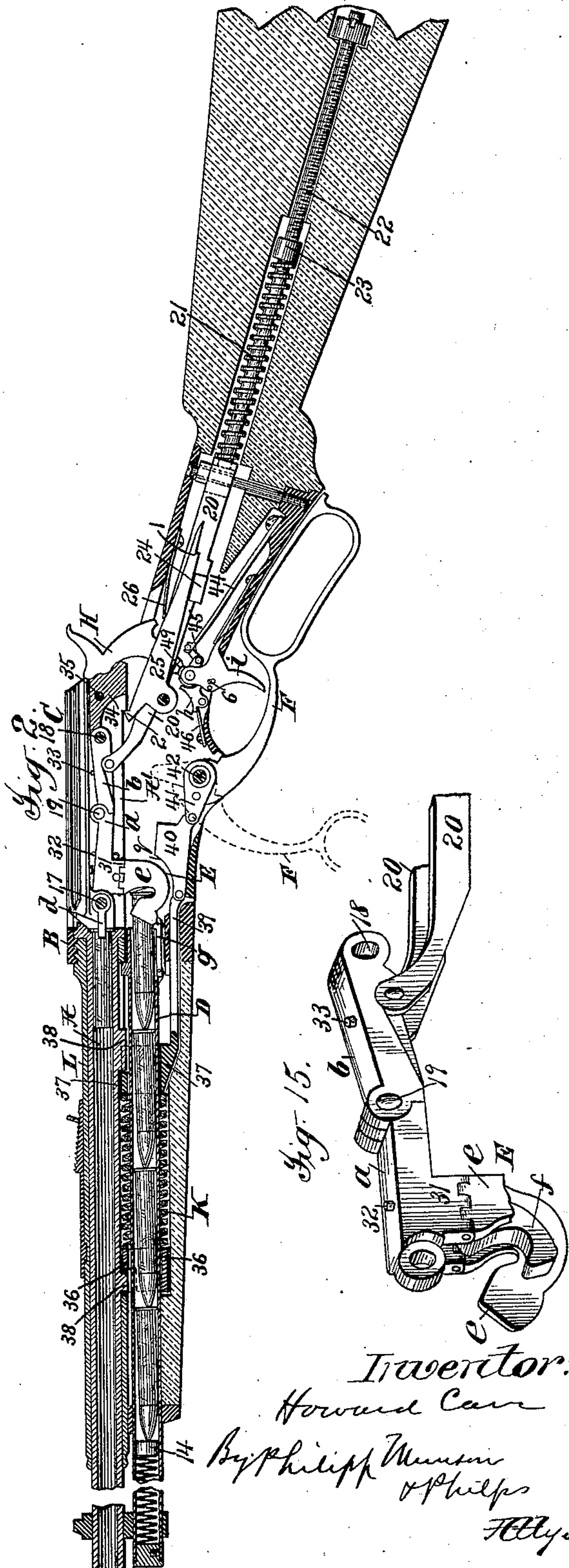


4 Sheets—Sheet 1.

No. 574,189.

Patented Dec. 29, 1896.



Attest:
Geo H. Botts.
Cl. Sawyer

The writer:
 Howard Carr
 By Philipp Munson
 of Phelps
 Fells

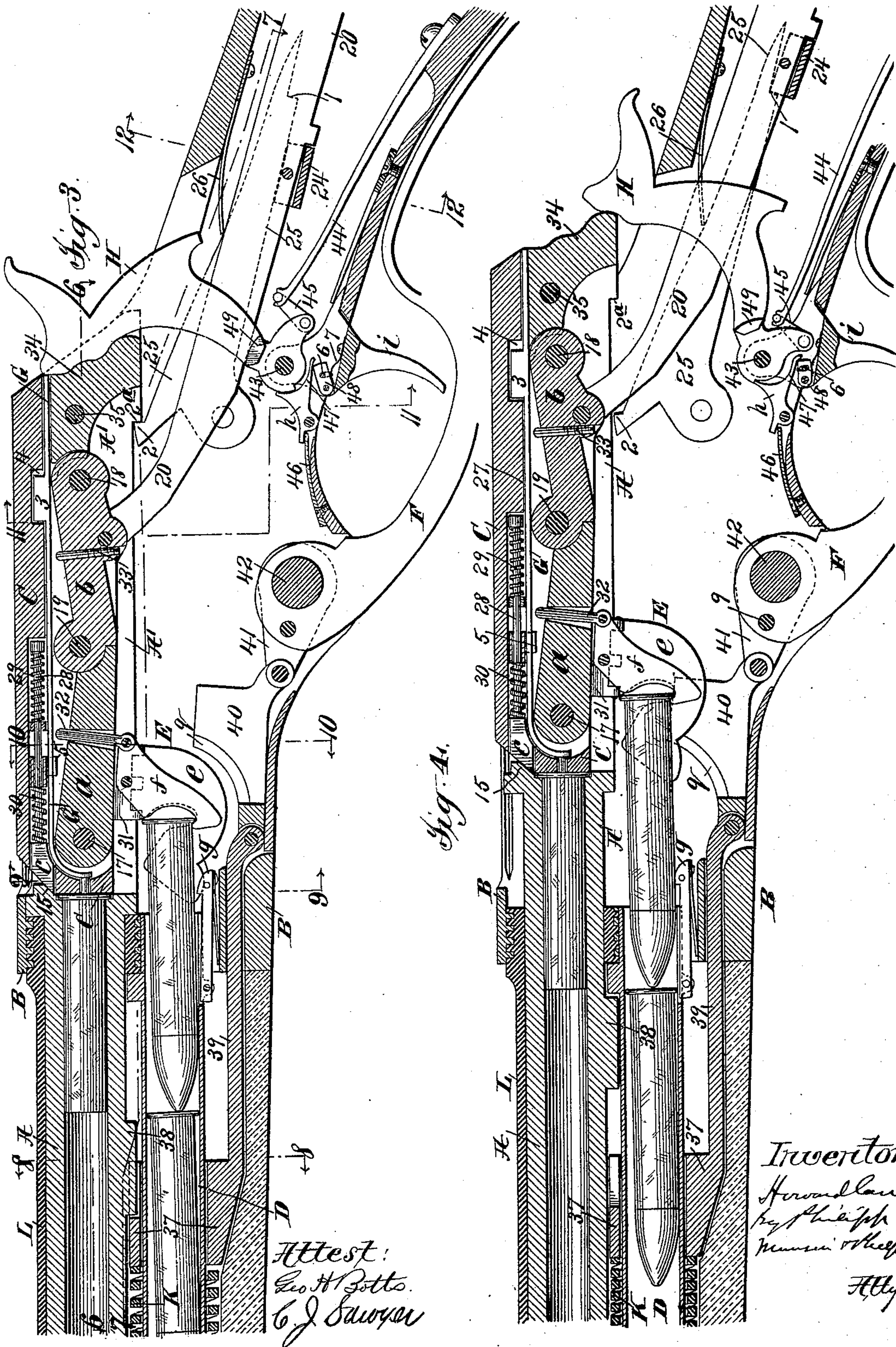
(No Model.)

4 Sheets—Sheet 2.

H. CARR.
RECOIL OPERATED FIREARM.

No. 574,189.

Patented Dec. 29, 1896.



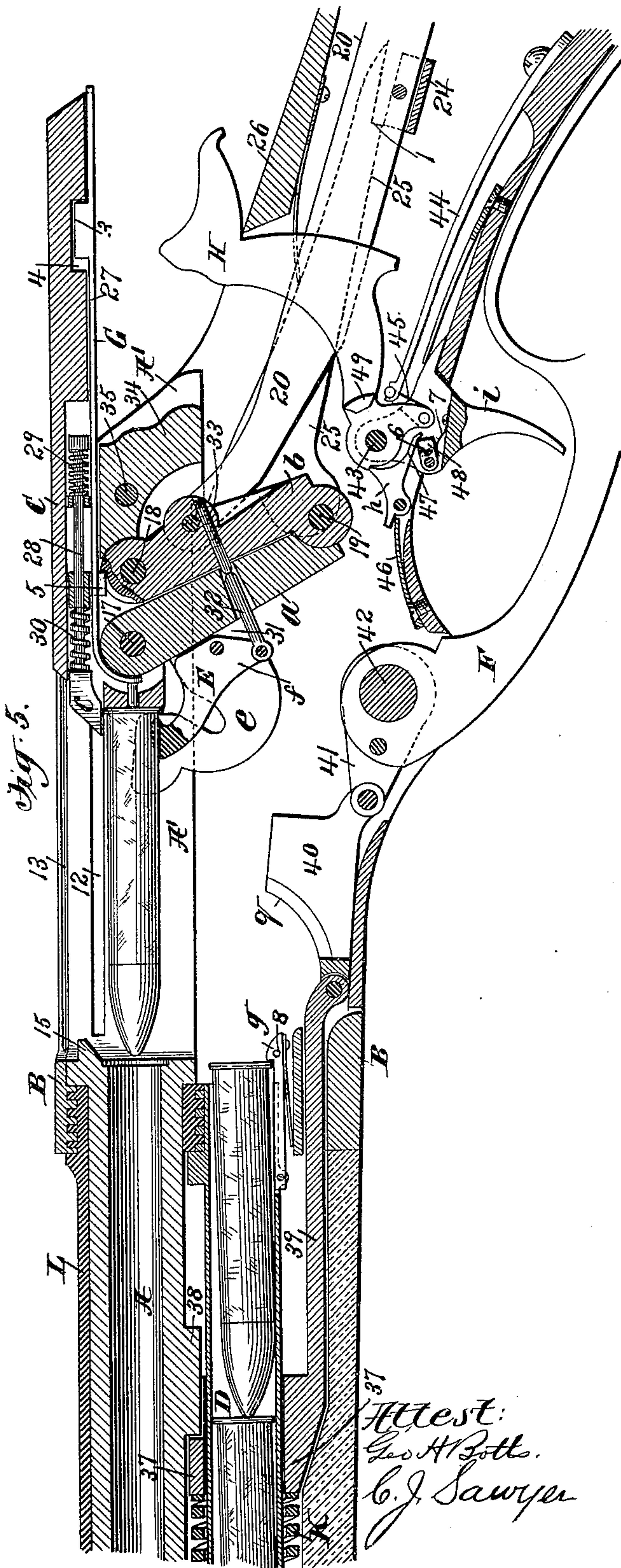
(No Model.)

4 Sheets—Sheet 3.

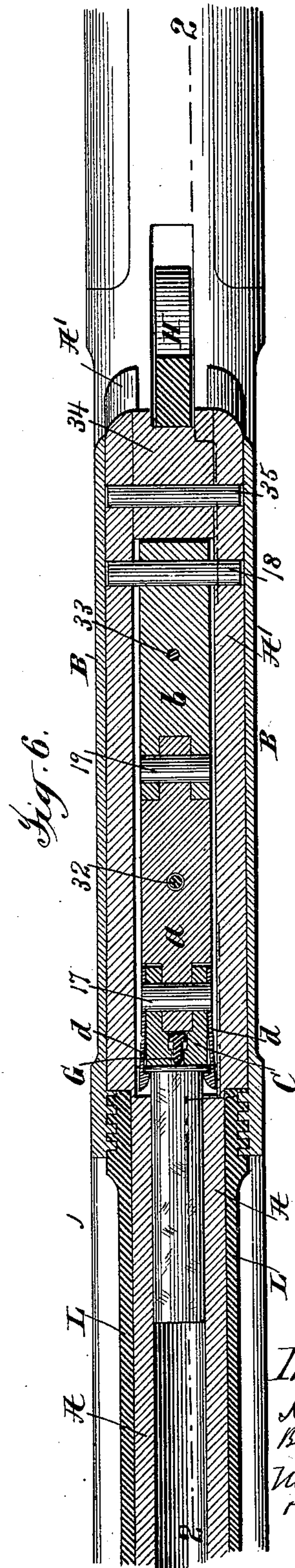
H. CARR.
RECOIL OPERATED FIREARM.

No. 574,189.

Patented Dec. 29, 1896.



Attest:
Geo. H. Botts.
C. J. Sawyer

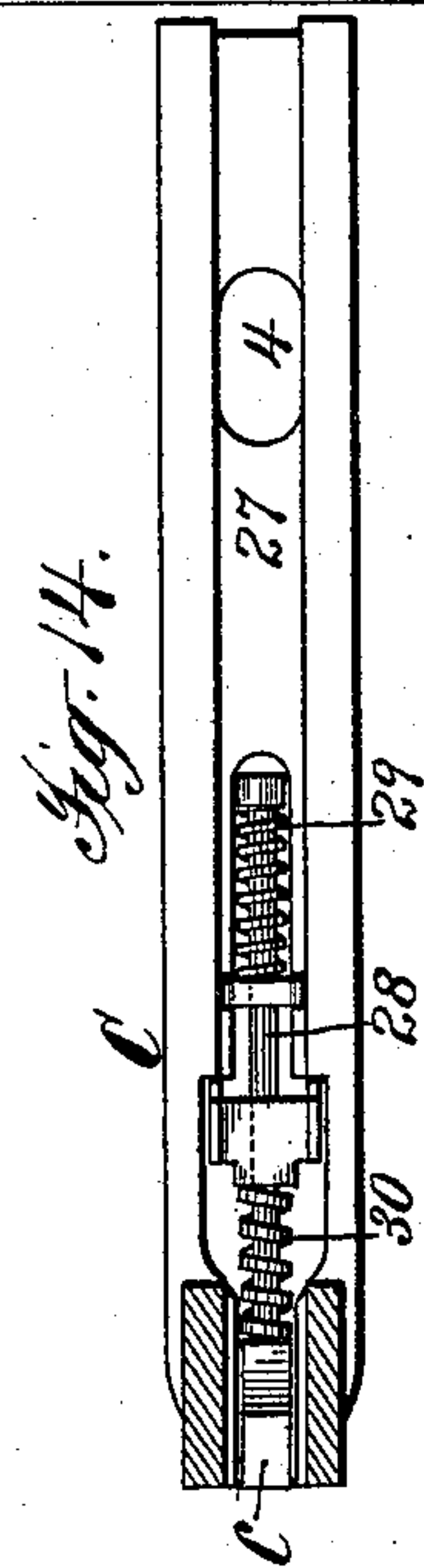
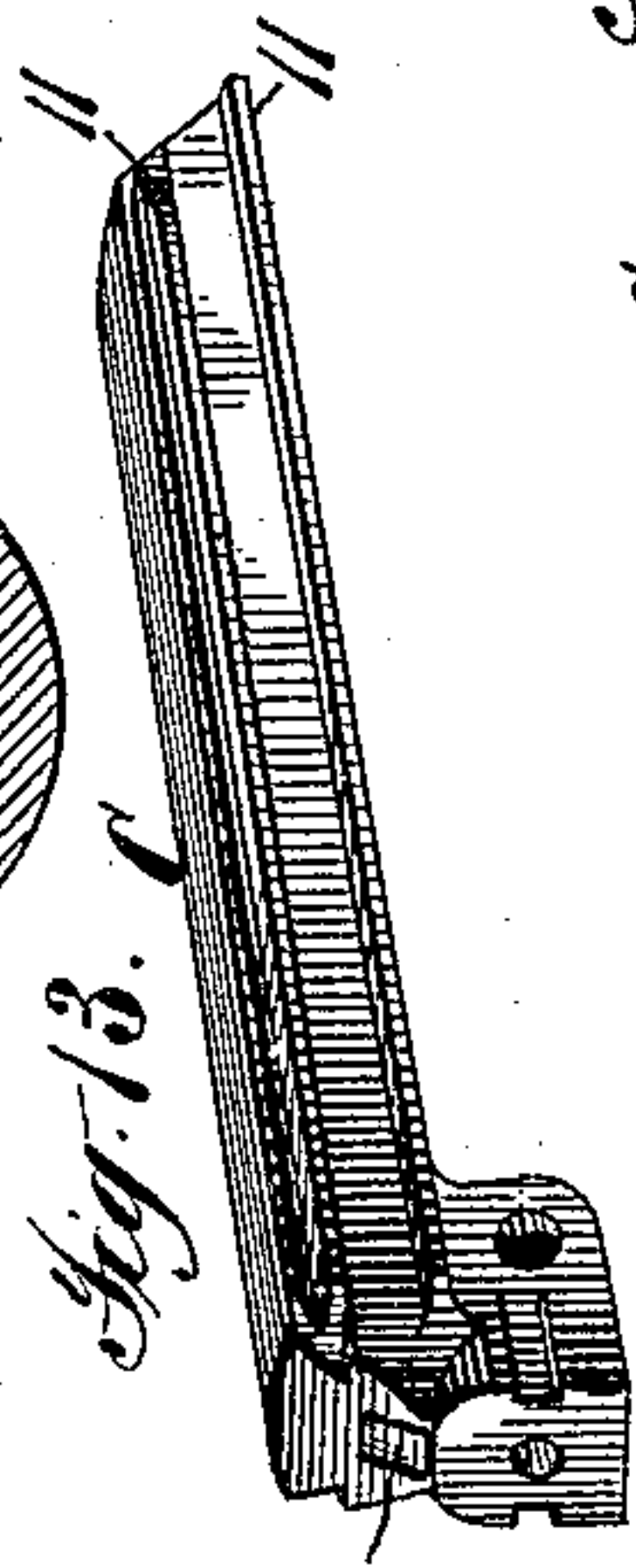
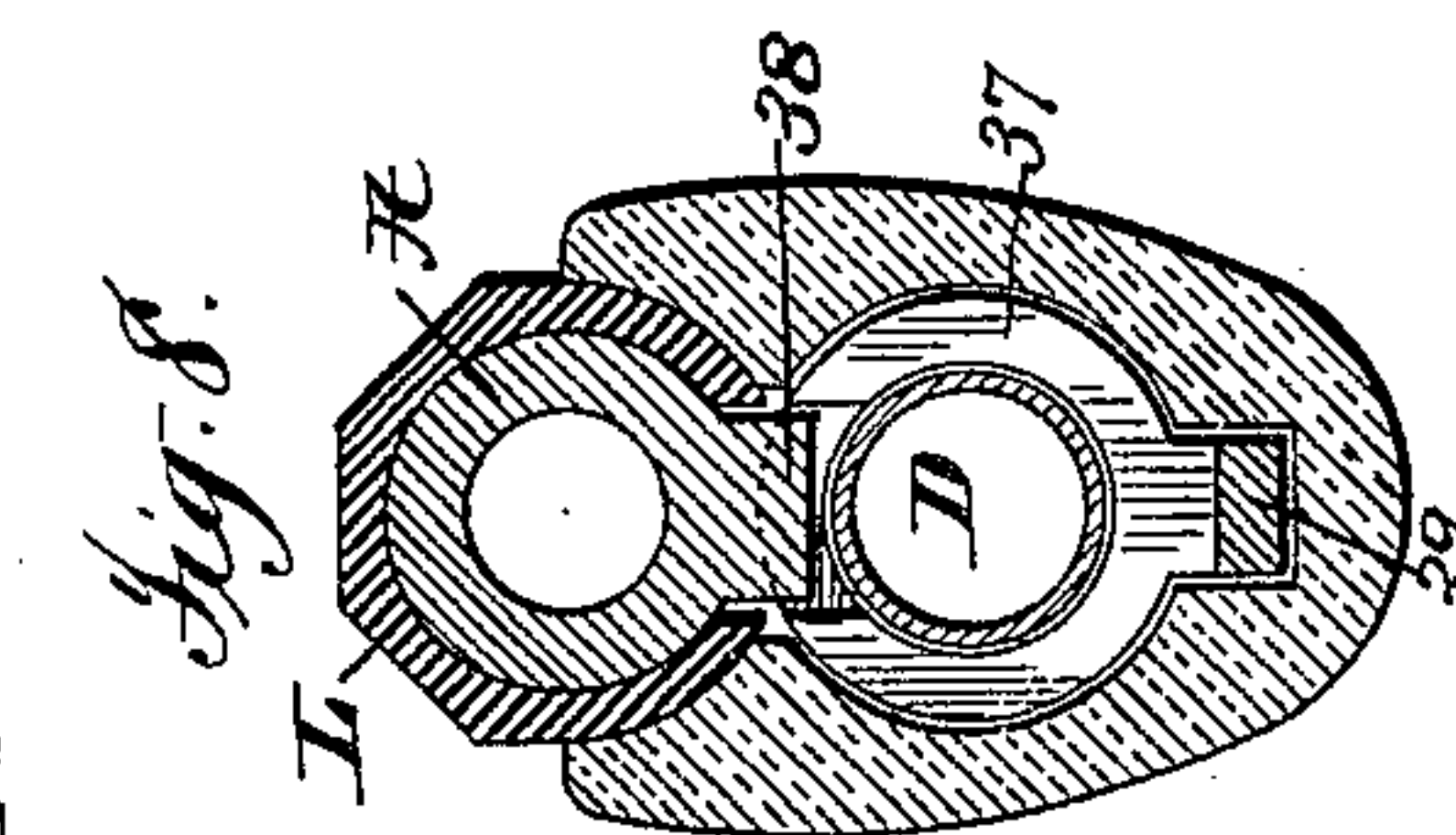
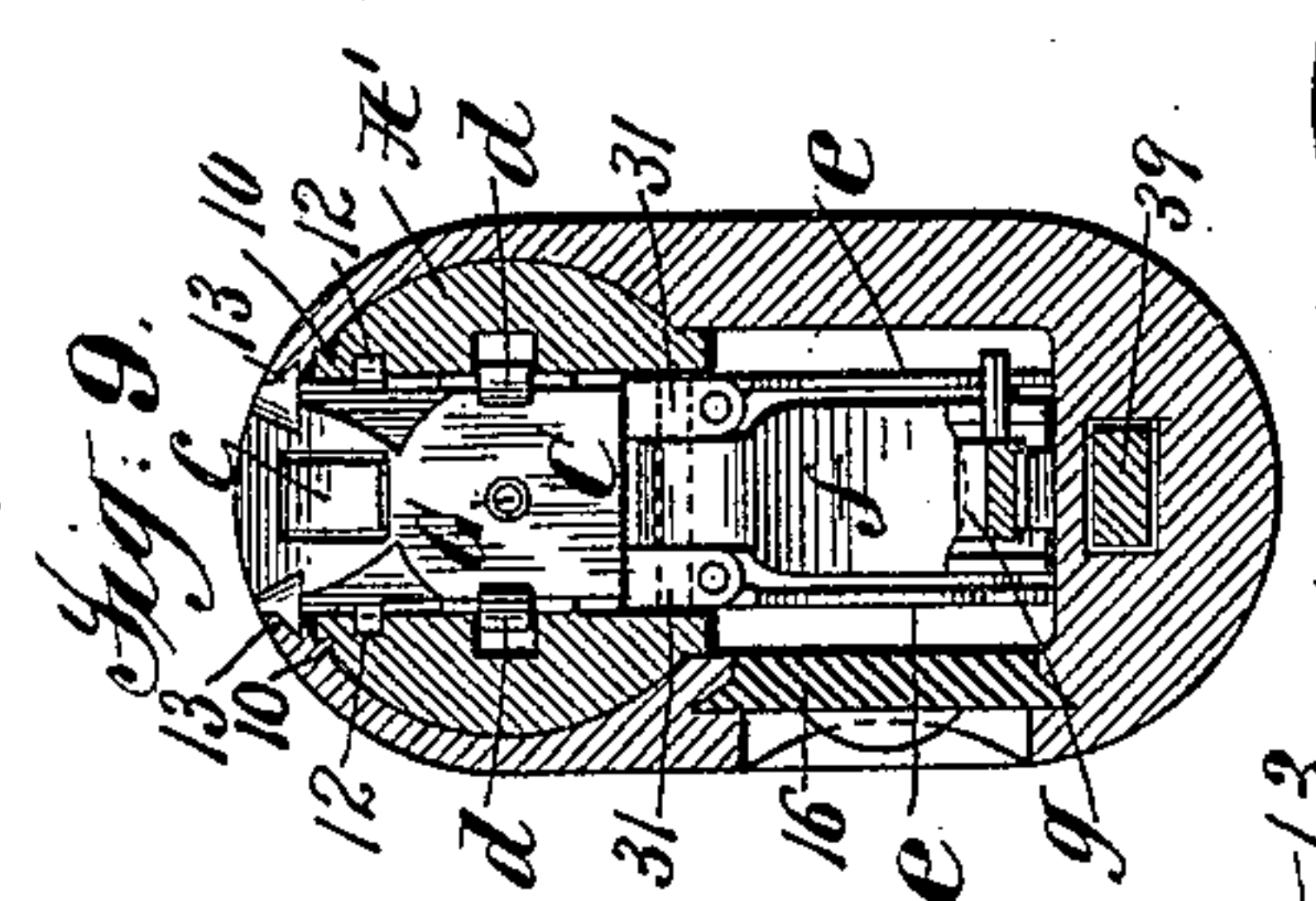
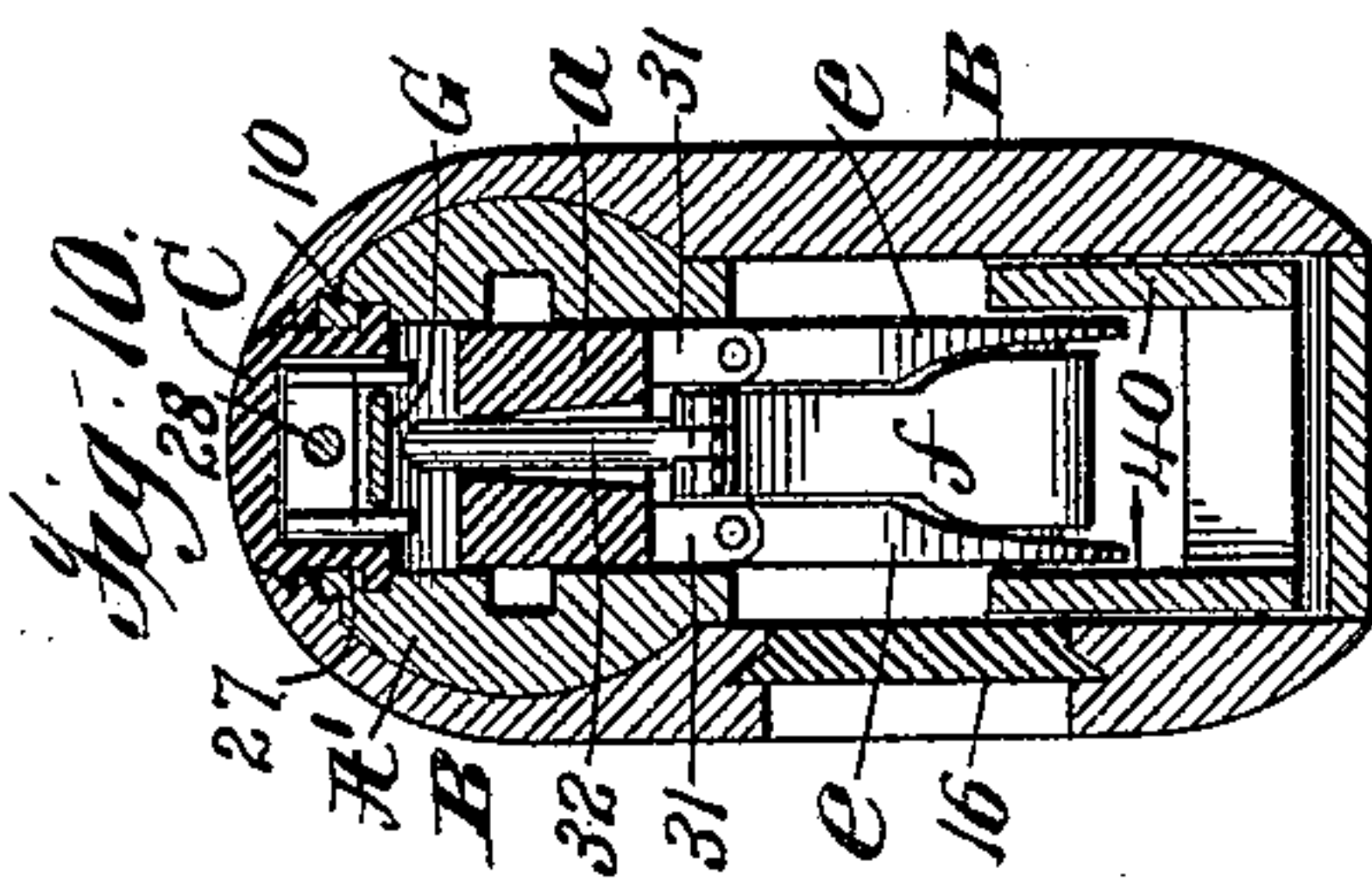
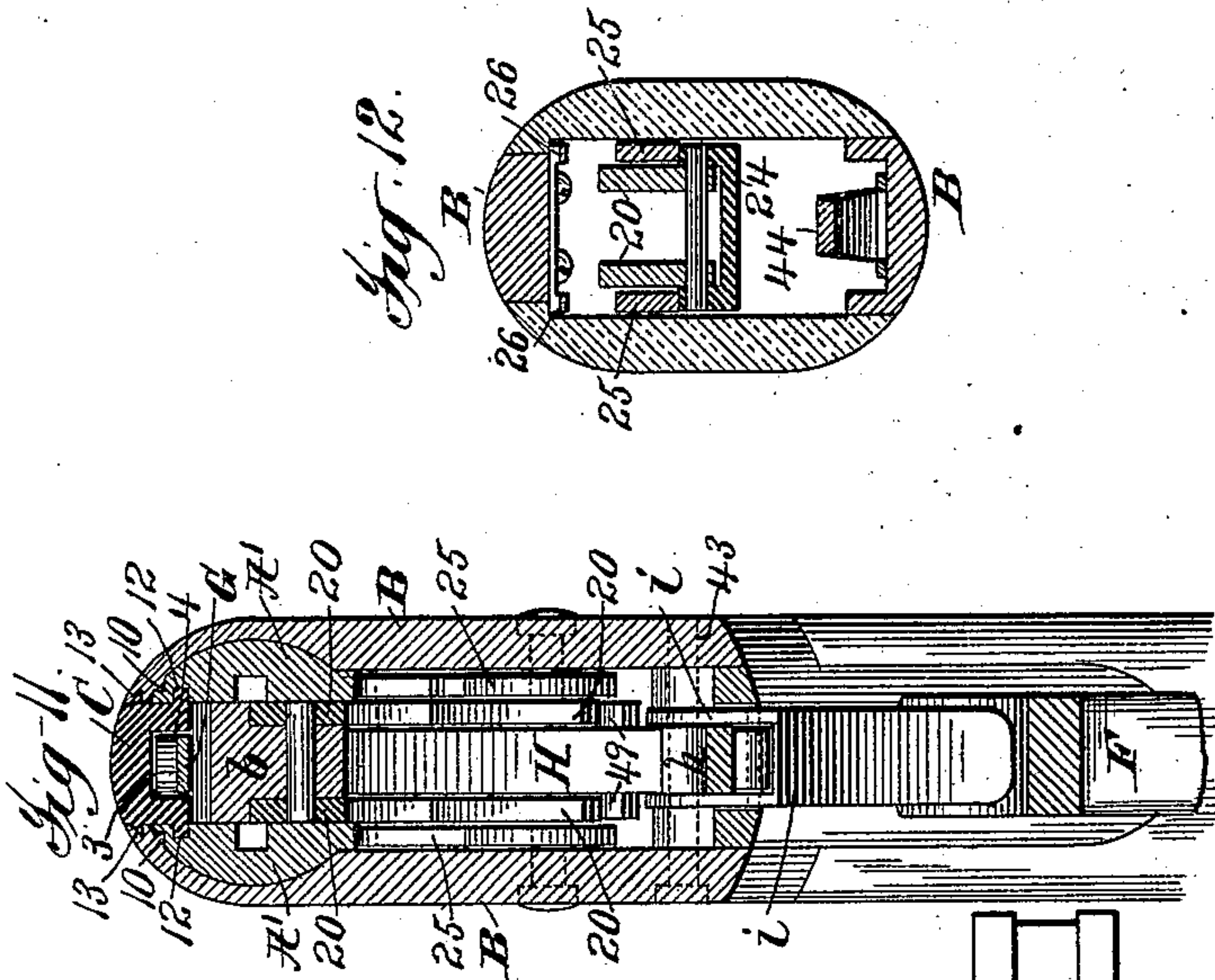
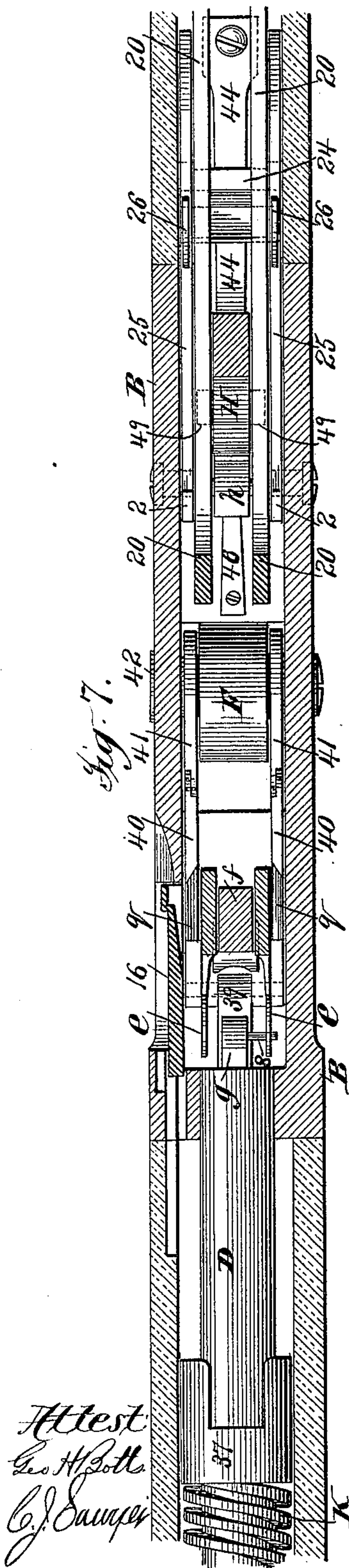


Inventor
Howard Carr
By Philip
Munroe
Attys

H. CARR.
RECOIL OPERATED FIREARM.

No. 574,189.

Patented Dec. 29, 1896.



Attest
Geo. H. Botta
C. J. Sawyer

Inventor:
Howard Carr
By *Philip M. Mendenhall*
Attys

UNITED STATES PATENT OFFICE.

HOWARD CARR, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE SAN FRANCISCO ARMS COMPANY, OF SAME PLACE.

RECOIL-OPERATED FIREARM.

SPECIFICATION forming part of Letters Patent No. 574,189, dated December 29, 1896.

Application filed September 25, 1894. Serial No. 524,051. (No model.)

To all whom it may concern:

Be it known that I, HOWARD CARR, a citizen of the United States, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Magazine-Guns, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to provide an improved magazine-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.

The present invention relates especially to firearms employing a longitudinally-movable barrel actuated by the recoil, the especial object of the invention being to provide an improved breech movement for such firearms; and the invention consists in various features of construction and combinations of parts in firearms having the barrel and breech-bolt connected by a pair of links pivoted together and actuated to withdraw the breech-bolt and open the breech and to return the breech-bolt to normal position, and certain features combined with such a movement to form a complete firearm, some of which features may be applied also in firearms having a different breech movement.

The features forming the invention may be embodied in many different ways, and the construction and arrangement of the barrel, links, and breech-bolt, and the devices coacting therewith to perform the required operations of the breech mechanism, may be varied widely, but for the purpose of illustration and a full understanding of the invention a detailed description of a construction embodying all the improvements of the present invention as applied in their preferred form to a shoulder-arm 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.

In the drawings, Figure 1 is a side view of the loading side of the gun with the barrel and magazine partially broken away. Fig. 2 is a longitudinal section on the line 2 of Fig. 6. Fig. 3 is a longitudinal central section, on a larger scale, of the breech portion of the gun, it being shown as just discharged, with the hammer resting upon the firing-pin. Fig. 4 is a similar view showing the parts in the position they occupy after the recoil with the barrel in its rearward position. Fig. 5 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 a cartridge from the carrier into the barrel and close the breech. Figs. 6 and 7 are longitudinal sections on the lines 6 and 7 of Fig. 3. Figs. 8, 9, 10, 11, and 12 are cross-sections on respectively the lines 8, 9, 10, 11, and 12 of Fig. 3. Fig. 13 is a perspective view of the breech-bolt. Fig. 14 is a sectional plan of the under side of the same with the firing-pin removed. Fig. 15 is a detail perspective of the links, carrier, and pressure-rod.

Referring to said drawings, A is the barrel, provided with an extension A', formed integral therewith or rigidly secured thereto in any suitable manner, the barrel and barrel extension sliding in the frame B, in which they are held and guided in any suitable manner, preferably by a tongue-and-groove connection 10, as shown in Figs. 9 to 11. The breech-bolt C slides in the barrel extension A', being held and guided therein and in the frame B by ribs 11 engaging grooves 12 13 in the barrel extension and frame, respectively.

D is the magazine, arranged below the barrel, and provided with the usual spring-pressed follower 14; E, the carrier, by which the cartridges are received from the magazine and raised into line with the barrel; F, the hand-lever for operating the parts when there is no cartridge in the barrel; G, the firing-pin, and H the hammer.

Considering now the construction of the gun in detail, the barrel extension A' is mor-

tised vertically the length of a cartridge, and this mortise registers with similar mortises in the frame B above and below the barrel extension. The mortise below the barrel extension communicates with the rear end of the magazine D and contains the carrier E, the empty cartridge-shell preferably being ejected from the top of the gun through the mortise above the barrel extension, as usual in such constructions, the barrel being provided with a rear projection 15 above the bore to tip the cartridge-shell forward as it is thrown out. It will be understood, however, that a side ejection may be used, if preferred. The magazine may be filled from its rear end through the opening 16 in the side of the frame B, as shown, and as usual in such constructions, or in any other suitable manner.

The bolt C is connected to the barrel extension A' by a pair of links *a b*, pivoted together, the forward end of the link *a* being pivoted to the breech-bolt C by the pivot 17, and the rear end of the link *b* to the barrel extension A' by the pivot 18, the pivot 19, by which the two links are connected together, preferably being normally slightly above the dead-center, as shown, so that any downward movement of the links tends to lock them until they pass the dead-center. To the rear end of the link *b* is pivoted a bar 20, preferably forked, being shown as consisting of two side plates, and this bar extends into the gun-stock and is seated therein on a spring 21, coiled about a rod 22, and made adjustable in tension by a screw-follower 23. This bar 20 carries a stop 24, which is shown as pivoted in the two side plates of the forked bar 20, as a better movement is thus secured, although it will be understood that a rigid stop may be used with fairly good results. Pivoted in the frame below the barrel extension and on opposite sides of the bar 20 are a pair of stop-levers 25, forming a catch by which the bar 20 is held during the return movement of the barre, the rear end of these levers being provided with shoulders 1, adapted to engage the stop 24, and the forward ends of the levers 25 being provided with shoulders 2, engaged by the barrel extension on its return to position to trip the catch and release the bar 20 at the proper time, all as hereinafter explained.

The firing-pin G consists of a flat piece of metal sliding in a groove 27 in the under side of the breech-bolt and curved about the front end of the link *a*, so as to bring the end into position central to the breech-bolt while permitting the rotation of the link on its pivot 17. The firing-pin carries near its rear end a lug or projection 3, engaging a notch 4 in the under side of the breech-bolt, the movement of the firing-pin thus being limited in both directions. Moreover, in case the firing-pin breaks in front of the lug 3, which is the only point at which breakage is liable, the rear part of the firing-pin will not be blown out but held by the lug 3.

Into the breech-bolt is set also in a groove, above and closed by the firing-pin, a cartridge-stop *c*, which is carried by a rod 28, sliding in the breech-bolt and having a lug or projection 5, extending below the breech-bolt in position to be actuated by the rear end of the link *b*, which has a groove into which the projection 5 enters, so that the stop *c* is thus advanced into position to stop the head of the cartridge as it is forced upward and prevent its being forced above proper position, the stop *c* being returned by a spring 29 within the breech-bolt when released by the rear end of the link *b*. In order to prevent breakage in case the cartridge happens to be in the path of the stop as it is pressed forward, the pressure upon the stop is preferably made yielding, and for this purpose the actuating-lug 5 is carried by a sleeve sliding on the rod 28 and acts against a spring 30, of greater strength than the stop-returning spring 29, so that in case of block the spring 30 will only be compressed by the sleeve on the lug 5 and the stop not forced forward. The breech-bolt carries also at its forward end side extractors *d*, which are shown as simple spring-hooked plates secured on the pin 17, by which the link *a* is pivoted to the barrel extension. It will be understood, however, that any other suitable form of extractor may be used.

At its forward end the link *a* has a downward projection 31, in which is pivoted the carrier E. This carrier consists of two thin plates *e*, which are formed or pivoted to swing sidewise, and a hooked lever *f*, pivoted between these plates to swing longitudinally of the gun, and which carries rearward of its pivot a pin 32, projecting into an opening through the link *a*, which is so placed that when the links *a b* are closed together the pin 32 is engaged by a pin 33, projecting from the rear link *b* and preferably adjustable therein, as shown, so as to secure the proper movement of the carrier. By the engagement of the pins 32 33 the lever *f* is rocked to carry the cartridge upward into line with the barrel and breech-bolt, and the lever *f* and pin 32 are returned to normal position by the next cartridge as it is forced rearward from the magazine by the follower 14. It will be seen that by this construction the cartridge is handled entirely by the head, which is very desirable. A spring-pressed dog *g* is used to retain the cartridges in the magazine while the carrier is raised, this dog being depressed by one of the plates *e*, which strikes a pin 8 on the dog when the carrier is lowered, so as to allow the next cartridge to pass rearward to the carrier, as shown in Figs. 2 and 3.

In order that the breech-bolt C may be withdrawn at the rear of the barrel extension A', the mortise in the latter is not closed permanently, but by a plug 34, secured by a pin 35, so that by removing this plug and knocking out the pin 18, forming the pivot for the rear

link *b*, and the pin by which the bar 20 is connected, the breech-bolt, links, and the carrier can be withdrawn at the rear of the barrel extension.

5 The spring *K*, by which the barrel is returned to position, is preferably placed, as shown, about the magazine *D*, with its opposite ends pressing against rings 36 37, surrounding the magazine and slotted part way
10 through their length to receive lugs 38 on the under side of the barrel, the barrel being surrounded for part of its length with a casing *L* through slots in which these lugs project. The rear sleeve 37 has an arm 39 extending
15 rearward under the magazine and connected by a link 40 to a crank-arm 41, loose on the pivot-bolt 42 of the hand-lever *F*, and actuated by the lever through a pin 9, connecting the lever and crank-arm. By this construction the barrel recoils against the pressure of the spring *K* and is returned thereby to normal position, while when the barrel is withdrawn by the hand-lever *F* acting through the crank-arm 41, link 40, and sleeve
25 37 the spring *K* moves rearward with the barrel between the rings 36, which are both carried rearward, and is not compressed, so that the resistance of the spring *K* is not to be overcome in operating the gun by the hand-lever.
30

The link 40 is provided with upwardly-extending projections having inclined edges *q*, between which the side plates *e* of the carrier *E* slide during the rearward movement of the
35 barrel, so as to close these hinged plates and grip the head of the cartridge firmly. It will be understood, however, that these inclined surfaces for actuating the plates *e* may be placed upon some stationary part of the gun, as upon the inside of the frame, or that the required pressure upon the plates *e* may be secured by springs, although the positive grip is preferable. The operation of these surfaces *q* is the same whether the breech movement be actuated by the recoil or by the hand-lever, the link 40 being thrown up in the latter case, so that it acts upon the plates *e*, although drawn back with the barrel.

The hammer *H* is pivoted at 43 and has the usual mainspring 44 acting upon it through the link 45. The sear *h*, having the sear-spring 46, is pivoted in front of the hammer and has a rearward hooked projection 47, which is engaged by a catch 48, carried by the trigger *i*, which is hung upon the hammer-pivot. The catch 48 has a pin 6 moving in a slot in the trigger, so that the catch can shift its position with the movement of the trigger, for a purpose presently to be described.

60 As above stated, the links *a b* are locked to a certain extent by the position of the connecting-pivot 19 above the line of dead-center. It is desirable, however, that a locking device should be provided by which a positive locking of these links should be secured during the recoil movement of the barrel, and this result is secured in the construction

shown by projections 49 on opposite sides of the hammer, which engage the under side of the side plates forming the forked connecting-rod 20 in the normal position of the links and hammer, so that the links are thus held in their raised normal position as the barrel and barrel extension move backward until the hammer is carried toward cock by the engagement of the recoiling barrel extension, when these projections 49 are brought into position to release the bar 20 and allow the links to be broken down. It will be understood that one projection on the hammer may be used, but the construction with the forked bar 20 and projections on opposite sides of the hammer is preferable. This forms also a safety device, in that the hammer cannot be brought down into position to engage the firing-pin unless the breech-bolt is fully returned to position, so as to raise the plates forming the rod 20, as otherwise the projections 49 will strike the under side of these plates. If the links are nearly closed when the hammer descends and a strong spring be used upon the hammer, the pressure will be sufficient to close the links fully and carry the breech-bolt forward into position to close the barrel; but if the force be not sufficient the hammer does not reach the firing-pin and the gun is not fired.

It will be seen that the barrel extension strikes the hammer below and rearward of the end of the firing-pin, so that the hammer is carried away from the firing-pin at once and there is no pressure upon the firing-pin in cocking the hammer. This is an important feature and in itself forms a part of the invention, although not essential to the operation of the gun.

The operation of the gun is as follows: Assuming that the parts are in the position shown in Figs. 2 and 3, the gun just having been discharged, the recoil carries the barrel and barrel extension *A'* rearward together to the limit of the recoil movement of the barrel, thus compressing the spring *K* against the sleeve 37 by the forward lug 38 on the barrel acting on the sleeve 36. During this movement, or a part thereof, the links *a b* are held in their normal position by the bar 20 engaging the projections 49 on the hammer *H* and the breech-bolt thus locked to the barrel, so that the full force of the recoil is utilized and the escape of gases at the breech prevented. During this recoil movement, however, the rear end of the barrel extension cocks the hammer and thus carries down the projections 49 and releases the rod 20, so that the links *a b* may be broken down and the breech-bolt withdrawn from the barrel. The rod 20 has now been carried rearward, so as to compress the spring 21 and carry the stop 24 past the shoulders 1 on the catch-levers 25, when the spring 26, acting upon these levers, forces them downward, so that the shoulders 1 are brought in front of the stop 24, and the shoulders 2 are by the same move-

ment raised into the path of the shoulder 2^a on the under side of the barrel extension. By this movement, also, the cartridge in the carrier, held by the side plates *e*, pressed together by the inclined surfaces *q* on the link 39, has been withdrawn partially from the magazine. The position of all the parts is now as shown in Fig. 4, the hammer being cocked by the recoiling barrel extension. The spring *K* now recoils, returning the barrel and barrel extension to normal position through the engagement of the spring *K* with the sleeve 36 and the action of the latter on the forward lug 38 on the barrel. The link *b* during this movement of the barrel is held against return by the stop 24 on the rod 20 catching the shoulder 1 on the catch-levers 25, and the pivot of the rod 20 to the link *b* thus forms a fulcrum about which the link *b* is oscillated as a lever, the rod 20 being depressed to permit this movement, and the rear end of the link *b* being carried forward with the barrel extension *A* and the front end downward and rearward, thus breaking the links down and, through the front link *a*, which now acts as a connecting-link, drawing the breech-bolt back, so as to fully open the breech when the barrel has returned to its normal position, and thus withdrawing the cartridge fully from the magazine, so as to lie opposite the mortise in the barrel extension, and raising the carrier so as to throw out the shell, as follows:

As the link *a* is rocked from the horizontal to an inclined vertical position, the side plates *e* of the carrier *E* are raised, so as to carry the cartridge upward, and as the links come together the pin 33 in the rear link *b* strikes the pin 32 in the front link *a* and rocks the lever *f*, so as to lift the cartridge from the side plates *e* and carry it into position in the front of the barrel, at the same time forcing out the empty cartridge-shell at the top of the gun, the shell being tipped forward as it is thrown out by the projection 15. As the links are closed together, also, the shoulder at the rear end of the link *b*, formed by the groove therein, engages the lug 5, by which the stop *c* is actuated, and pushes the stop forward in time to stop the head of the cartridge as it is raised by the lever *f*, so as to hold it in proper position to be forced into the barrel by the breech-bolt on the return of the latter. As the barrel and barrel extension reach their normal position, the shoulder 2^a on the rear end of the barrel extension strikes against the shoulder 2 at the forward end of the levers 25 and rocks these levers so as to raise the rear ends from the stop 24 and release the rod 20, so that the spring 21 may act to return the rod 20 and thus close the links *a b* and carry the breech-bolt into position to close the breech. All the parts are now in the position shown in Fig. 5, and the breech-bolt is about to be returned to position. The spring 21 now recoils, forcing forward the rod 20 and thus forcing the link *b* forward and upward, so as to open the links and carry the

barrel extension forward from the position shown in Fig. 5, and as the links are opened and the breech-bolt moved forward the lug 5 is released by the shoulder at the rear end of the link *b* and the cartridge-stop *c* is returned by the spring 29. As the link *a* is raised from the vertical to the horizontal position, the plates *e* and lever *f* of the carrier *E* are moved downward as soon as the cartridge has been carried into the barrel sufficiently to require no further support from the carrier, and as the carrier reaches its lowest position and trips the dog *g* to release the next cartridge, the next cartridge is forced back between the plates *e* and by its pressure upon the lever *f* returns the latter and pin 32. The parts have now all been returned to their normal position, as shown in Figs. 2 and 3, except that the hammer is cocked and the gun is ready for another discharge on pulling the trigger.

The action of the trigger mechanism is as follows: As the trigger is thrown backward, the first action of the catch 48 is to raise the sear *h* by engagement of the catch with the hooked tail 47, the trigger carrying the catch with it as the latter is pivoted thereon, and as the trigger continues its movement the sear is released from the hammer and the latter allowed to fall. As the catch 48 is pivoted on a center differing from that of the trigger, however, and the slot in the trigger receiving the pin 6 is concentric with the pivot of the catch on the trigger, or of such size as to enable the catch to move on its own pivot independently of the trigger, the position of the pin in the slot is varied during the sear-releasing movement of the trigger, so that at the end of the backward movement of the trigger the pin 6 is at the top of the slot in the trigger, where it is held by the tension of the light spring 7, and as the hammer is cocked again the sear-spring 46 throws the sear again into position to catch the hammer-notch, the catch 48 being thrown downward on its pivot by the movement of the sear under pressure of sear-spring 46 against the tension of light spring 7, this movement of the sear and catch being made possible by the freedom of movement of the pin 6 on the catch in the concentric or large slot in the trigger, although the trigger is held back, the pin 6 acting as a stop for the catch at the opposite ends of the slot. If repeated firing on a single pull is desired, the catch 48 may be replaced by a fixed projection on the trigger, when the sear will be held out of position to engage the hammer as long as the trigger is held back.

When the gun is to be loaded by hand, the hand-lever *F* is thrown forward from the position shown in full lines in the figures to that shown in dotted lines in Fig. 2, thus rotating the crank-arm 41 on the pivot 42 and through the link 40, arm 39, and sleeve 37 engaging the rear projection 38 on the barrel, drawing the barrel backward, the operation then being the same as in the automatic operation, when the barrel is thrown back by the recoil,

except that the barrel is returned to position by drawing back the hand-lever instead of by the spring K, as in the automatic operation. As both the sleeves 36 37 move backward with the barrel during this operation by the hand-lever, the spring K is not compressed, so that this operation of the hand-lever requires but little force.

It will be understood that the invention is not to be limited to the exact arrangement and form of devices shown, as these may be varied by those skilled in the art without departing from the invention, and that certain features of the invention may be applied to guns of other general construction than that shown and not employing the link movement for operating the breech mechanism, and are thus claimed.

What is claimed is—

1. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, mechanism for actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt and barrel to normal position, and a locking device for holding the links in position to lock the breech-bolt to the barrel at the commencement of the recoil, 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, mechanism for breaking the links downward to withdraw the breech-bolt and open the breech and for returning the breech-bolt and barrel to normal position, and a locking device for holding the links to lock the breech-bolt to the barrel at the commencement of the recoil, 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, mechanism for actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt and barrel to normal position, and a locking device having a member engaging one of the links to lock the breech-bolt to the barrel and releasing the link when the parts have reached the position for the withdrawal of the breech-bolt, 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 actuating the links to withdraw the breech-bolt and open the breech, and a spring for returning the breech-bolt to normal position connected to operate upon one of the links between the points of connection of the links to the breech-bolt and barrel, 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 actuating the links to withdraw the breech-bolt and open the breech,

and a spring for returning the breech-bolt having a fixed bearing at one end and the other end connected to operate upon the rear link at one side of its barrel-pivot, 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, and mechanism for actuating the links after the rearward movement of the barrel is completed to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, 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 the barrel to position after recoil, and 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, 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, devices for holding one of the links, whereby said link is actuated as a lever during the return movement of the barrel to withdraw the breech-bolt and open the breech, and means for releasing the breech-bolt and returning it to normal position, 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, a catch and connections between said catch and one of the links, whereby said link is actuated as a lever during the return movement of the barrel to withdraw the breech-bolt and open the breech, and means for tripping said catch and for returning the breech-bolt to normal position, substantially as described.

10. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, said links being locked in their normal position during recoil and unlocked for the return movement of the barrel, means for returning the barrel to position after recoil, and mechanism for actuating said 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, 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, and mechanism for actuating the links during the return movement of the barrel to withdraw the breech-bolt and open the breech and for actuating the links

to return the breech-bolt to normal position, substantially as described.

12. 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, and means for tripping said catch for the return of the breech-bolt, substantially as described.

13. 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 for returning the breech-bolt to normal position, substantially as described.

14. 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 position, a member carried by and pivoted on the rear link, and means for holding said member during the return of the barrel whereby said link is actuated as a lever to withdraw the breech-bolt and open the breech, substantially as described.

15. 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 member carried by and pivoted on the rear link, means for holding said member during the return of the barrel, whereby the said link is actuated as a lever to withdraw the breech-bolt and open the breech, and means for actuating said member to return the breech-bolt, substantially as described.

16. 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 position, a member carried by and pivoted on the rear link, a catch holding said member during the return of the barrel, and means for tripping said catch for the return of the breech-bolt, substantially as described.

17. 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 position, a member carried by and pivoted on the rear link, and a catch holding said member during the return of the barrel and tripped by the returning barrel as the latter reaches its normal position, substantially as described.

18. 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 pressure-bar pivoted on the rear link, means for holding said pressure-bar during the return of the barrel whereby the link is actuated as a lever to withdraw the breech-bolt and open the breech, and a spring acting upon said bar to return the breech-bolt, substantially as described.

19. 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, a pressure-bar pivoted on the rear link, means for holding said pressure-bar during the return of the barrel, whereby the link is actuated as a lever to withdraw the breech-bolt and open the breech, and a spring put under tension by the operation of the breech mechanism and reacting upon said bar to return the breech-bolt, substantially as described.

20. 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 pressure-bar extending into the stock of the gun and pivoted on the rear link, means for holding said pressure-bar during the return of the barrel whereby the link is actuated as a lever to withdraw the breech-bolt and open the breech, and a spring in said stock put under tension by the operation of the breech mechanism and reacting upon said bar to return the breech-bolt, substantially as described.

21. 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 pressure-bar pivoted on the rear link, a catch for holding said bar during the return of the barrel whereby the link is actuated as a lever to withdraw the breech-bolt and open the breech, a spring acting upon said bar to return the breech-bolt, and means for tripping said catch for the return of the breech-bolt, substantially as described.

22. 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 pressure-bar pivoted on the rear link, a catch for holding said bar during the return of the barrel and tripped by the barrel as it reaches its normal position, whereby the link is actuated as a lever to

withdraw the breech-bolt and open the breech, and a spring acting upon the bar to return the breech-bolt, substantially as described.

23. 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 a carrier carried by the forward link, substantially as described.

24. 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 a carrier carried by the forward link and having a pivoted member actuated by the closing of the links together to carry the cartridge into line with the breech-bolt, substantially as described.

25. 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 a carrier carried by the forward link and having a pivoted member, and a pin on said member extending into an opening through the link and actuated from the other link when the links are closed together, substantially as described.

26. 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 a carrier carried by the forward link and having a pivoted member, a pin on said member extending into an opening through the link, and a pin carried by the other link to actuate said pivoted member, substantially as described.

27. 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, a carrier carried by the forward link and consisting of two side wings engaging the head of the cartridge, and a central lever actuated by the closing of the links together, substantially as described.

28. 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, a carrier carried by the forward link and consisting of two side wings engaging the head of the cartridge, a central lever actuated by the closing of the links together to carry the cartridge into line with the breech-bolt, and means for pressing said wings together upon the head of the cartridge as the breech-bolt is withdrawn, substantially as described.

29. The combination with a longitudinally-movable barrel, of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to position, mechanism for actuating the links to withdraw the breech-bolt and open the breech, a carrier for transferring a cartridge to the barrel, and a cartridge-stop actuated by the links for stopping the head of the cartridge in line with the breech-bolt as the cartridge is advanced into line with the breech-bolt by the carrier, substantially as described.

30. The combination with a longitudinally-movable barrel, of a breech-bolt, links connecting said breech-bolt and barrel, means for returning the barrel to position, mechanism for actuating the links to withdraw the breech-bolt and open the breech, a carrier for transferring a cartridge to the barrel, and a spring-pressed cartridge-stop advanced by the links into position to stop the head of the cartridge in line with the breech-bolt as the cartridge is advanced by the carrier, substantially as described.

31. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, a spring arranged under the barrel put under tension by the recoil of the barrel and reacting to return the barrel to normal position, and mechanism actuated by said spring for actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, substantially as described.

32. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, a magazine arranged below the barrel, a spring coiled about the magazine put under tension by the recoil of the barrel and reacting to return the barrel to normal position, and mechanism for actuating the links to withdraw the breech-bolt and open the breech and for returning the breech-bolt to normal position, substantially as described.

33. A gun or other firearm having a longitudinally-movable barrel, a breech-bolt, links connecting said breech-bolt and barrel, a magazine arranged below the barrel, a spring coiled about the magazine between a lug on the barrel at the forward end of the spring and a sleeve at the rear end, a lug on the barrel

rearward of the sleeve, a hand-lever and connections to said sleeve for drawing back the barrel by hand, substantially as described.

34. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel, a spring arranged under the barrel put under tension by the recoil of the barrel and reacting to return the barrel to normal position, mechanism actuated by said spring for actuating the links to withdraw the breech-bolt, and a spring for returning the breech-bolt, substantially as described.

35. The combination with a longitudinally-movable barrel actuated by the recoil, of a breech-bolt, links connecting said breech-bolt and barrel and normally lying in straightened position with their point of connection beyond the dead-center, mechanism for actuating the links to withdraw the breech-bolt and for returning the breech-bolt and barrel to normal position, and a member engaging one of the links to lock the breech-bolt to the barrel at the commencement of the recoil, substantially as described.

36. 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, mechanism for actuating the links to withdraw the breech-bolt and for returning the breech-bolt to normal position, and a hammer cocked by the recoil and co-acting with said mechanism to lock the links in their normal position at the commencement of the recoil, substantially as described.

37. 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, mechanism for actuating the links to withdraw the breech-bolt and for returning the breech-bolt to normal position, a hammer cocked by the recoil, and a projection on the hammer positioned to engage the links during the latter part of the firing movement of the hammer if the links are not fully returned to normal position, substantially as described.

38. The combination with barrel A and breech-bolt C, of links *a*, *b*, bar 20 pivoted to link *b*, a spring for returning the barrel, stop 24 carried by said bar, spring-pressed lever 25 having catch 1 engaging said stop, a spring pressing on bar 20, and means for tripping catch 1, substantially as described.

39. The combination with barrel A and breech-bolt C, of links *a*, *b*, bar 20 pivoted to link *b*, a spring for returning the barrel, stop 24 carried by said bar, spring-pressed lever 25 having catch 1 engaging said stop, and shoulder 2 on the lever, a spring pressing on bar 20, and shoulder 2^a on the barrel engaging the shoulder 2 on the return of the barrel to trip the catch, substantially as described.

40. The combination with barrel A and breech-bolt C, of links *a*, *b*, bar 20 pivoted to link *b*, a spring for returning the barrel, hammer H having projection 49 coacting with said bar to lock the links, stop 24 carried by said bar, spring-pressed lever 25 having catch 1 engaging said stop, a spring pressing on bar 20, and means for tripping catch 1, substantially as described.

41. The combination with barrel A and breech-bolt C, of links *a*, *b*, bar 20 pivoted to link *b*, spring K below the barrel for returning the latter, stop 24 carried by said bar, spring-pressed lever 25 having catch 1 engaging said stop, a spring pressing on bar 20, and means for tripping catch 1, substantially as described.

42. The combination with barrel A, breech-bolt C and links *a*, *b*, of spring K below the barrel acting on lug 38 on the barrel, and mechanism for actuating the links, substantially as described.

43. The combination with the barrel, breech-bolt, and links *a*, *b*, of carrier E on link *a* consisting of side wings *e* and central lever *f*, pin 32 on said lever entering an opening in link *a*, and pin 33 on link *b* engaging pin 32 to actuate the lever when the links are closed together, substantially as described.

44. The combination with a longitudinally-moving breech-bolt and carrier moving therewith having side wings *e*, of inclined surfaces *q* by which the wings are pressed together as the carrier moves rearward, substantially as described.

45. The combination with the barrel and breech-bolt, and links *a*, *b*, connecting the breech-bolt and barrel of carrier E on link *a* having side wings *e*, and inclined surfaces *q* by which the wings are pressed together as the carrier moves rearward, substantially as described.

46. Carrier E having side wings *e* for engaging the sides of the cartridge and central hooked lever *f* for engaging the under side of the head of the cartridge, substantially as described.

47. The combination with a barrel, breech-bolt and carrier, and means for opening the breech and actuating the carrier, of stop *c* in the breech-bolt for the head of the cartridge, and means for advancing the stop into the path of the cartridge as the latter is advanced by the carrier and retracting the stop as the breech-bolt returns to position, substantially as described.

48. The combination with a barrel, breech-bolt and carrier, and means for opening the breech and actuating the carrier, of spring-returned stop *c* in the breech-bolt for the head of the cartridge, and means for advancing the stop, substantially as described.

49. The combination with a barrel, breech-bolt and carrier, and means for opening the breech and actuating the carrier, of stop *c* in the breech-bolt for the head of the cartridge,

and means for advancing said stop under a yielding pressure and returning it to position, substantially as described.

50. Breech-bolt C having a longitudinal recess, stop *c* carried by rod 28 in said recess and having actuating-lug 5, and spring 29 for returning the stop, substantially as described.

51. Breech-bolt C having a longitudinal recess, stop *c* carried by rod 28 in said recess and having actuating-lug 5, loose on the rod and acting against spring 30, and spring 29 for returning the stop, substantially as described.

52. Breech-bolt C having a longitudinal recess, stop *c* carried by rod 28 in said recess and having actuating-lug 5, spring 29 for returning the stop, and firing-pin G closing the recess, substantially as described.

53. The combination with a hammer and recoil-operated cocking mechanism, of sear *h* having tailpiece 47, trigger *i* carrying catch 48 pivoted on the trigger at a point different from the trigger-pivot and spring-pressed against the tailpiece 47, and pin 6 on the catch entering a slot in the trigger, said slot being concentric with the pivot of the catch

on the trigger or of such size as to permit the pin to move in the slot independently of the trigger, whereby the pin is moved to the upper end of the slot when the trigger is actuated to release the sear and returned by the sear as the hammer is cocked, substantially as described.

54. The combination with the barrel A, of barrel extension A' mortised through at the rear end, a breech-bolt moving in said mortise, and a removable plug closing the rear end of the mortise, substantially as described.

55. The combination with the barrel A, of barrel extension A' mortised through at the rear end, breech-bolt C moving in said mortise, links *a*, *b*, and removable plug 34 closing the rear end of the mortise, substantially as described.

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

HOWARD CARR.

Witnesses:

HOLLAND SMITH,
JOHN FAUBEL.