returning said barrel to normal position, a member having a pin-and-slot connection with the rear link, and mechanism coacting with said member for actuating said links during the return movement of the barrel to withdraw the breech-bolt and open the breech and to return the breech-bolt to normal position, substantially as described.

8. The combination with a longitudinally-movable barrel, actuated by the recoil of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to position after recoil, mechanism for actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, and means for transmitting recoil-pressure from the breech-bolt to the barrel independently of the rear link, substantially as described.

9. The combination with a longitudinally-movable barrel, actuated by the recoil of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to position after recoil, mechanism for actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, and lugs on the front link and barrel engaging during the recoil movement for transmitting the recoil-pressure, substantially as described.

10. The combination with the longitudinally-movable barrel actuated by the recoil, breech-bolt, barrel extension G and links a, b connecting the breech-bolt and barrel extension G engaging during the recoil movement, substantially as described.

11. The combination with a longitudinally-movable barrel, actuated by the recoil of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to position after recoil, mechanism for actuating the links during the return movement of the barrel to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, a firing-pin, a hammer cocked by the recoil, and a safety device holding the firing-pin away from the cartridge until the parts are fully returned to normal position, substantially as described.

12. The combination with a hammer and recoil-operated cocking mechanism, of a sear, a trigger, and a pivoted member on the sear engaged by the trigger to release the hammer and rocked by the hammer to release the sear when the hammer falls, substantially as described.

13. The combination with a hammer and recoil-operated cocking mechanism, of sear 32 carrying pawl 33, trigger 30 having projection 9 beneath said pawl when the trigger is in its normal position, and projection 36 on the hammer arranged to rock said pawl off the projection 9 as the hammer falls, substantially as described.

14. The combination with a carrier L having the spring-wings *l*, of the breech-bolt E having a projection separating said wings for the receipt of the cartridge from the magazine, substantially as described.

15. The combination with the barrel, barrel extension, breech-bolt and links *a*, *b*, and removable part frame *c'* carrying said members, of breech-actuating mechanism detachably connected to said links and barrel extension and means for detachably securing the parts of the gun-frame together, substantially as described.

16. The combination with the barrel, barrel extension, breech-bolt, and links *a*, *b*, and removable part frame *c'* carrying said members, said link *b* having an open slot, of breech-actuating mechanism connected with

said lever by a pin entering said open slot, and means for detachably securing the parts of the gun-frame together, substantially as described.

17. The combination with the longitudinally-movable barrel, breech-bolt F and barrel extension G, of links *a*, *b*, connecting the breech-bolt and barrel-extension link *b* having slot 1, lever 18 having pin 2 entering said slot, catch 4 engaging said lever, and means for tripping said catch, substantially as described.

18. The combination with the longitudinally-movable barrel, breech-bolt F and barrel extension G, of links *a*, *b*, connecting the breech-bolt and barrel-extension link *b* having slot 1, lever 18 having pin 2 entering said slot, catch-arm 20, carrying catch 4 for holding the lever 18, and a carrier having arm 23 engaging said catch-arm to trip the catch, substantially as described.

19. The combination with the longitudinally-movable barrel, breech-bolt F and barrel extension G, of links *a*, *b*, connecting the breech-bolt and barrel-extension link *b* having slot 1, lever 18 having pin 2 entering said slot, catch-arm 20 carrying catch 4 for holding the lever 18, and a carrier having arm 23 engaging said catch-arm to trip the catch and having projections 24, 25 engaged by the links to actuate the carrier, substantially as described.

20. The combination with the longitudinally-movable barrel, breech-bolt F and barrel extension G, of a breech mechanism having links *a*, *b*, connecting the breech-bolt and barrel extension and a carrier having projections 24, 25 engaged by said links to actuate the carrier, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ROBERT M. CATLIN.

Witnesses:

E. L. McMAHAN,
JAS. DAUGHERTY.