

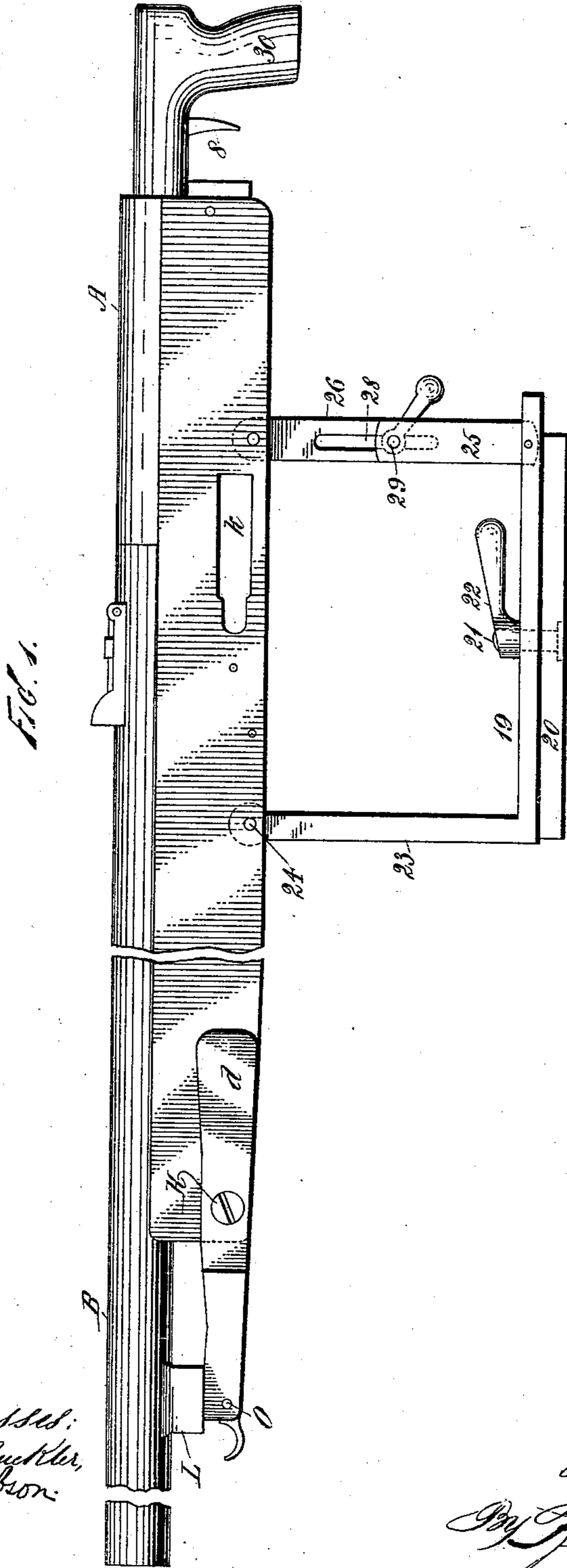
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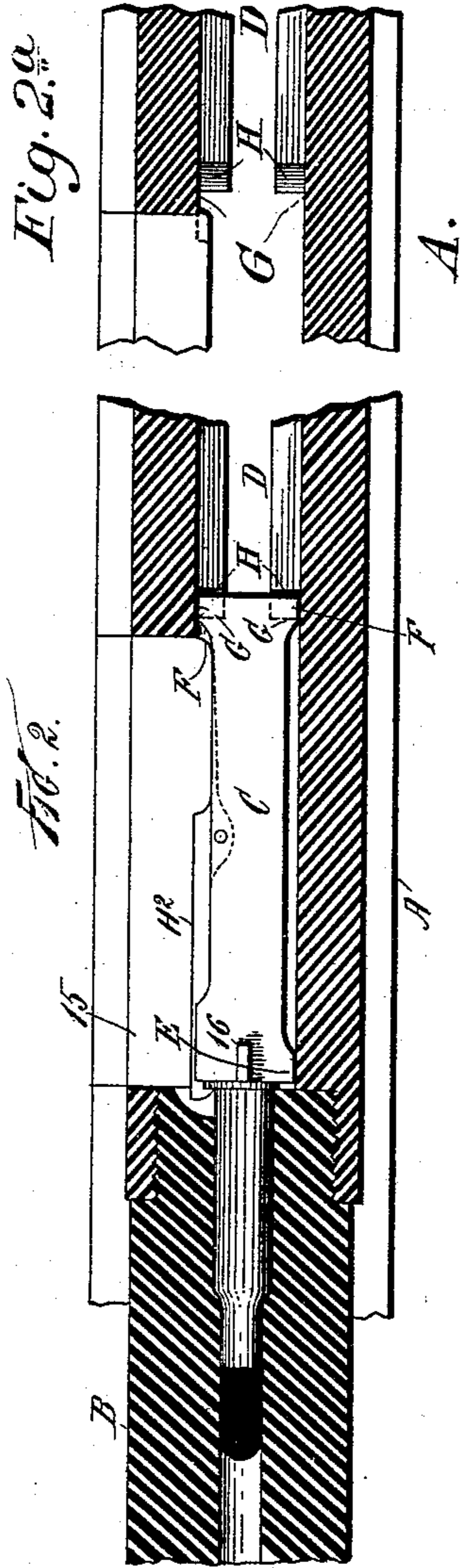
J. M. & M. S. BROWNING.
GAS OPERATED BREECH LOADING GUN.

No. 544,660.

Patented Aug. 20, 1895.



Witnesses:
John Buckler,
M. Gibson.



Inventors.
John M. Browning and
Matthew S. Browning
By Reading as filed Attorneys.

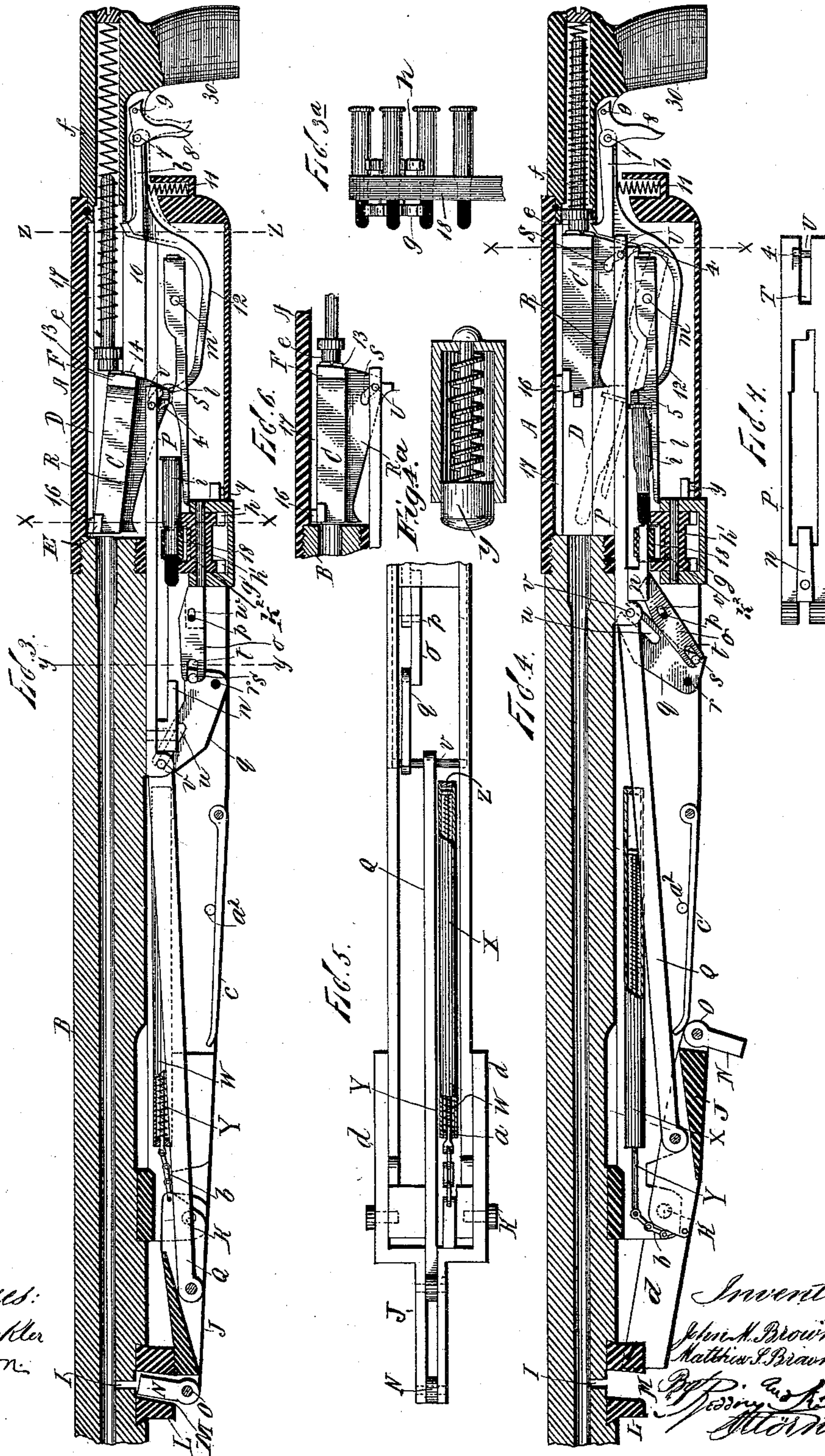
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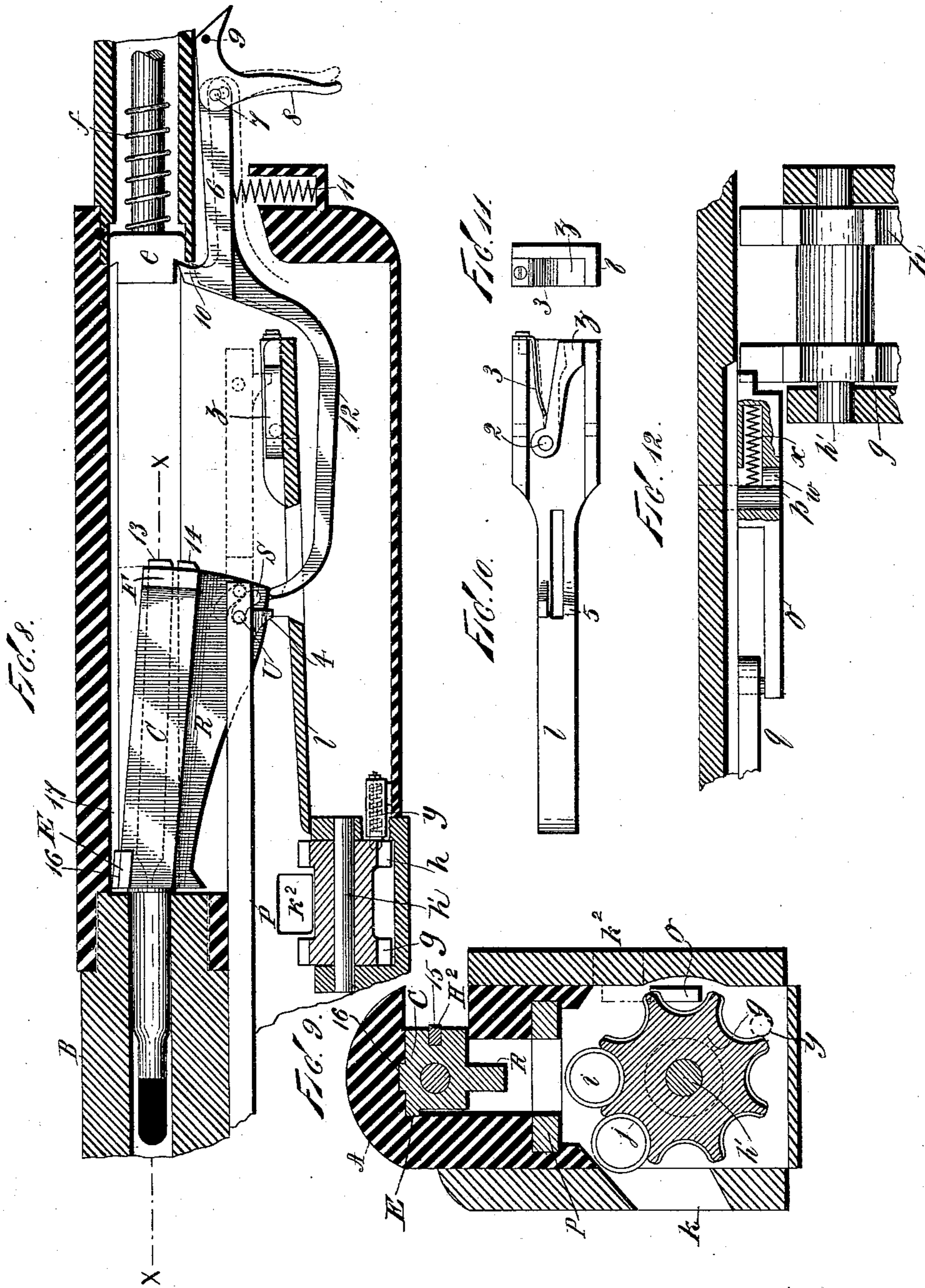
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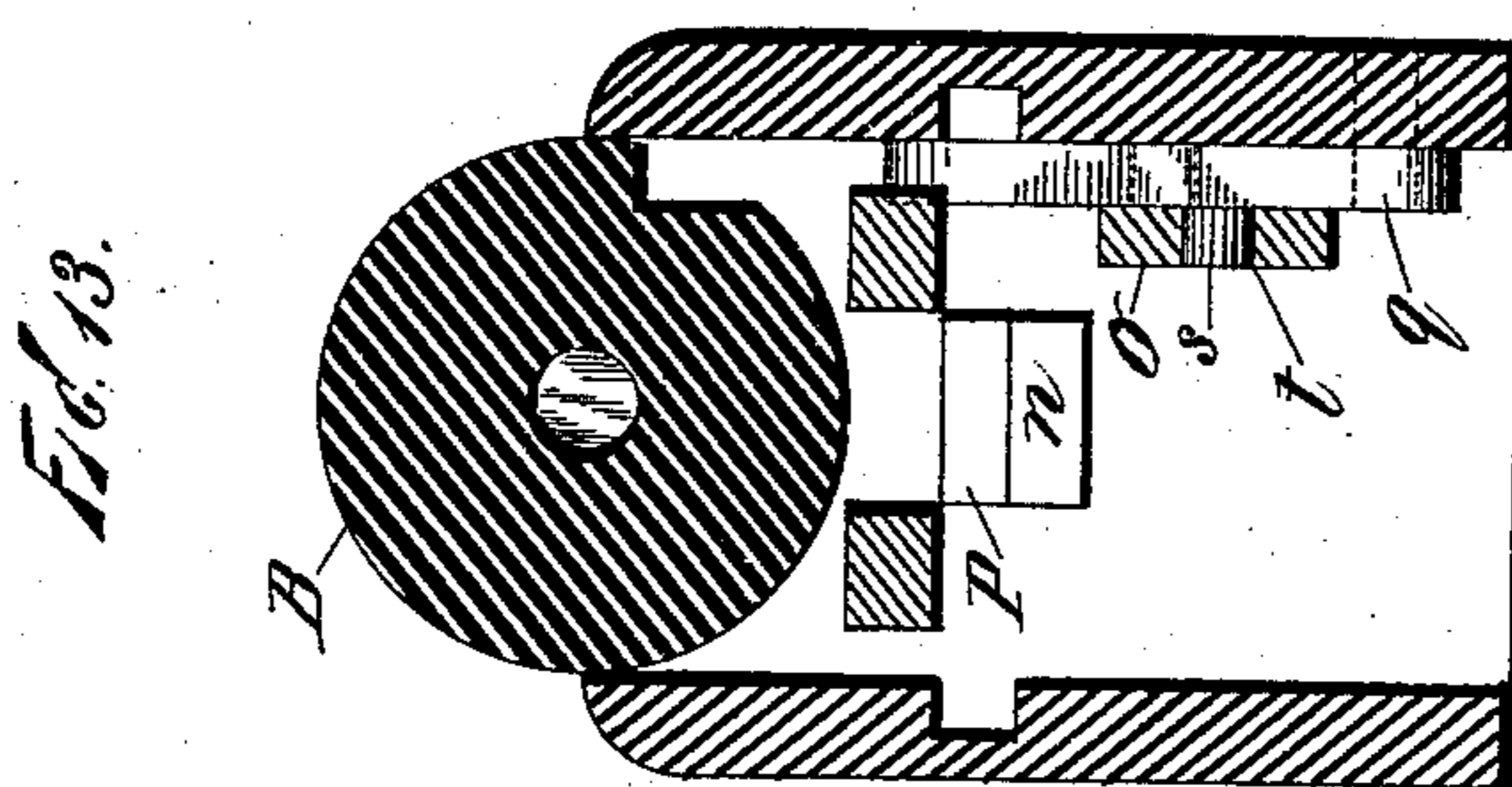
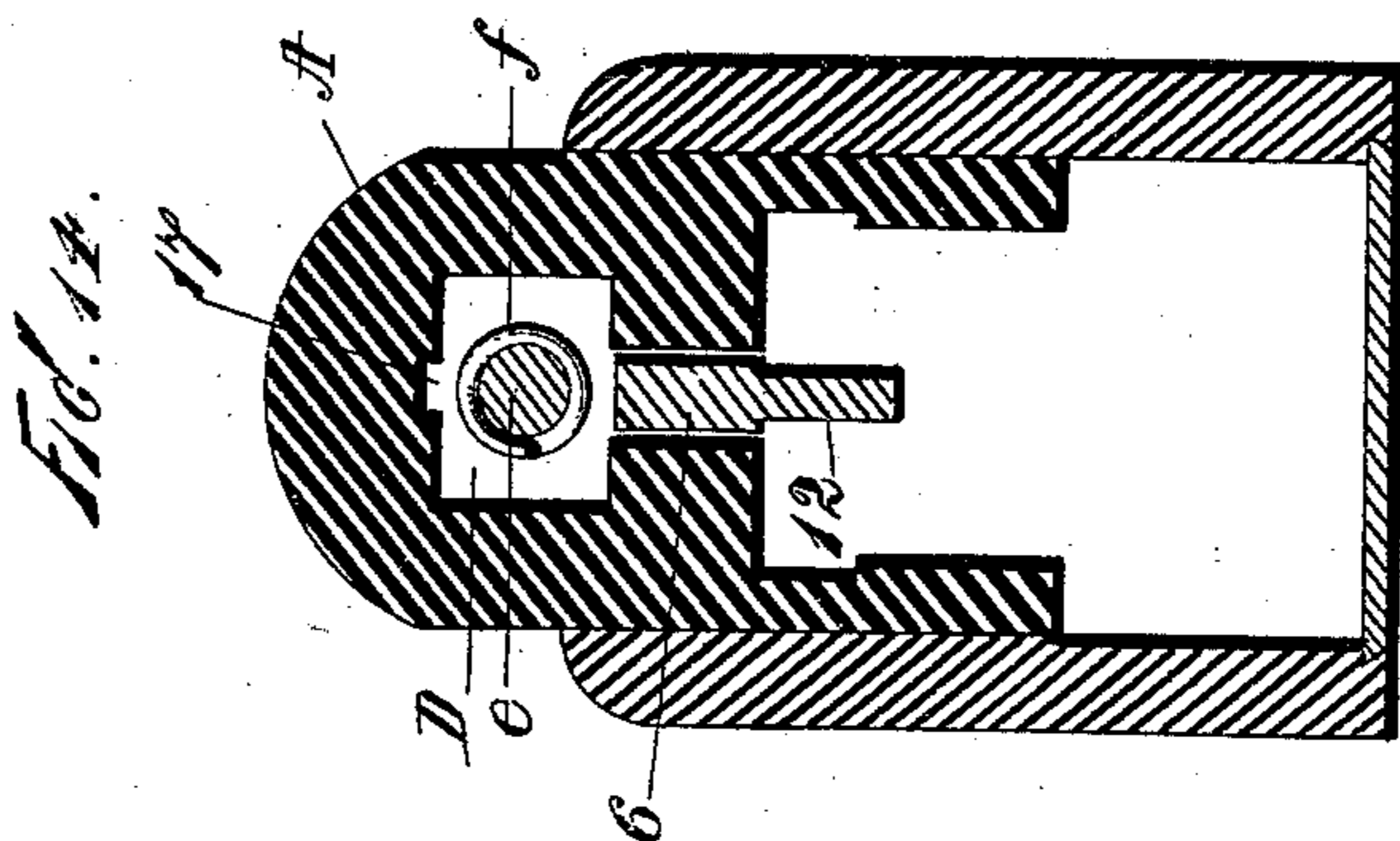
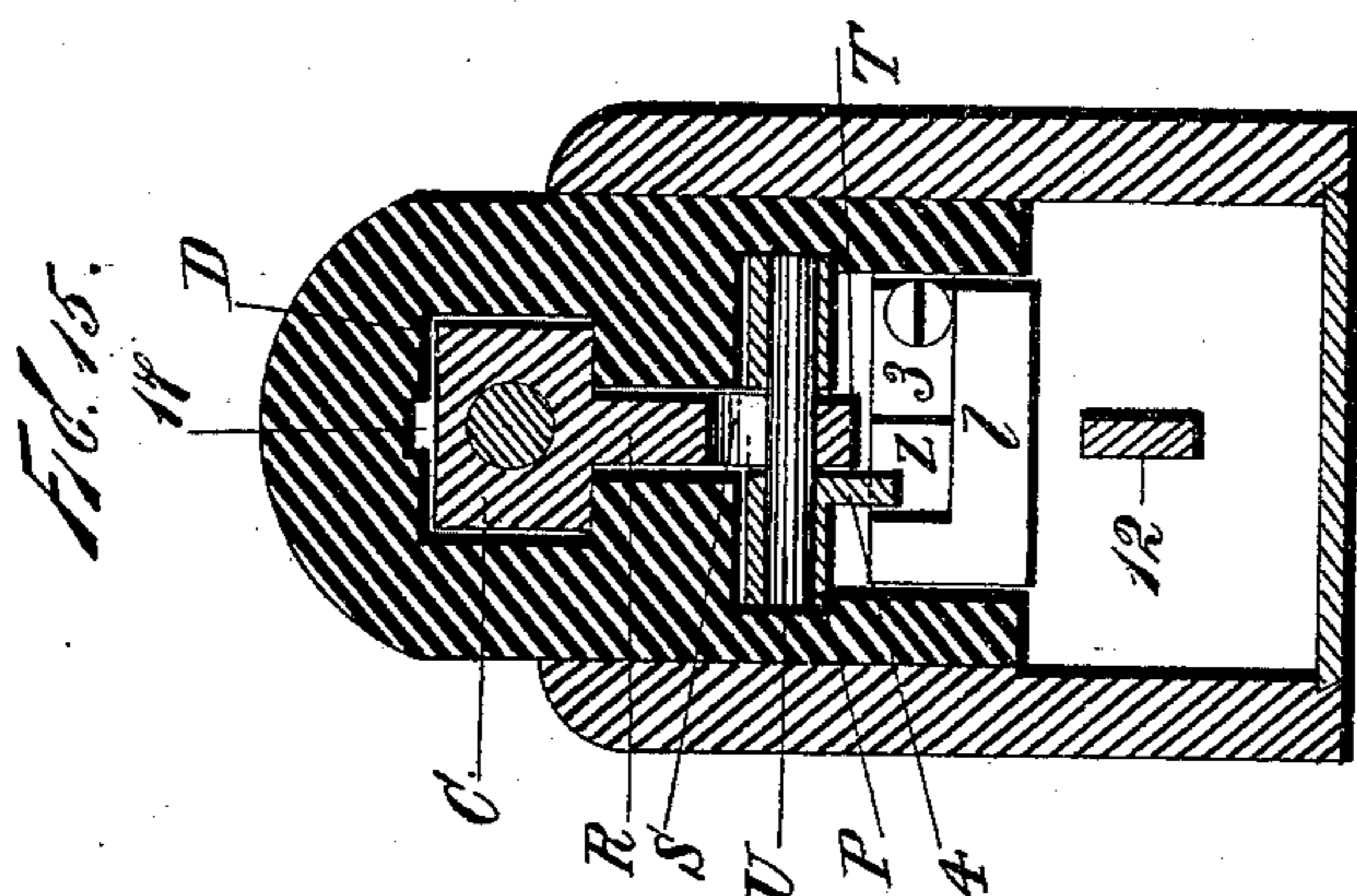
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4 Sheets—Sheet 4.

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No. 544,660.

Patented Aug. 20, 1895.



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UNITED STATES PATENT OFFICE.

JOHN M. BROWNING AND MATTHEW S. BROWNING, OF OGDEN, UTAH TERRITORY.

GAS-OPERATED BREECH-LOADING GUN.

SPECIFICATION forming part of Letters Patent No. 544,660, dated August 20, 1895.

Application filed September 11, 1893. Serial No. 485,215. (No model.)

To all whom it may concern:

Be it known that we, JOHN M. BROWNING and MATTHEW S. BROWNING, citizens of the United States, and residents of Ogden, in the county of Weber and Territory of Utah, have invented certain new and useful Improvements in Breech-Loading Guns, of which the following is a specification.

This invention relates to improvements in that class of guns in which the gas produced by explosion after it has given a sufficient initial velocity to the projectile is further utilized as a means for operating the breech mechanism of the arm, and whereby rapid and successive firing may be automatically produced, it being only necessary after firing the first shot to furnish a supply of cartridges to the gun, which continues its operation so long as cartridges are so supplied.

The object of the invention is to produce a simple and efficient mechanism adapted to receive the action of or to be actuated by the pressure of the gases of explosion before the projectile shall have left or issued from the barrel, and by means of which movement is transmitted to the breech mechanism of the arm for its operation, the mechanism being provided with means for its perfect control and the interruption of its operation at any time at will.

The invention is more particularly set forth in the claims hereinafter following, forming a part of this specification of invention, one embodiment thereof being comprised in the parts and mechanisms and in the combination of parts and mechanisms and their operations, hereinafter described and illustrated in the accompanying drawings, in which—

Figure 1 is a side view in elevation of the gun complete. Fig. 2 is a longitudinal horizontal section cutting on line xx of Fig. 8. Fig. 2^a is a similar section, but with the breech-piece removed to more clearly show the abutments for the breech-piece. Fig. 3 is a longitudinal and vertical sectional side view showing the mechanism in the closed position. Fig. 3^a is a side view representing the feed-wheel detached and as provided with a carrying-band for the cartridges. Fig. 4 is the same view as Fig. 3, showing the mechanism in the open position. Fig. 4^a is a detached

longitudinal section of the spring-stop for the feed-wheel. Fig. 5 is an under side view of the gun forward of the feed-wheel. Fig. 6 is a longitudinal and vertical section showing side view of the breech-piece in its raised position preparatory to its rear movement. Fig. 7 is an under side view of the longitudinally-reciprocating slide P. Fig. 8 is a partial longitudinal and vertical section on an enlarged scale for better illustration of the invention. Fig. 9 is a transverse vertical section on line xx of Fig. 3, looking forward. Fig. 10 is a top view of the carrier. Fig. 11 is a rear view of the carrier. Fig. 12 is a partial horizontal section showing the pawl and a portion of the feed-wheel. Fig. 13 is a transverse vertical section cutting on line yy of Fig. 3, looking rearward. Fig. 14 is a transverse vertical section on line zz of Fig. 3, looking forward; and Fig. 15 is a transverse vertical section on line xx of Fig. 4, looking forward.

A represents the receiver, to the forward end of which the barrel B is attached, the barrel opening into the receiver at the rear.

C represents the breech-piece, which is arranged in the receiver and adapted for longitudinal movement backward and forward in the rear of the open end of the barrel. The breech-piece is also adapted to swing vertically, so that in the forward position its rear end may stand forward of abutments to support the breech-piece against recoil, and from which abutments the breech-piece escapes at the proper time by an upward movement of its rear end.

The receiver is constructed with a longitudinal recess D, comprising the bore of the receiver, within which the breech-piece is adapted to move longitudinally and up and down, as will be presently explained. This recess is covered on the top, but is open longitudinally through the bottom, and is so constructed that the recess on each side of the said central opening thereof forms grooves or through which the breech-piece may work. At the forward end of the breech-piece is a lateral projection E, which extends to and works against one side of the recess, and from that projection E, rearward, the breech-piece is narrower than the said downward opening from the recess or bore in which the breech-

piece works, and so that the breech-piece may freely swing up and down, the said projection supporting the forward end of the breech-piece as a trunnion to permit the swinging movement of the breech-piece. At the rear end the breech-piece is constructed with lateral projections F F—one on each side—which are broader than the said opening from the recess in which the breech-piece moves and which projections are adapted to work on the said grooves or sides of the recess in the back-and-forward movement of the breech-piece. The sides of the opening downward from the recess are constructed with notches G G, corresponding to the shape of the lateral projections F F of the rear end of the breech-piece, forming shoulders H H, so that when the breech-piece is in its extreme forward or closed position the rear end of the breech-piece will drop, the projections passing down through the notches G G, bringing the said projections against the shoulders H H, and the breech-piece will rest against said shoulders as abutments to resist recoil, as seen in Figs. 3 and 8, thereby locking the breech-piece or breech mechanism; but when the rear end of the breech-piece is raised, as shown in Fig. 6, it takes the breech-piece up and out of engagement with the shoulders H H, so that the breech-piece may then move rearward in its guides to the open position, as seen in Fig. 4, and then when the breech-piece is again moved forward its rear end may drop to engage the abutments, as before described.

In the barrel at some point forward of the cartridge-chamber an aperture I is formed, which opens outwardly or radially from the bore of the barrel, so that the gases produced by the explosion of the cartridge may escape through said aperture as soon as the bullet has passed that point and before it has escaped from the barrel.

J represents a lever which is hung upon a fixed pivot K, and which lever is adapted to swing in a plane parallel with the axis of the aperture I or of the vertical axis of the barrel. As here represented the lever is hung at the rear of the aperture I, alongside and beneath the barrel, and it extends forward, so that its forward end is exposed to the action of the gases which pass through the aperture I. Consequently when the gases escape through said aperture they act upon the said lever and force it to swing from its closed position (shown in Fig. 3) to its open position, as seen in Fig. 4, away from the aperture I in the barrel. As here represented the gases do not operate directly upon the lever as in other efficient constructions (not shown) they may do within the purview of our invention; but a housing L is arranged around the aperture I, forming an enlarged opening M between the end of the lever and the aperture, and in the lever a finger N is hung upon a pivot O on the lever, the finger extending from the lever in the plane of the aperture I and is adapted to enter the opening M in the

housing L, as seen in Fig. 3, so that the end of the finger is directly exposed to and closes the aperture I, and the gases will operate directly upon the end of the finger, which finger communicates the force of the gases to the lever. The finger has a certain amount of freedom in its swinging movement, and is of somewhat smaller diameter than the opening in the housing, so as to insure its proper entrance to the housing at all times and allow for the expansion of the barrel and other parts occasioned through the heat generated by successive firing, and thereby prevent the possibility of clogging the finger within the housing. The housing serves as a guard to prevent the lateral escape of the gases, which might occasionally happen were the end of the lever shown in the drawings adapted to bear directly against the aperture upon the outside of the barrel without some such protection, and thus the barrel about the aperture and the moving part adapted to cover the aperture are constructed, the one with a projection and the other with a recess, whereby in the normal condition the projection will be substantially inclosed by said recess, but so that the projection and recess will separate as the moving part is thrown from the aperture under the action of the gases of explosion; but the broad invention thus stated is not our joint invention and is the sole invention of one of us—John M. Browning—and is therefore not claimed herein, but is claimed in an application of said John M. Browning under Serial No. 531,171, filed December 8, 1894. The movement of the lever as hereinabove described is adapted to impart to the breech-piece the opening movement, as from the position seen in Fig. 3 to that seen in Fig. 4, and the movement of the lever is communicated to the breech-piece through a slide P, arranged in longitudinal guides beneath the breech-piece. This slide is connected to the lever by means of a rod Q, and so that as the lever is thrown to the open position, as seen in Fig. 4, the slide will be correspondingly moved rearward, as from the position in Fig. 3 to that seen in Fig. 4. The breech-piece being locked against its abutments, it is necessary to raise it before it can receive its rear movement and in order to produce such rising movement of the rear end of the breech-piece the breech-piece is constructed upon its under side with a downwardly-projecting rib R, less in width than the opening downward from the recess in which the breech-piece moves, and this rib is constructed with an upward and forwardly inclined or cam-shaped slot S, which cam slot or groove is horizontal at its top for a short distance and then inclines downward and rearward, as shown Fig. 8.

One of the purposes subserved by providing the cam-slot in the rib of the breech-piece with a horizontal portion at its forward end is that a slight rearward movement of the slide is attained before the slide commences to un-

lock the breech-piece, whereby time is allowed for the escape of the projectile from the barrel before the breech-piece is unlocked, and if the breech mechanism were operated by hand, as it would have to be if the radial aperture were closed or in a construction omitting the gas-operated lever, the breech-piece would be held locked during that time against delayed firing; and a further object is attained by the use of the horizontal portion of the cam-slot in the return or forward movement of the slide, in that the breech-piece will have reached its fully-locked position before the hammer is released from the sear and will be held in its fully-locked position while the pin on the slide traverses the horizontal part of the cam-groove, producing a period of rest for the breech-piece in its fully-locked position before the gun is again fired.

The rib R of the breech-piece extends into a longitudinal slot T in the rear end of the slide P, and across that slot is a pin U, which passes through the cam-shaped slot S in the rib R of the breech-piece. The position of the cam-slot S in the breech-piece with relation to the pin U of the slide is such that when the breech-piece is in the down or closed position, as seen in Fig. 3, the pin stands at the upper horizontal end of the slot S. Consequently in the first part of the rear movement of the slide P, after the pin U has moved through the short horizontal part of the slot S, the pin U operates in the inclined portion of said slot S and causes the breech-piece to rise, as seen in Fig. 6, until it escapes from its abutments. Then the continued movement of the slide P, as before described, will produce a longitudinal rearward movement of the breech-piece until it reaches its extreme open position, as seen in Fig. 4. Then when the slide P returns or is moved forward it will draw the breech-piece forward with it to its closed position, and so soon as the breech-piece has reached its closed position and comes to a stand the pin U will again act in the cam-slot S and as the slide completes its forward movement will cause the rear end of the breech-piece to drop forward of its abutments, whereby it will be supported against recoil, as before stated. Instead of having the pin on the slide P and the cam-groove in the breech-piece the arrangement may be reversed and the pin located in the breech-piece and the cam-groove in the slide, and the described operation of the parts would be as effectually performed.

The opening movement of the breech-piece is produced by the gases, as before described. The closing movement is produced by mechanical means, as a spring. As here represented, a spiral spring W is arranged in a longitudinal tube X in a line parallel with the plane of movement of the lever J. From the forward end of the tube X a rod Y extends longitudinally through the spring, and the rod carries at its rear end a head Z, upon which the rear end of the spring rests, the

forward end of the spring being supported against a stationary head a in the spring-tube, and so that as the rod is drawn forward the spring will be compressed within the tube. The forward end of the rod is connected to the hub of the lever J, as by a chain b , and so that as the lever turns from the position seen in Fig. 3 to that seen in Fig. 4 the connection between the lever and the rod will cause the rod to be drawn forward, as seen in Fig. 4, and correspondingly compress the spring W. The power of the spring thus compressed is sufficient that its reaction will produce the return movement of the lever and the breech-piece, as from the position seen in Fig. 4 to that seen in Fig. 3, the force of the explosion being sufficient not only to throw the parts to the open position but to compress the spring, so that the lever and all parts connected therewith, including the breech mechanism, may be returned by the reaction of said spring so soon as the force of the gases shall have been expended. Two or more of such retracting-springs may be employed adapted to operate conjointly to restore the parts to their normal or closed positions, and they may be located and arranged in the same manner and compressed by the same means as shown in the drawings and hereinbefore described with reference to the single spring W, or otherwise, if desired; and of course, as will be understood, devices or mechanisms other than springs may be employed adapted to be operated by the movement of a lever, as J, through the action thereon of the gases of explosion to store up power to automatically restore the parts to their normal or closed positions within the scope of our invention.

As a cushion for the opening movement of the lever and so as to gradually break the force of the opening movement and take up the excess of momentum, a spring c is arranged in rear of the lever and attached to the side plate and against which the lever will strike as it approaches its extreme open position, the spring serving as a cushion or buffer to produce an easy or yielding stop for the lever at its extreme open position. Forward of the pivotal point of the spring c is located a pin a^2 , secured in the side plates, against which the spring c engages to keep it from being forced upward when the lever Q or the finger O, attached thereto, strikes it. Instead of attaching a separate spring to the side plates to provide a cushion for the swinging lever J the bottom plate of the gun may be extended, so that its forward end will be struck by the free end of the lever J as it is forced around by the pressure of the powder-gases, and the forward end of the bottom plate may be slightly tapered and split to secure a more yielding buffer; and any other device or arrangement for the purpose stated is comprised in our invention, and such spring-buffers serve the double purpose of taking up the excess of momentum of the

lever in its rearward movement and imparting to the lever an initial impetus on its return movement.

The lever *J* may be counterbalanced by extensions *d* upon the opposite side of its pivot. This counterbalance tends to prevent any vibration of the barrel which might result from the rapid action of the lever and the rod connected thereto, but such counterbalance is not essential and may be dispensed with altogether, if desired.

In rear of the breech-piece a longitudinally-reciprocating hammer *e* is arranged, provided with a suitable spring *f*, so that as the breech-piece is thrown rearward the hammer will also be forced rearward and compress its spring, the hammer being caught by a suitable sear connected to the trigger when in its full-cocked position and there held until the breech-piece returns. Then the trigger may be pulled to liberate the hammer and the blow imparted to the firing-pin in the breech-piece in the usual manner.

In the usual operation of the gun cartridges will be successively supplied to the barrel in the manner to be presently explained when the breech-piece is open, and the hammer will operate as soon as the breech-piece is closed to explode the cartridge introduced into the barrel, which explosion will cause the breech-piece to be raised and unlocked and opened and re-cock the hammer, and then the breech-piece will be returned, as before described, to produce a second explosion, and so on, the continuous successive explosions being produced as fast as and as long as cartridges are supplied to the barrel.

To supply the cartridges a rotating feed-wheel is arranged upon an axle *h'*. This wheel may be in cylindrical form and is constructed with longitudinal grooves on its periphery, each adapted to engage and carry a cartridge, and so that under the rotation of the wheel the cartridges will be carried around and fed to the position for transfer. Preferably the feed-wheel is constructed with an annular recess around its central portion, forming heads *g h*, with an annular space between them, the heads being grooved, forming thereon peripheral sprockets, as seen in Fig. 12, and which will in like manner engage and carry the cartridges to the position for transfer from the wheel to the carrier, the operation of the feed-wheel, so far as receiving and transferring cartridges is concerned, being the same as if the cartridge-grooves were continued throughout the length of the cylinder and without the annular space around the wheel between the heads.

As seen in Fig. 9, *i* and *j* represent two cartridges as held in the feed-wheel, the cartridges being introduced through an opening *k* in the front side plate of the casing, either one at a time by hand or from out of a band formed in pockets, as shown in Fig. 3^a, each holding a cartridge, the band being fed through the opening *k* in one side plate and

the empty end of the belt passing out through an opening *k*² in the opposite side plate, the exploded shells being expelled through an opening *l*⁵ in the receiver, as shown in Figs. 2 and 9.

The feed-wheel is rotated so as to successively present a cartridge into a plane vertically through the barrel—that is, into a position below the bore of the barrel in a way hereinafter explained.

In rear of the feed-wheel a carrier *l* is hung upon a pivot *m* near its rear end, and so as to swing in a vertical plane, as usual in this class of carriers in magazine-firearms. Normally the carrier stands in the position seen in Fig. 3 below the line of the cartridge *i* in the feed-wheel, and so that the cartridge so standing may be forced rearward from the feed-wheel onto the carrier, as seen in Fig. 4. To thus transfer the cartridges from the feed-wheel onto the carrier, the slide *P* is provided at its front end and on its under side with a rearwardly-projecting finger *n*, which stands in line with the cartridge in the feed-wheel, as seen in Fig. 3, and so that as the slide approaches its rear position the finger *n* will strike the forward end of the cartridge *i* in the feed-wheel or in one of the pockets in the feed-belt that has been fed onto the roller through the opening *k* before referred to and force it rearward onto the carrier, as seen in Fig. 4, to take the cartridge to a position that its forward end is just in rear of the rear end of the barrel but below it. Then the carrier with the cartridge upon it is raised, as seen in broken lines, Fig. 4, to bring the forward end of the cartridge into position at the rear of the open end of the barrel and the head end of the cartridge forward of a portion of the open breech-piece, and so that as the breech-piece next moves forward it will transfer the cartridge from the carrier into the barrel, as usual in guns having a longitudinally-reciprocating breech-piece and a vertically-vibrating carrier. As one cartridge is transferred from the feed-wheel, the feed-wheel is caused to rotate far enough to present the next cartridge for transfer to the carrier. This rotation of the feed-wheel is produced by means of a pawl *o* hung upon a pivot *p*, (see Fig. 4,) and a vibratory movement is imparted to this lever *o*, through a rocking arm *q*, hung upon a pivot *r* on the side plate. This lever *q* carries a stud *s*, which works into a longitudinal slot *t* in the tail of the pawl *o*, and the lever *q* is constructed with a longitudinal slot *u*, in which a projecting pin *v* on the slide *P* extends, so that as the slide moves rearward from the position seen in Fig. 3 to that seen in Fig. 4 it will correspondingly turn the lever *q* and raise one end of the pawl *o*, as seen in Fig. 4. The nose of the pawl extends into the feed-wheel so as to engage therewith, but its nose is beveled and it is permitted a certain amount of longitudinal movement by means of a slot *w* at its pivot *p*, so that the nose of the pawl striking the teeth of the feed-

wheel will escape therefrom without action on the wheel. The pawl is provided with a spring x (see Fig. 12) at the rear of its pivot, the tendency of which is to force the pawl to its rear position on the pivot. Consequently after the pawl has escaped from the tooth of the feed-wheel with which it has engaged in its up position it will be forced rearward into engagement with the next tooth of the feed-wheel, as indicated in broken lines, Fig. 9. Then as the slide P returns and returns the pawl, the pawl will operate upon the feed-wheel to advance it one step and present the next cartridge carried by the feed-wheel into position for transfer to the carrier.

The feed-wheel is provided with a spring-stop y , such as is usual in similar mechanical devices, to engage the wheel when in its position of rest and yieldingly hold it until its next movement is required, when the forced movement of the wheel causes it to readily escape from the said spring-stop, a device too well known to require particular description. This spring-stop y is separately shown in Fig. 4^a, and its position relatively to the feed-wheel is indicated by a dotted circle in Fig. 9.

The carrier l is raised at the beginning of the forward movement of the breech-piece, and in order that the movement of the carrier may be made at the proper time and with certainty the carrier is provided with a latch z on its upper side, hung upon a pivot 2, so as to swing in a horizontal plane, the upper side of the carrier at this point being grooved or recessed to receive the latch, as seen in Figs. 10 and 11. The latch extends to the rear of the pivot on which the carrier is hung and is provided with a spring 3, the tendency of which is to hold the latch at one side of the groove in the carrier in which it is arranged, but so as to permit it to yieldingly swing toward the other side, as indicated in broken lines, Fig. 10.

The slide P is constructed with a downward projection 4, the path of which is on that side of the latch z opposite the spring 3, and so that as the slide moves rearward the said projection 4 will pass the latch, the latch yielding so that the projection may escape to the rear of the latch and without effect upon the carrier; but on the return of the slide the projection 4 will strike the end of the latch z and operate as a cam thereon to depress the rear end of the carrier and raise its forward end, as seen in broken lines, Fig. 4. This movement of the carrier occurs in order to properly present the cartridge forward of the breech-piece, so that the forward end of the breech-piece may strike the rear end of the cartridge on the carrier and force it to its place in the barrel. Then as the parts approach the closed position the projection 4 on the under side of the slide strikes an upward projection 5 on the upper side of the carrier and operates thereon to return the carrier to its down position, as seen in Fig. 3.

To produce automatic and continuous fir-

ing whenever it is desired so to do and yet prevent accidental firing, the sear is arranged so that the hammer can only be released when the breech-piece is in its closed position.

6 represents the sear, which is hung by its rear end on a pivot 7 to the trigger 8, the trigger being hung upon a pivot 9 in rear of the pivot 7, the nose 10 of the sear being adapted to engage a corresponding notch or shoulder of the hammer when the hammer is in the rear position, and a spring 11 is provided, the tendency of which is to force and hold the nose of the sear into such engagement with the hammer. The sear is constructed with a forwardly-projecting finger 12, which extends to a position underneath the breech-piece, and so as to bear upon the breech-piece when the breech-piece is in the closed position, as seen in Fig. 2. Under this arrangement the bearing of the finger 12 on the breech-piece serves as a fulcrum to the sear, and so that as the trigger is pulled, as seen in broken lines, Fig. 2, the rear end of the sear will be thrown downward, the sear turning upon its bearing-point at the breech-piece, and draw the nose of the sear from its engagement with the hammer to liberate it; but the trigger held in the pulled position serves as a fulcrum for the sear when the breech-piece is open, and so that as the breech-piece is thrown rearward and escapes from the finger 12 of the sear the sear is free to rise under the action of the spring 11 into a position to engage the hammer when it arrives at the full-cock position. The trigger being held in the pulled position, when next the breech-piece is moved forward, the breech-piece will strike the end of the finger 12 and turn the sear down out of engagement with the hammer, so as to liberate the hammer. Hence, so long as the trigger is held pulled the opening movement of the breech-piece leaves the sear free to engage the hammer; but the closing movement of the breech-piece turns the sear to liberate the hammer, and therefore automatic engagement and disengagement of the hammer occur so long as the reciprocating movement of the breech-piece is continued and the trigger is held; but if the trigger be released then the breech-piece has no effect upon the sear and the hammer will remain in the cocked position and the firing cease.

The firing-pin projects at the rear end of the breech-piece in the usual manner, as seen at 13, Fig. 8, and in order that no contact can possibly occur between the hammer and the firing-pin until the breech-piece is in the fully closed and locked position the breech-piece is constructed with a projection 14 below the firing-pin corresponding or exceeding in projection to the projection of the firing-pin 13, and the position of this projection 14 is such that the hammer must strike that projection unless the breech-piece be in its extreme down position, as seen in Fig. 8.

To the breech-piece is attached on its right

side a spring extractor-hook H^2 of the well-known kind, which, yielding on the forward movement of the breech-piece, springs over the cartridge-head, and on the backward movement of the breech-piece it engages the cartridge-head and positively draws the shell from the barrel, and on the continued rearward movement of the breech-piece the cartridge-head is pressed against a projection on the receiver standing in the path of the cartridge as it is being extracted and causes it to be flung sidewise from the grasp of the extractor-hook and out through the opening 15 (see Fig. 9) in the receiver, as will be readily understood. The breech-piece may be provided, however, with any other suitable and effective extracting and ejecting devices to withdraw the exploded shell from the barrel and discharge it from the gun, the discharge being through an opening located in an appropriate place in the receiver and the extracting and ejecting devices arranged accordingly.

As represented, the breech-piece is provided with an upward projection 16 at its forward end, which works in a longitudinal groove 17 in the top or upper inside face of the recess in the receiver in which the breech-piece moves. This serves to support the breech-piece laterally when in its forward position and in the line of the discharge-opening.

Devices may be arranged to supply cartridges to the feed-wheels by hopper or by bands, such devices being adapted to successively present the cartridges through the opening k to the feed-wheel, carrying devices of this character being too well known to require particular description.

The construction of the feed-wheel with annular grooves, so as to form a spool shape, is desirable when a band 18 is employed for the supply of the cartridges, Figs. 3, 3^a, and 4 representing the band, the cartridges being introduced through transverse pockets in the band, so as to project from both sides of the band and engage the feed-wheel, so that the rotation imparted to the feed-wheel will operate upon the band like sprocket-wheels.

The gun may be adapted to be fired from the shoulder; but it is preferred to arrange it upon a support to hold the gun more firmly than can be done from the shoulder. One construction of such support is shown in Fig. 1, and consists of a turn-table 19 arranged upon a suitable base 20, which table turns in a horizontal plane upon an axis 21, it being adapted to be clamped to the base by means of a nut 22 on the axis. At one side of this table an upright 23 is arranged, and to the upper end of which the gun is hinged upon a pivot 24. Upon the opposite side of the turn-table is an upright 25, and to the gun a link 26 is hung upon a pivot 27, corresponding in position to the upright 25, the link 26 being adapted to be adjustably secured to the upright 25. As here represented, this adjustment is produced by means of a longitudinal

slot 28 in the link 26, through which a bolt 29 extends, and by which the link may be clamped to the upright, and by means of which the rear of the gun may be elevated or depressed to any desired extent, and then clamped in that position by means of the bolt 29. Lateral adjustment is produced by means of the turn-table 19, the gun being secured in position by clamping the turn-table to its base, as before described. Other characters of supports by which the gun may be raised and lowered and turned from side to side, so as to enable the gun to be pointed in any direction, may be used instead of the means shown in the drawings and hereinabove described without departing from our invention.

When operating as a machine-gun it will be convenient to provide a grasp 30 in rear of the trigger, so that the operator may apply his hand thereto and conveniently reach the trigger with his finger.

Parts of the mechanism of the gun described, while specially adapted for machine-guns, are also applicable to other firearms, as magazine or single breech-loaders. For illustration, the slide P may be operated by a handle under the barrel forward of the receiver, and so that by the hand of the operator the slide may be moved backward and forward to operate the mechanism of the arm, an arrangement of slide and handle too well known to require illustration, and in such case the breech-piece with its sear and trigger will operate the same as a single breech-loader or as a repeater, the arrangement of the sear and trigger with relation to the breech-piece being such that it is impossible to release the hammer until the breech-piece be fully closed. Again, the gun may be provided with a common tubular magazine forward of the receiver, opening directly onto the carrier, as in well-known magazine-guns, the mechanisms being operated by the gases, as described, or the mechanism may be operated by the handle, as before described, and in a well-known manner. While, therefore, all the parts of the gun are specially adapted for employment in a machine-gun, the invention is not to be understood as limited to the employment of the mechanism in a machine-gun.

The foregoing clearly describes a gun (shown in the accompanying drawings) which embodies our invention; but, as before stated, we do not mean to limit ourselves to the particular construction herein shown and described; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. In a gun the combination with the barrel having an opening in rear of the muzzle through which the gases of explosion escape, of a breech mechanism normally held locked, locking devices therefor a lever hung upon a fixed-pivot, means connecting said lever with the breech mechanism, the free end of said lever extending toward said opening and pro-

vided with a device movably attached thereto, said device substantially closing said opening in its closed position, and operated by the gases of explosion to be removed from said opening, and thereby operates said lever to unlock and open the breech mechanism, and automatically operating means to restore said device and lever to their closed positions and thereby close and lock the breech mechanism.

2. In a gun, the combination with the barrel constructed with an aperture opening therefrom at a point in rear of the muzzle, of a lever hung upon a fixed pivot and adapted to swing in substantially a longitudinal plane, the free end of the lever extending toward said aperture and provided with a finger hinged thereto, said finger substantially covering said aperture when in the closed position, and whereby the gases of explosion may escape through said aperture and operate upon the end of said finger thereby operating said lever and a breech mechanism connected with said lever, whereby the opening movement of said lever will impart the opening movement to said breech mechanism, and automatically operating means to restore said lever to its closed position and close and lock the breech mechanism.

3. In a gun the combination with the barrel constructed with an aperture opening outward from the bore of the barrel at a point in rear of the muzzle, of a lever hung upon a stationary pivot adapted to swing in a longitudinal plane, its free end extending to said aperture, a finger hung to the free end of said lever and adapted to cover said aperture, a housing around said aperture having an opening through which said finger may pass to said aperture, breech mechanism and connection from said lever to said breech mechanism, whereby the opening movement of said lever will impart the opening movement to said breech-piece, and a spring adapted to return said lever and bring said breech mechanism to its closed position.

4. In a gun the combination with the barrel open at the rear and constructed with an aperture opening radially from the bore at a point in rear of the muzzle, of a lever hung upon a stationary pivot and extending to said aperture, whereby the free end of the said lever is adapted to receive the force of the gases of explosion escaping through said aperture to impart to said lever a swinging movement away from said aperture, mechanism connecting said lever with the breech mechanism of the gun, whereby the opening and closing movement of the lever will impart corresponding opening and closing movement to the breech mechanism, the said lever constructed with projections from its hub to form a counterbalance.

5. In a gun the combination with the barrel opening in the rear into the receiver to the forward end of which receiver the barrel is attached, of a breech-piece adapted for longitudinal movement backward and forward

in said receiver, said receiver being constructed so as to form or having a groove on each side thereof, the rear end of the breech-piece being constructed so as to form or being provided with a lateral projection on each side thereof adapted to ride on or through the said grooves in the sides of the receiver in the backward and forward movement of the breech-piece, the sides of the receiver being also constructed with notches through which the said lateral projections on the breech-piece will drop and against the abutments formed by said notches the said projections will rest in its extreme forward position to resist recoil, substantially as set forth.

6. In a gun the combination with the barrel, of a longitudinally reciprocating slide provided with a rearwardly extending finger or projection, a feed-wheel adapted to carry cartridges into the pathway of said finger, a vertically vibrating carrier located at the rear of said feed-wheel and operated by the movements of said slide and mechanism for imparting longitudinal movement to said slide so that as the slide moves rearward, the projection or finger thereon will engage with the forward end of a cartridge in the feed-wheel and force it rearward onto the carrier.

7. In a gun the combination with the barrel, of a longitudinally reciprocating breech-piece, a slide arranged longitudinally beneath the barrel and connected to said breech-piece, said slide being provided with a rearwardly extending finger or projection, a feed-wheel adapted to carry cartridges into the pathway of said finger, a vertically vibrating carrier located at the rear of the feed-wheel, mechanism for imparting longitudinal movements to said slide and corresponding longitudinal movements to the breech-piece and means connecting the breech-piece and slide and engaging parts of the slide and carrier whereby as the slide moves rearward, the projection or finger thereon will engage with the forward end of a cartridge in the feed-wheel and force it rearward onto the carrier and the breech-piece will also be moved rearward and on the return movement of the slide, said slide will engage with the carrier to raise it to bring the forward end of the cartridge into position at the rear of the open end of the barrel and the breech-piece will also return and engage with the said cartridge and transfer it from the carrier into the barrel and the slide will engage with the carrier again and lower it to its down position.

8. In a gun the combination with the barrel, of a longitudinally reciprocating breech-piece, a slide arranged longitudinally beneath the barrel and connected to said breech-piece, said slide being provided with a rearwardly extending finger or projection, a feed-wheel adapted to carry cartridges into the pathway of said finger, a vertically vibrating carrier located at the rear of the feed-wheel, mechanism for imparting longitudinal movements to said slide and corresponding longitudinal

movements to the breech-piece and means connecting the breech-piece and slide and engaging parts of the slide and carrier whereby as the slide moves rearward, the projection or finger thereon will engage with the forward end of a cartridge in the feed-wheel and force it rearward onto the carrier and the breech-piece will also be moved rearward and on the return movement of the slide, said slide will engage with the carrier to raise it to bring the forward end of the cartridge into position at the rear of the open end of the barrel and the breech-piece will also return and engage with the said cartridge and transfer it from the carrier into the barrel and the slide will engage with the carrier again and lower it to its down position, and means for rotating said feed-wheel step by step so as to bring in succession one cartridge after another into position for transfer onto the carrier.

9. In a gun the combination with the barrel, of a longitudinally reciprocating breech-piece, a slide arranged longitudinally beneath the barrel and connected to said breech-piece, said slide being provided with a rearwardly extending finger or projection, a feed-wheel adapted to carry cartridges into the pathway of said finger, a vertically vibrating carrier located at the rear of the feed-wheel, mechanism for imparting longitudinal movements to said slide and corresponding longitudinal movements to the breech-piece and means connecting the breech-piece and slide and engaging parts of the slide and carrier whereby as the slide moves rearward, the projection or finger thereon will engage with the forward end of a cartridge in the feed-wheel and force it rearward onto the carrier and the breech-piece will also be moved rearward and on the return movement of the slide, said slide will engage with the carrier to raise it to bring the forward end of the cartridge into position at the rear of the open end of the barrel and the breech-piece will also return and engage with the said cartridge and transfer it from the carrier into the barrel and the slide will engage with the carrier again and lower it to its down position, and automatically operating means for extracting the exploded shell from the barrel and ejecting it from the gun.

10. In a gun the combination with the barrel, of a longitudinally reciprocating breech-piece, a slide arranged longitudinally beneath the barrel and connected to said breech-piece, said slide being provided with a rearwardly extending finger or projection, a feed-wheel adapted to carry cartridges into the pathway of said finger, a vertically vibrating carrier located at the rear of said feed-wheel, and mechanism for imparting longitudinal movements to said slide and corresponding longitudinal movements to the breech-piece and means connecting the breech-piece and slide and engaging parts of the slide and carrier whereby as the slide moves rearward, the projection or finger thereon will engage with the forward end of a cartridge in the feed-

wheel and force it rearward onto the carrier and the breech-piece will also be moved rearward and on the return movement of the slide, said slide will engage with the carrier to raise it to bring the forward end of the cartridge into position at the rear of the open end of the barrel and as the slide returns the breech-piece will also return and engage with the said cartridge and transfer it from the carrier into the barrel and the slide will engage with the carrier again and lower it to its down position and means for rotating said feed-wheel step by step adapted to be operated by said slide on its return or forward movement so as to bring in succession one cartridge after another into position for transfer onto the carrier.

11. In a gun, the combination with the barrel of a longitudinally reciprocating breech-piece, a slide arranged longitudinally beneath the barrel and connected to said breech-piece, said slide being provided with a rearwardly extending finger or projection, a feed wheel adapted to carry cartridges into the pathway of said finger, means connecting the breech-piece and slide, a vertically vibrating carrier located at the rear of said feed wheel, mechanism for imparting longitudinal movements to said slide, and parts on said slide and carrier adapted to engage during the longitudinal movements of said slide said parts including a latch which yields during the rearward movement of said slide but is engaged during the forward movement thereof and thereby causes the forward end of the carrier to be raised so as to bring the cartridge into position at the rear of the open end of the barrel.

12. In a gun having the breech open into the receiver at the rear, the combination with a longitudinally reciprocating breech-piece, a longitudinal slide extending forward from the receiver and into the receiver rearward below and connected to the breech-piece and adapted to impart longitudinal reciprocating movement to said breech-piece, a hammer arranged to move longitudinally in rear of the said breech-piece and so as to receive a rear movement under the rear movement of the breech-piece, a spring adapted to be compressed by said hammer in its rear movement, a trigger hung upon a pivot adapted to swing in a longitudinal plane, a sear hung to said trigger forward of its pivot, the sear extending upward and its nose adapted to engage a corresponding shoulder on the hammer, and the sear constructed with a finger extending forward beneath the breech-piece, and upon which the breech-piece bears when in its closed position, and a spring adapted to force the sear into engagement with the hammer.

13. In a gun the combination with the barrel, of a longitudinally reciprocating breech-piece, a slide arranged longitudinally beneath the barrel and extending rearward into the receiver, mechanism for imparting longitudinal movement to said slide, the slide connect-

ed to and adapted to impart backward and forward movement to the breech-piece, a carrier located beneath the said slide and hung upon a pivot near its rear end adapted to swing in a vertical plane, the forward end of the carrier adapted to receive a cartridge, the carrier extending in rear of its pivot, and constructed with a spring-latch, the said slide constructed with a downward projection from its under side adapted to escape said latch in its rear movement, but to engage therewith as the slide moves forward to depress the rear end of said carrier and raise the forward end to present the cartridge on the carrier forward of the front face of the breech-piece.

14. In a gun having the barrel opening into the receiver at the rear, the combination therewith of a longitudinally reciprocating breech-piece, a longitudinal slide beneath the breech-piece, mechanism for imparting longitudinal reciprocating movement to said slide, the said slide being connected to and adapted to impart corresponding reciprocating movement to said breech-piece, a carrier hung below said slide, and adapted to swing in a vertical plane, a cartridge feed-wheel forward of said carrier and adapted under rotation to carry cartridges and successively present them to said carrier, the said slide constructed with a finger on its underside projecting rearward, and adapted to force a cartridge from said feed-wheel onto said carrier, and mechanism to impart rotation to said feed-wheel, substantially as and for the purpose described.

15. In a gun the combination with a barrel opening in the rear into the receiver, of a breech-piece adapted for longitudinal movement backward and forward in said receiver, the breech-piece being adapted to swing on its forward end vertically in said receiver and provided on its underside with a downwardly extending projection or rib having a cam-slot formed horizontal at its forward and upward end and then inclined downwardly and rearwardly, a firing mechanism, a slide located beneath the barrel provided with a pin adapted to work in the cam-slot in the rib of the breech-piece and mechanism actuated by the gases of explosion for imparting longitudinal reciprocating movement to said slide and breech-piece, whereby the said slide will have a slight rearward movement independent of the movement of the breech-piece, and on the continued rearward movement of the slide the breech-piece will be unlocked and opened and on the return movement of the slide the breech-piece will be fully closed and locked, before the slide has completed its return or forward movement and before the firing mechanism is released.

This specification signed and witnessed this 2d day of September, A. D. 1893.

JOHN M. BROWNING.
MATTHEW S. BROWNING.

In presence of—
JOHN E. RAMSDEN,
KATE LINEHAN.