

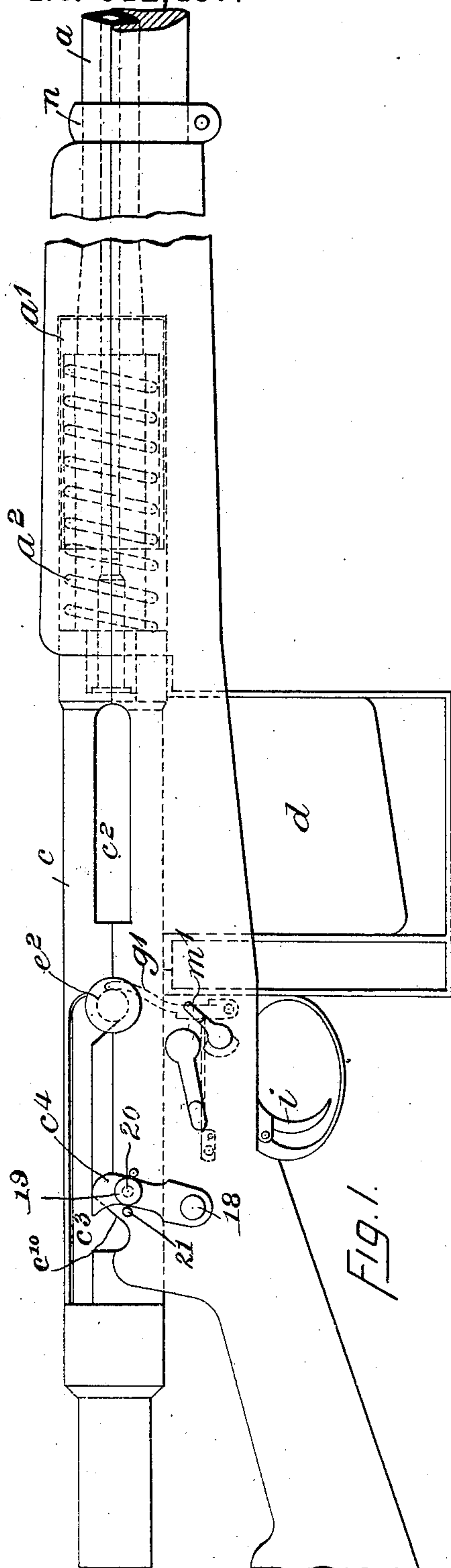
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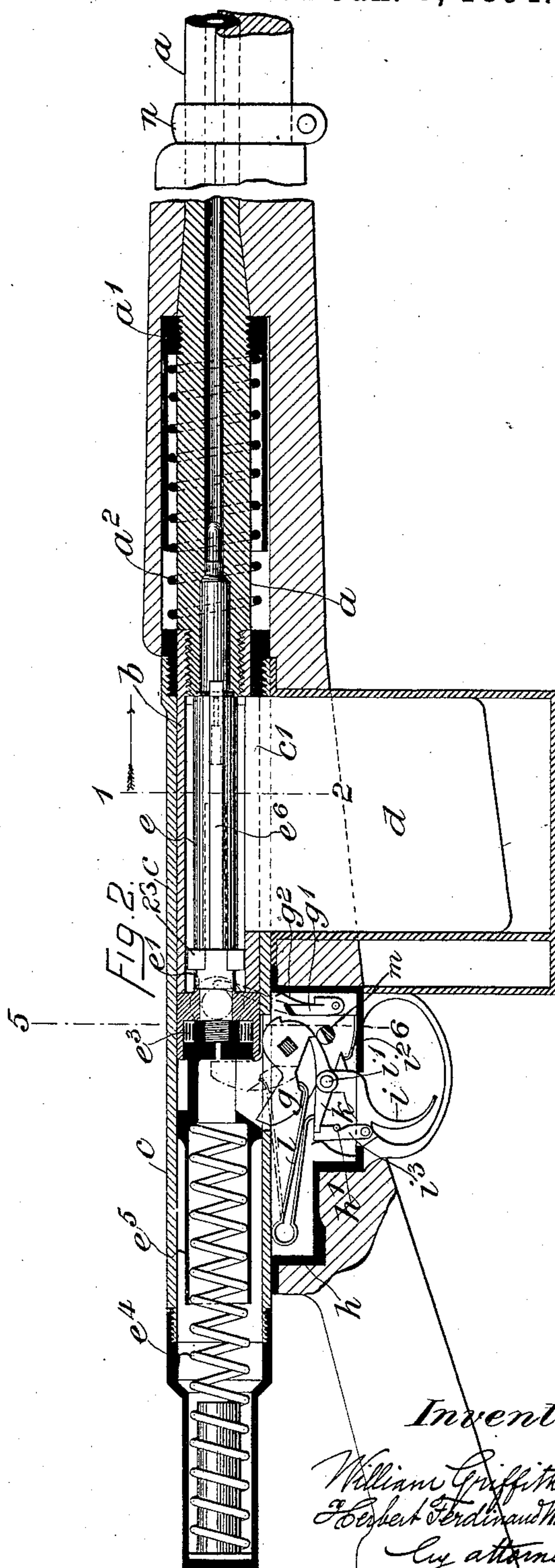
W. GRIFFITHS & H. F. WOODGATE.
RECOIL OPERATED GUN.

No. 512,437.

Patented Jan. 9, 1894.



Witnesses: { George Barry
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Inventors:

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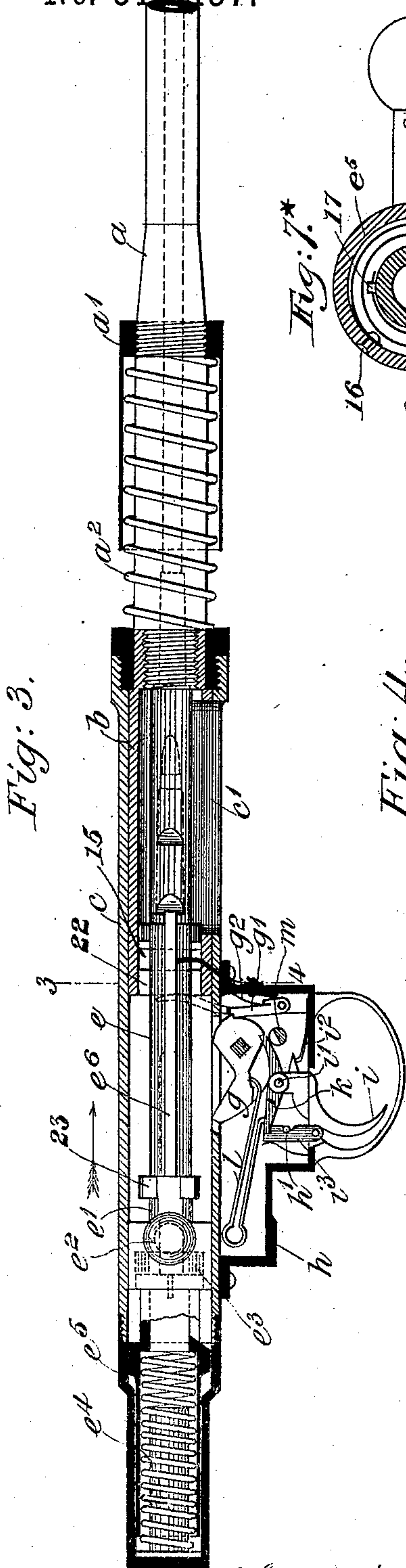


Fig: 3.

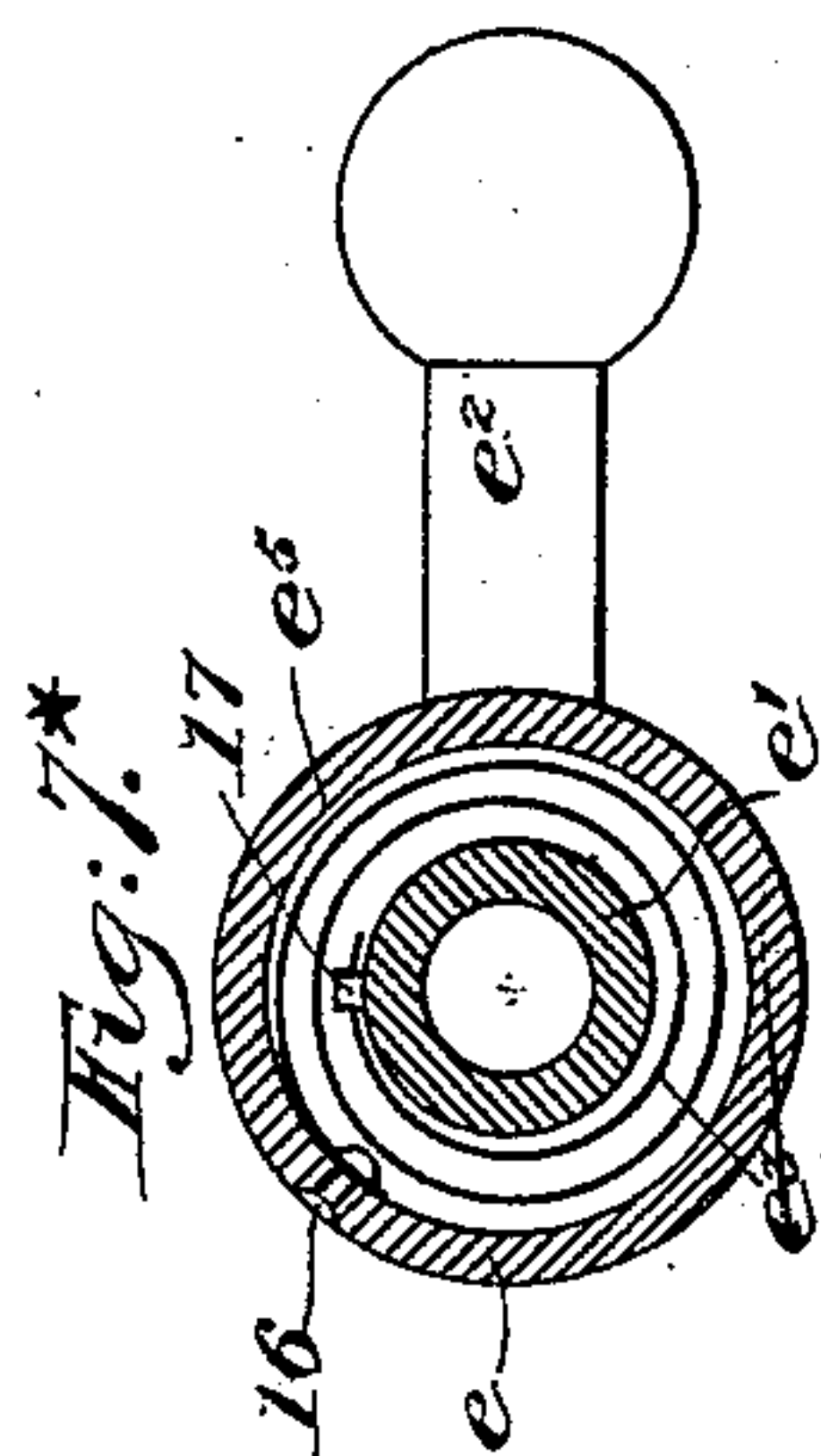


Fig: 7.*

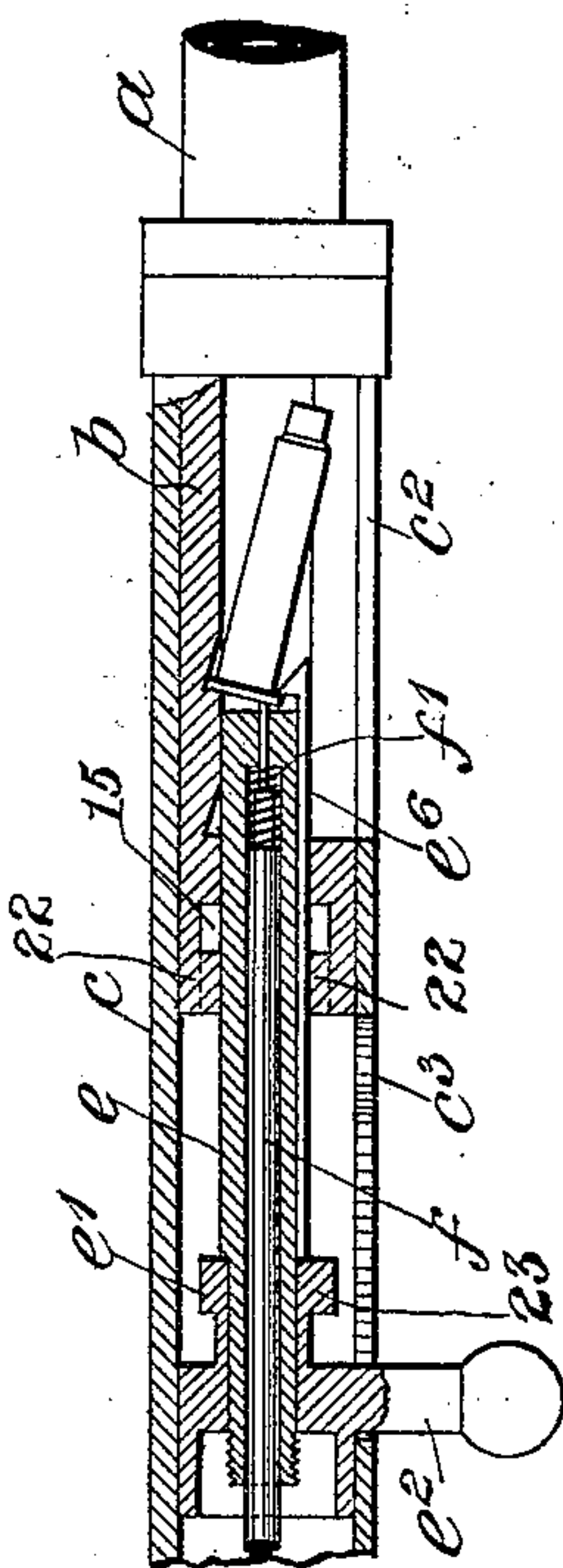


Fig. 4.

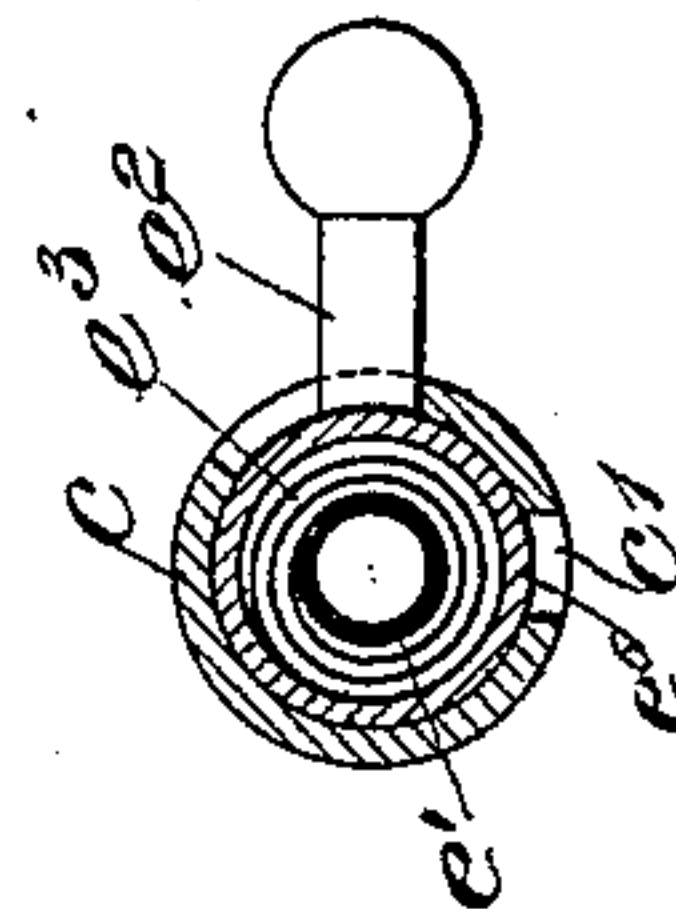


Fig: 7.

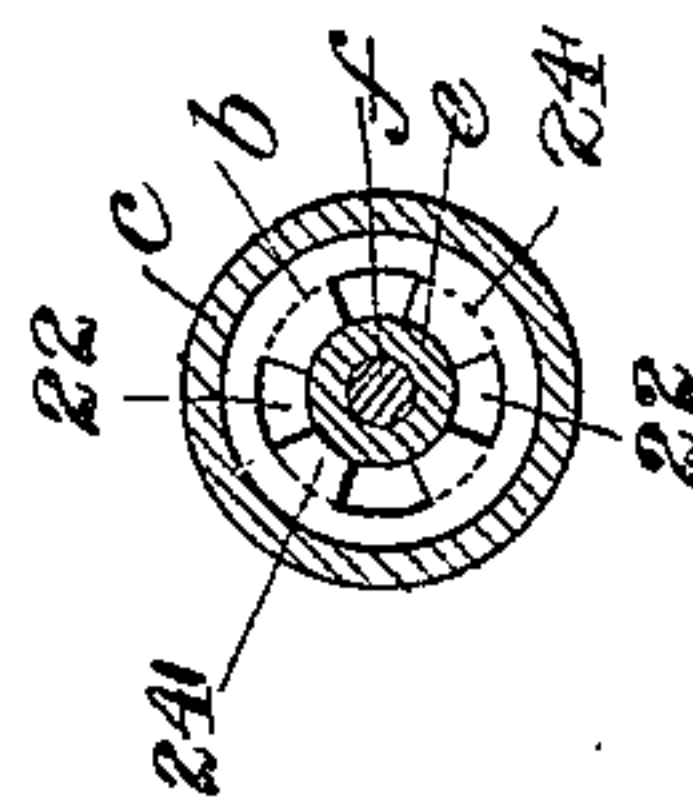


Fig: 6

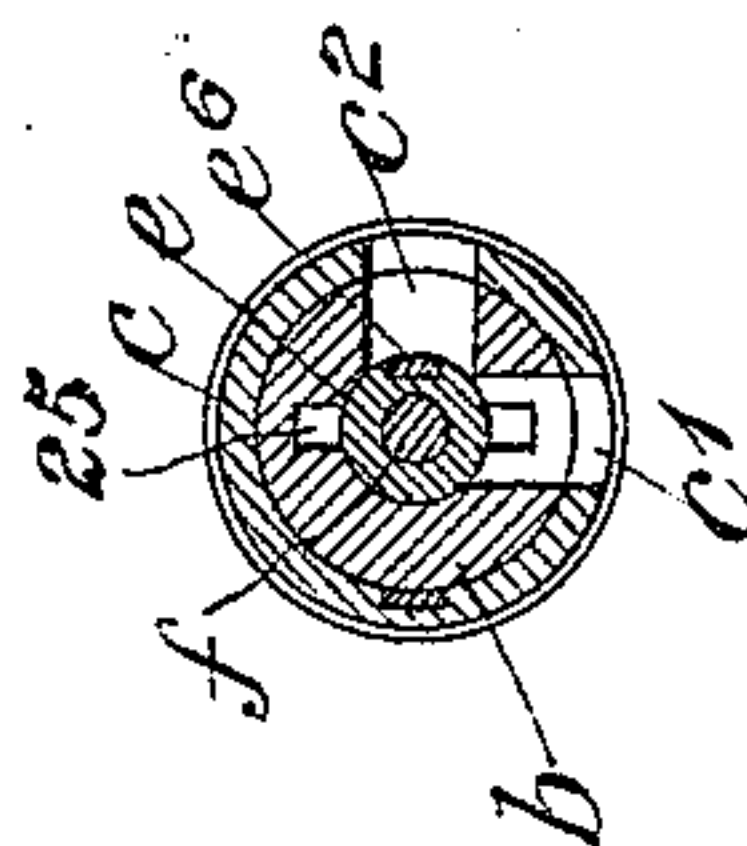


Fig: 5.

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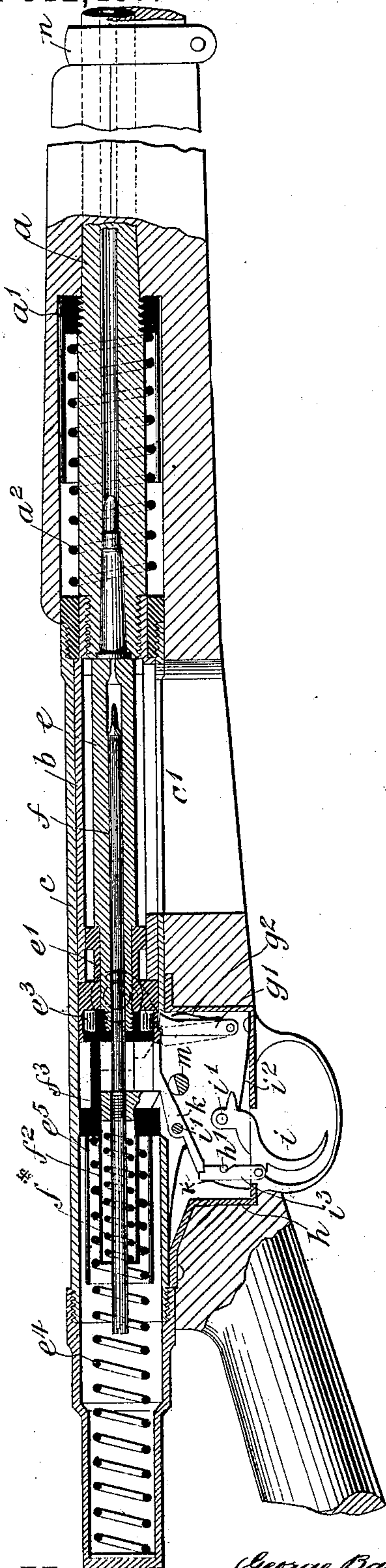
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Fig. 12.



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Fig. 10.

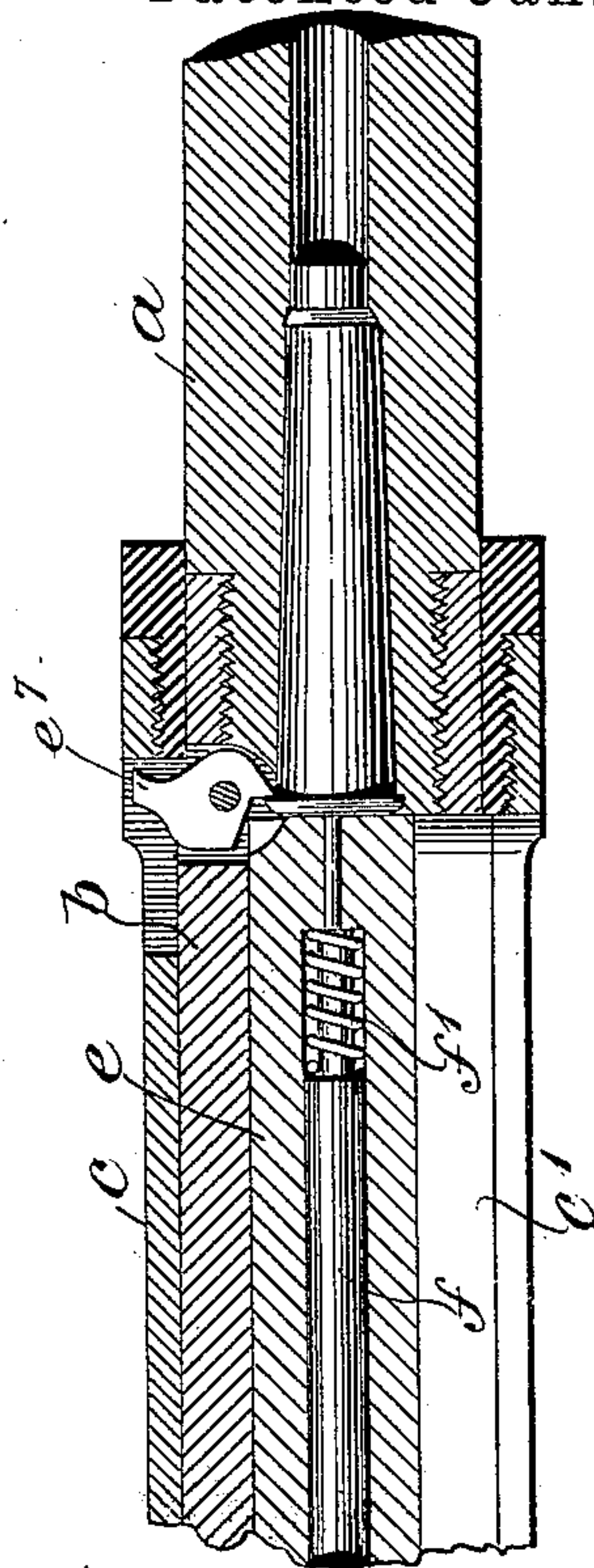
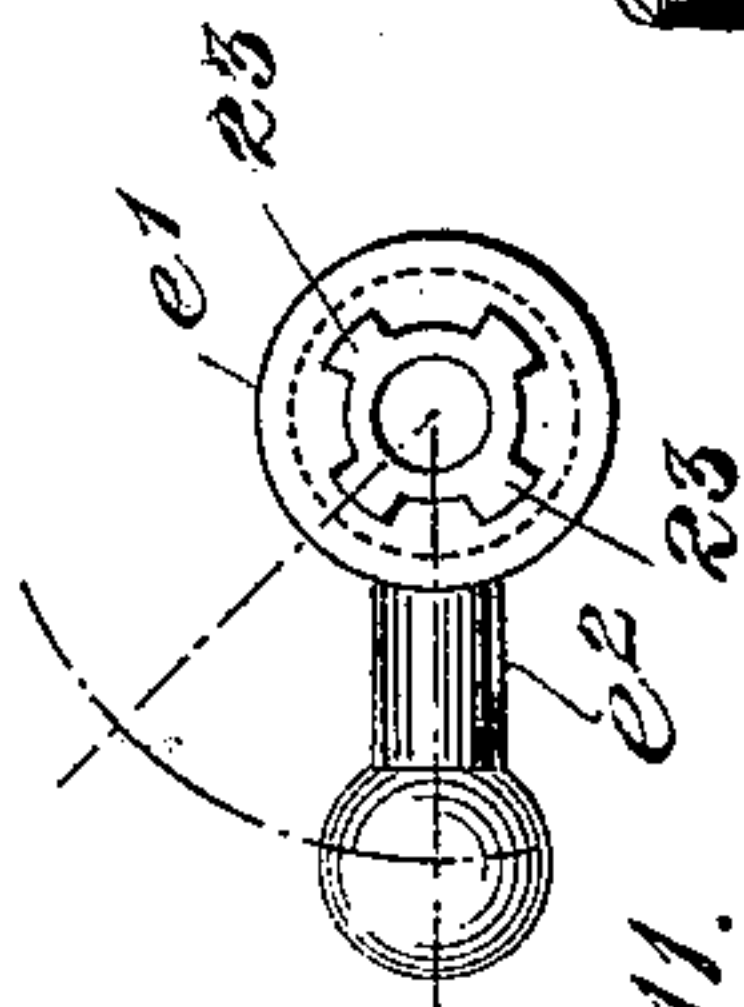


Fig. 9.



Figs. 11.

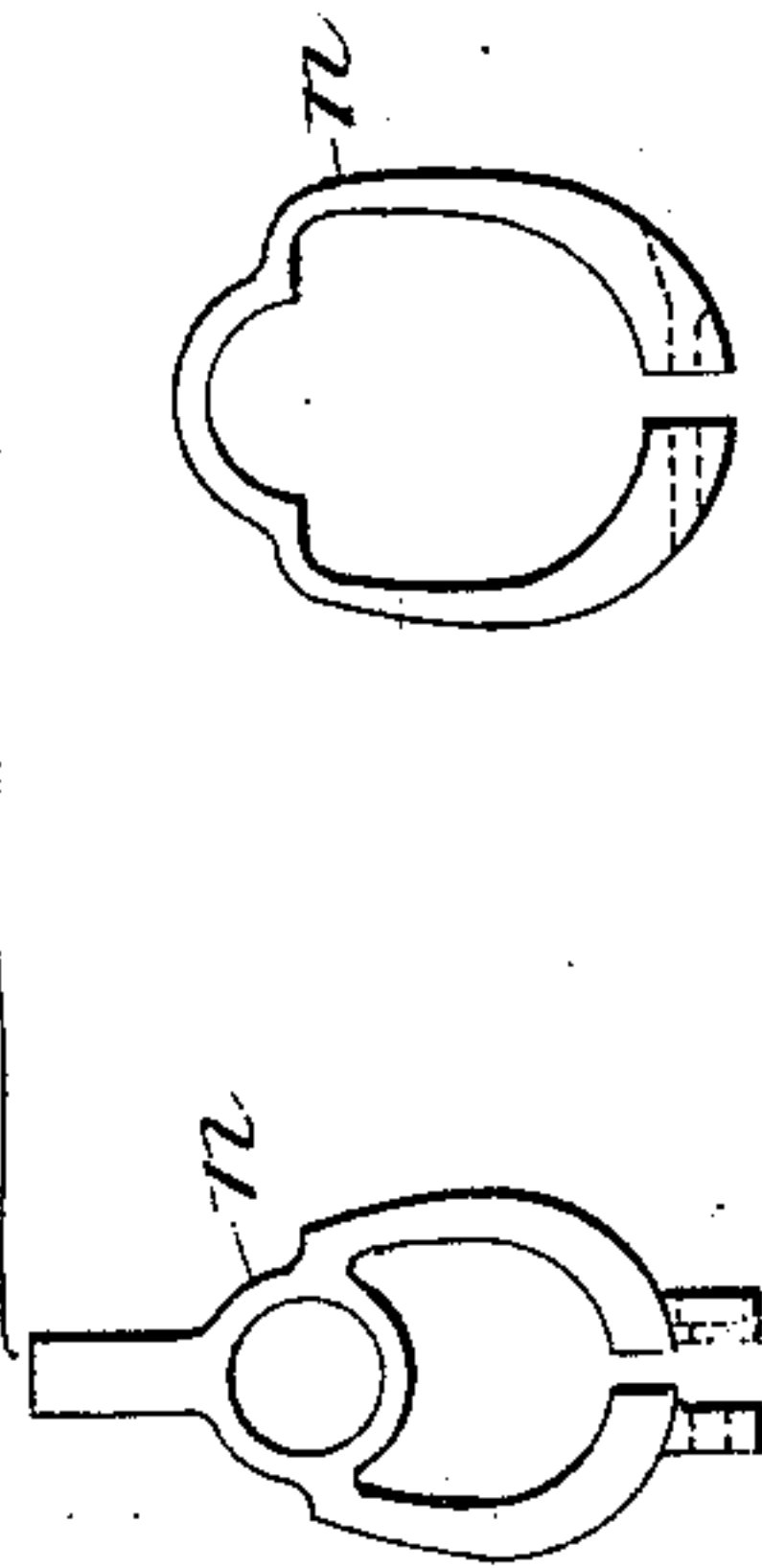
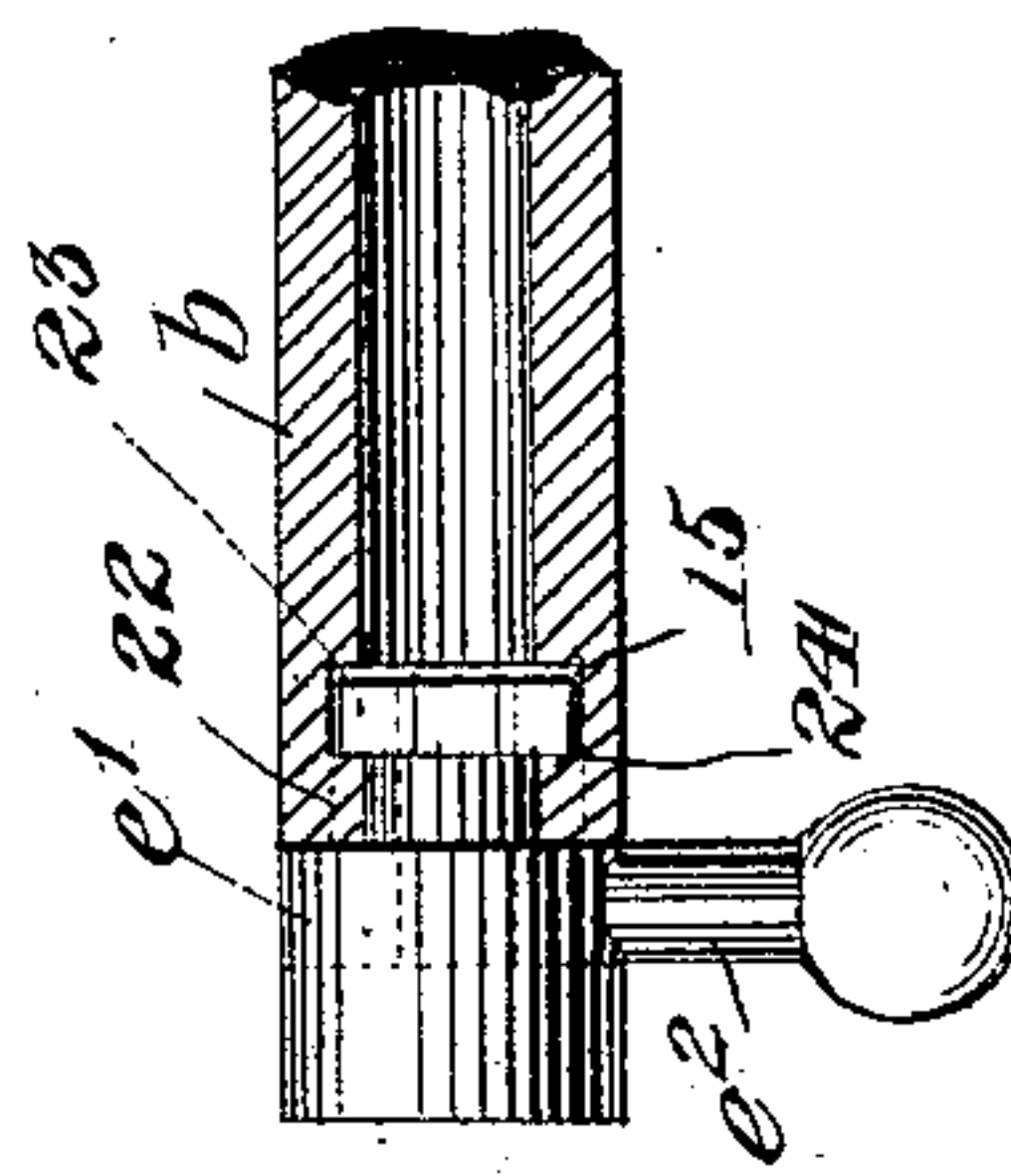


Fig. 8.



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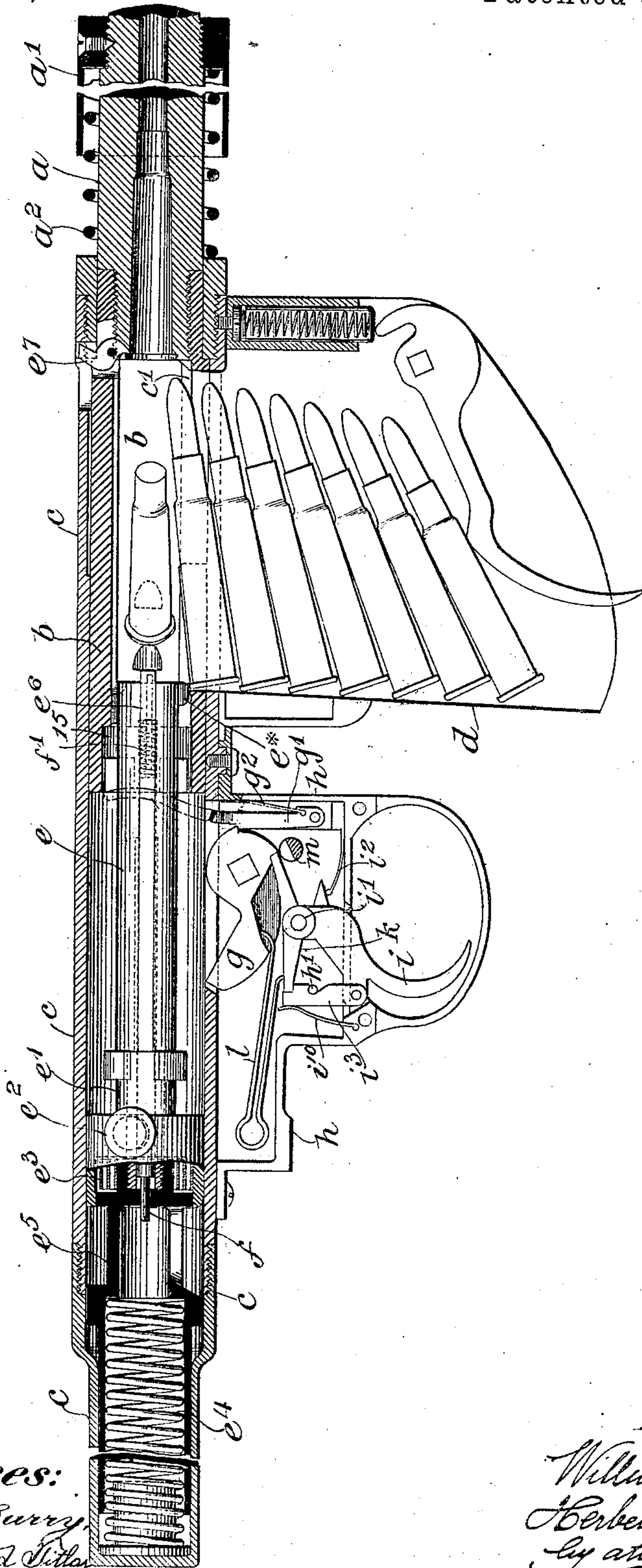
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Fig: 10^a



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UNITED STATES PATENT OFFICE.

WILLIAM GRIFFITHS AND HERBERT FERDINAND WOODGATE, OF LONDON,
ENGLAND.

RECOIL-OPERATED GUN.

SPECIFICATION forming part of Letters Patent No. 512,437, dated January 9, 1894.

Application filed March 23, 1893. Serial No. 467,274. (No model.) Patented in England December 5, 1891, No. 21,282, and in France November 5, 1892, No. 225,439.

To all whom it may concern:

Be it known that we, WILLIAM GRIFFITHS, of Bexley Heath, and HERBERT FERDINAND WOODGATE, of Woolwich, London, in the
5 county of Kent, England, have invented certain new and useful Improvements in Magazine Firearms, (for which we have obtained Letters Patent in Great Britain, No. 21,282, dated December 5, 1891, and a brevet d'in-
10 vention of the French Republic, No. 225,439, dated November 5, 1892,) of which the following is a specification.

Our invention chiefly relates to military rifles fitted with magazines, but it is also ap-
15 plicable to other firearms and guns in which the force of the recoil is utilized for opening the breech, extracting and ejecting the empty cartridge cases, cocking the hammer or firing rod, and closing and locking the breech, as
20 hereinafter described.

The improvements are mainly directed to means for locking and unlocking the breech bolt and controlling its movements, and to a new arrangement of safety lock.

25 In the accompanying drawings, Figure 1 shows in partial side view a magazine gun constructed according to our invention. Fig. 2 is a longitudinal section of the same, showing the locked position of the breech bolt,
30 and the hammer in the cocked position ready for firing. Fig. 3 is a longitudinal section, showing the extreme effect of the recoil on the breech bolt and hammer, and the clearance made for the admission of a fresh car-
35 tridge to the barrel. Fig. 4 is a horizontal section, showing the breech bolt as having reached the point in the back movement where the extractor acts to discharge the spent cartridge. Fig. 5 is a cross section on
40 the line 1, 2 of Fig. 2. Fig. 6 is a cross section on the line 3, 4 of Fig. 3; and Fig. 7 is a cross section on the line 5, 6 of Fig. 2. The arrows Figs. 2 and 3 indicate the direction in which the sections are viewed. Fig. 7* is a
45 section on a larger scale than Fig. 7, taken in the same line, of the locking nut and the breech bolt. Fig. 8 shows in plan view the locking nut of the breech block interlocked with the breech piece, and Fig. 9 is a front
50 view of the locking nut detached. Fig. 10

represents a longitudinal section of the breech piece, the breech bolt and parts of the barrel with a side view of a lever extractor for starting the spent cartridge. Fig. 10^a is a partial
55 longitudinal section of the gun, on an enlarged scale, showing the breech open, and the breech bolt on the point of releasing the cartridge uppermost in the magazine, and allowing it to take the position for charging
60 the barrel, the hammer being already cocked and held fast by the locking or safety sear. Fig. 11 are side views of two metal bands which serve as supports and guides for the barrel. Fig. 12 is a longitudinal section of a
65 magazine rifle, showing an improved safety lock as modified to suit a hammerless gun.

In Figs. 1 to 4 inclusive and in Fig. 10^a, *a* is the barrel, rigidly secured to a tubular breech piece *b*, which is free to slide in a cy-
70 lindrical metallic case *c*, made fast by screws to the stock of the gun. This case is closed at its rear end, and is slotted at the bottom as indicated at *c'* for the reception of the car-
tridges from the magazine *d*, and at one side as indicated at *c''* for the discharge of the
75 spent cartridges.

e is the breech bolt, which is free to slide in the breech piece *b*, and is carried rearward, under the action of the recoil, to cock the
80 hammer *g*, eject the empty case, and open a space in rear of the barrel for the supply of a fresh cartridge.

The barrel *a* is fitted with a sleeve *a'*, to form a seat for a coiled spring *a''*, which bears against the forward end of the cylindrical
85 case *c* attached firmly to the stock.

Fitted to the rear end of the breech bolt *e*, and free to turn thereon, is a locking nut *e'*, with radial projections or ribs 23 shown de-
90 tached at Figs. 8 and 9. This nut carries a lever arm or handle *e''*, which projects through a cam slot *c''* (Fig. 1) formed in the right hand side of the cylindrical case *c*. The interlock-
ing of this nut with the rear end of the tubular breech piece *b* takes place when the nut
95 has entered the breech piece through grooves or ways 22 provided in the latter, and the arm of the nut has traversed the forward curve of the cam slot *c''* and is in the depressed po-
100 sition of Fig. 1. The rear bend of this slot

provides for the locking of the breech bolt in its back position, a spring catch c^4 being empowered to hold down the arm or handle e^2 , when depressed, which arrangement provides for the gun being used as a single loader. The said catch c^4 consists of a thin laterally resilient piece of spring steel pivoted to the stock by a pin 18, as shown in Fig. 1, and carrying a small inwardly projecting pin 19, the point of which may enter one or other of two holes 20, 21, in the stock. When the said pin 19 is in the forward one of said two holes as shown in Fig. 1, the catch leaves the handle of the locking nut free to turn in and out of the recess formed in the bottom of the rear part of the cam groove c^3 , but when the catch is moved to bring the said pin 19 into the other hole 21, the said catch prevents the handle from being turned upward and allows a cartridge to be inserted by hand into the barrel; this being done, the catch is tripped out of the hole 21 and the breech bolt is free to be moved forward. The locking position assumed by the nut is due to the forward movement of the breech bolt, which causes the arm e^2 to travel along the cam slot, until it reaches the forward end of the slot. Arrived at this point, the arm is thrust down into the position of Fig. 1 by means of a coiled spring e^3 , (see Figs. 7 and 10^a) which imparts an axial motion to the nut, and causes it to engage with the tubular breech piece, as shown in the detached view Fig. 8. This coiled spring e^3 is made fast at one end by riveting as shown at 16 in Fig. 7*, to the interior of the guiding sleeve e^5 forming part of the breech-bolt and is made fast at the other end to the exterior of the locking nut e' by being hooked on to a stud 17 fast in the said nut. The coiling up of this spring is caused by the arm e^2 of the nut being forced by the recoil action from the position shown in Fig. 1, up into the horizontal portion of the slot c^3 . In Fig. 8, it will be seen that an annular groove is cut on the inner face of the breech piece, near the rear thereof, and this groove is entered by notches or grooves 22, which correspond to the ribs or locking pieces 23 of the nut e' . These notches or grooves 22 are shown in Figs. 3 and 6 in which the sections are taken directly through them, and they are also indicated by dotted outlines in Figs. 4 and 8, and the ribs 23 of the locking nut are shown in Figs. 2, 3, 4 and 8. When, therefore, the nut is brought up so as to pass through the notches or grooves 22 of the breech piece, and enters the annular recess at the end thereof, it will, being free to move axially under the action of the coiled spring e^3 , (see Figs. 7 and 7*) interlock, as shown in Fig. 8, with the shoulders 24 (see Figs. 6 and 8) left behind the circular groove 15 in the breech piece between the notches or grooves 23, and thus secure the bolt until the recoil, after firing, takes place. The first effect of this recoil is to drive back the breech bolt and barrel. The back press-

ure thus put upon the bolt will cause the nut to be turned by its lever arm e^2 traveling up the cam groove, and the release of the bolt from the breech piece will be thereby effected, leaving the bolt free to move back alone, under the impulse of the recoil, recock the hammer g , and compress the propelling spring e^4 , as shown at Fig. 3.

In order to retard the movements of the breech bolt, while completing its back motion (under the impulse of the recoil), and commencing its return, to give time for the placing of a fresh cartridge in line, as shown by dots in Fig. 3, the rear end of the slot c^3 is curved or sloped downward as shown at c^{10} in Fig. 1, thus causing the arm e^2 to travel through a lengthened course in comparison with the progress made at the same time by the breech bolt. The forward or return motion of the breech bolt, thus slightly retarded, is effected by the recoil of the compressed spring e^4 , which, as will be seen, bears upon the closed end of the case c , and enters a guiding sleeve e^5 carried by the bolt. This bolt is made hollow, as usual, at its front end, to receive the firing pin f , with its retracting spring f' (Fig. 4), and it projects into the guiding sleeve e^5 of the bolt. The case c and sleeve e^5 are slotted longitudinally in the plane of motion of the hammer g , to admit of the hammer rising to strike the firing pin.

Projecting from the underside of the breech bolt, close to the fore end thereof, is a stud e^* (see Fig. 10^a) which serves, in the advanced position of the bolt, to hold down the cartridges, which are pressed upward by the propelling spring of the magazine. On the recession, however, of the bolt, the uppermost cartridge is thrust up from the magazine and into the position shown in Fig. 10^a and ultimately into the dotted position of Fig. 3, ready to be forced, on the return movement of the bolt, by the expansion of the spring e^4 , into the barrel.

e^6 is the extractor, consisting of an elastic hooked finger attached to, and recessed into the breech bolt e . To prevent this bolt turning in its traverse movements, it is fitted with a stud 25 (see Fig. 5) which enters a longitudinal groove formed in the breech piece b .

To facilitate the discharge of the spent cartridge, we may use a lever extractor e^7 , of the form shown in Figs. 10 and 10^a pivoted in a slot made at the junction of the breech piece and barrel. The outer end of this lever extractor works in a longitudinal slot in the case c , its inner or shorter end entering the cartridge chamber in the breech, to take onto the cartridge head. On the recoil of the barrel, the outer end of the extractor comes into contact with the rear end of the longitudinal slot, when the breech is within three-sixty-fourths of an inch of being fully unlocked. By the further backward movement of the breech piece, the extractor is forced back until its highest point is low enough to pass inside

the case, thus offering no obstruction to the completion of the recoil. This tipping movement of the extractor e^7 starts the empty cartridge case, leaving it free to be taken back by the extractor e^6 attached to the bolt, and ejected from the case as shown in Fig. 4. The forward end of the longitudinal slot serves to bring the lever extractor back into place, upon the return of the barrel.

The means for operating the hammer we will now proceed to describe. h , Figs. 2, 3 and 10^a, is a box fixed to the under side of the case c by screws, and to its bottom the trigger guard is attached. This box is intended to receive the whole mechanism of the lock. i is the trigger, hung loosely upon a pin i' , and retained in its normal position by a spring i^2 . The pin i' serves also as the fulcrum for a sear lever k . The hammer g , mounted in the box h , is formed and fitted, to receive a locking or safety sear g' (held in contact with the hammer by the spring g^2), and the firing sear, which is the sear lever k just mentioned. For actuating this sear lever, the trigger is fitted with a lifting arm i^3 , which is pivoted to a lug on the back of the trigger and pressed into engagement with the rear end of the sear lever by a spring i^{10} . (See Fig. 10^a.) This lifting arm, by its rise, is caused to trip the sear lever clear of the hammer. This sear lever is held in the bent of the hammer by the pressure upon its tail end, of one end of the main spring l , its other end acting, as usual, on the hammer.

In the face of the lifting arm i^3 an inclined slot is cut to receive a fixed pin h' , projecting from the side of the box. As, therefore, the arm i^3 is raised by the pulling of the trigger to fire the gun, the arm will, when it has released the sear lever from the hammer, be thrust back in the act of sliding against the fixed pin h' , leaving the main spring free to rock the sear lever into its raised position, ready to engage again with the hammer, when the hammer is thrust back by the recoil of the gun.

In order to prevent the gun from being fired before the breech bolt e has been returned to its seat in the breech end of the barrel, the locking sear g' is provided. This sear consists of a notched bar fulcrumed at the bottom of the box, and extending upward and outward through the box, to meet the arm e^2 of the locking nut e' of the breech bolt e , immediately before the arm e^2 reaches the bottom of the cam groove c^3 . The return movement, therefore, of the breech bolt (effected by the rebound of its propelling spring e^4), will cause the arm of the locking nut e^2 to strike the projecting tail of the sear arm g' , and throw that sear out of contact with the hammer, thus leaving the hammer free to move on the tripping of the sear k and strike the firing pin, so soon as the breech bolt is properly seated and secured in place.

Affixed to the stock near its forward end,

and serving as supports and guides for the barrel a , are two metal bands $n n$, Figs. 1 and 2, and shown detached at Fig. 11. The foremost of these bands serves not merely as a guide for the barrel, but carries also a foresight.

From the foregoing description it will be understood, that in firing our improved gun, the following movements will take place. On the pulling of the trigger i , the arm i^3 , which is pivoted thereto, will lift the tail end of the sear lever k , and withdraw the sear from the bent of the hammer g . The hammer thus set free will, under the action of the main spring l , rise to the firing position shown in dots in Fig. 2, and strike the firing pin f , thereby discharging the cartridge inserted in the barrel a . The recoil action produced by this discharge will have the effect of driving the barrel toward the rear end of the case e , against the pressure of the coiled spring a^2 , which spring serves to return the barrel to its normal position. In its back movement, the barrel carries back with it the tubular breech piece b , and the breech bolt e contained therein, and locked thereto by the nut e' , and, at the same time, it sets the cartridge extractors in action. As the nut e' is fitted with a lever arm or handle e^2 , which is free to traverse the cam slot c^3 , it will, by the back movement of the breech bolt, be disengaged from the tubular breech piece b , and following the impulse given to it by the recoil, the bolt will recede from the closed position of Fig. 2, to the extreme position of Fig. 3. This movement of the breech bolt compresses the spring e^4 at its rear, and at the same time causes the handle e^2 to move down the rear bend of the groove c^3 . This back movement of the breech bolt, carrying with it the firing pin f , also drives back the hammer g to its cocked position, where it is instantly engaged with the safety sear g' , and the firing sear lever k , which latter, having been released by the tripping of the trigger arm i^3 , will be held in position for catching the hammer, whether the trigger be released or not from pressure. While the breech bolt is completing its back movement, and is under the impulse of the spring e^4 starting for its return, its movement is retarded, as already explained, by the lengthened movement of the arm e^2 in the rear bend of the slot c^3 . Time is thus given for a fresh cartridge to be raised into line with the barrel, and, on the completion of the return of the breech bolt, this cartridge will be thrust forward into the barrel, and into contact with the ejector lever e^7 , which, at the recoil of the barrel, was caused to start the spent cartridge, and facilitate its discharge by the ordinary extractor. The propelling action of the compressed spring e^4 drives forward the breech bolt e , until the arm or handle of the nut e' reaches the forward end of the cam groove c^3 . In traversing the forward bend, the arm, assisted by the coiled spring of the

nut e' , imparts to the nut an axial motion, and thereby locks the breech bolt to the tubular breech piece. At the same time, the arm e^2 encounters the tail of the sear g' , and trips the sear out of the hammer bent, thereby leaving the hammer free to respond to the motion of the trigger.

To adapt our safety lock to hammerless guns, we modify the arrangements of the sear lever as shown in the longitudinal section Fig. 12, reference letters in which refer to like-lettered parts in the foregoing description. k is the sear lever, mounted, in this case, on a fulcrum separate from that of the trigger i . f is the firing-pin which is free to slide in and with the breech bolt e , and is propelled forward by a coiled spring f^* contained in a tubular case f^2 , which is closed at its rear end, and is attached to the tubular extension of the breech bolt e . The firing pin f is free to slide through a central hole in the bottom of the tube f^2 , and it is propelled forward through the head of the bolt, to reach the cartridge in the barrel, by the recoil of the spring f^* , which is compressed between the bottom of the tube f^2 and a block f^3 made fast to the firing pin. This block projects through a longitudinal slot in the bolt e , and is caught by the sear lever k , on the advance of the bolt to close the breech. A special sear spring k' bears on the tail of the sear lever, and thus insures this action of the sear. The release of the sear lever k from the firing pin is effected by the trigger i , when pulled, raising the lifting arm i^3 and tripping the sear lever. To prevent the firing pin acting prematurely, or before the breech bolt is seated and locked in place, the safety sear g' of Figs. 2 and 3 is employed, but in this instance it is adapted to stop the action of the sear lever k , until the breech bolt is locked. This it does by presenting to the under side of the sear lever, a shoulder, which, so long as that shoulder lies in the plane of motion of the sear lever, will prevent the lever responding to the pressure put on the trigger. So soon, however, as the arm of the locking nut i' reaches the tail of the sear g' , the sear will be rocked on its fulcrum from the dotted position of Fig. 12 to its drawn position, thereby leaving the sear lever k free to respond to the movement of the trigger.

To prevent the sear lever, in either of the above described arrangements, from being accidentally disengaged from the bent of the hammer or firing-pin, we provide a horizontal rocking pin m , which has its bearings in the sides of the box h , and underlies the sear lever. This pin is recessed at the part immediately below the sear, to allow for the downward movement of the sear lever. To prevent this movement, it is only necessary to give the rocking pin a half turn by means of a lever m' outside the box, when the pin m will be caused to bear on the under side of the sear lever, and prevent it from leaving

the bent of the hammer or the retaining block of the firing pin.

It may be well here to remark, that the advantages which we claim for our improved lock mechanism, are (a) that the arm is fully recocked and at the instant following the explosion, even though the trigger has not been released from the pressure put upon it at firing; (b) that when the breech is reclosed and locked on a new cartridge, the firing of such cartridge is effectually prevented until the pressure on the trigger is removed; the trigger is returned by its spring to the normal position; and the readjustment of the lifting arm and sear lever is effected.

What we claim is—

1. The combination of the stock and a cylindrical metallic case made fast thereto and having in it a cam-slot, a tubular breech-piece fitted to slide in said cylindrical metallic case and having the gun barrel attached to it, a breech-bolt fitted to slide in said breech-piece and provided with a guiding sleeve, a hammer, a safety sear for engaging with the hammer, a ribbed locking nut turning on the breech-bolt for engaging it in its forward position with the breech-piece, a coiled spring applied between said guiding sleeve and locking nut for turning the said nut in a direction to lock the breech-bolt to the breech-piece, and a handle or arm on said nut working in the cam-slot of the cylindrical metallic case for turning said nut in either direction and for disengaging the safety sear, all substantially as herein set forth.

2. The combination of the breech-piece, the breech-bolt sliding therein, the locking-nut for locking the breech-bolt to the breech-piece, and the cylindrical metal case in which the breech-piece slides, said locking nut being provided with a projecting arm, said cylindrical case containing a cam-slot for the passage of said arm or handle, and said cam-slot having at its rear end a downward slope to retard the completion of the backward movement of the breech-bolt, substantially as herein set forth.

3. The combination with the hammer and trigger, of a sear lever of which the front end engages with the hammer or equivalent firing device and a spring applied to the rear end of the said lever to produce such engagement, a lifting arm having an inclined face and pivoted to the trigger to engage with the rear end of the said lever, a spring applied to said lifting arm to produce the latter engagement, and a fixed pin arranged in front of said inclined face to produce the disengagement of said lifting arm and lever by the pull of the trigger, substantially as herein described.

4. The combination with the hammer and trigger, of a sear lever pivoted upon the trigger pin and engaging at its front end with the bent of the hammer, a main spring of which one end presses upward on the hammer and

the other downward upon the rear end of said
sear lever, a lifting arm having an inclined
face and pivoted to the trigger, a spring ap-
plied to said lifting arm to engage it with said
5 sear lever, and a fixed pin which is arranged
in front of said inclined face and against
which the said inclined face works to disen-
gage said arm from said sear lever, substan-
tially as herein set forth.

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