

(No Model.)

3 Sheets—Sheet 1.

R. J. GATLING.

BREECH LOADING ORDNANCE.

No. 311,973.

Patented Feb. 10, 1885.

Fig. 1.

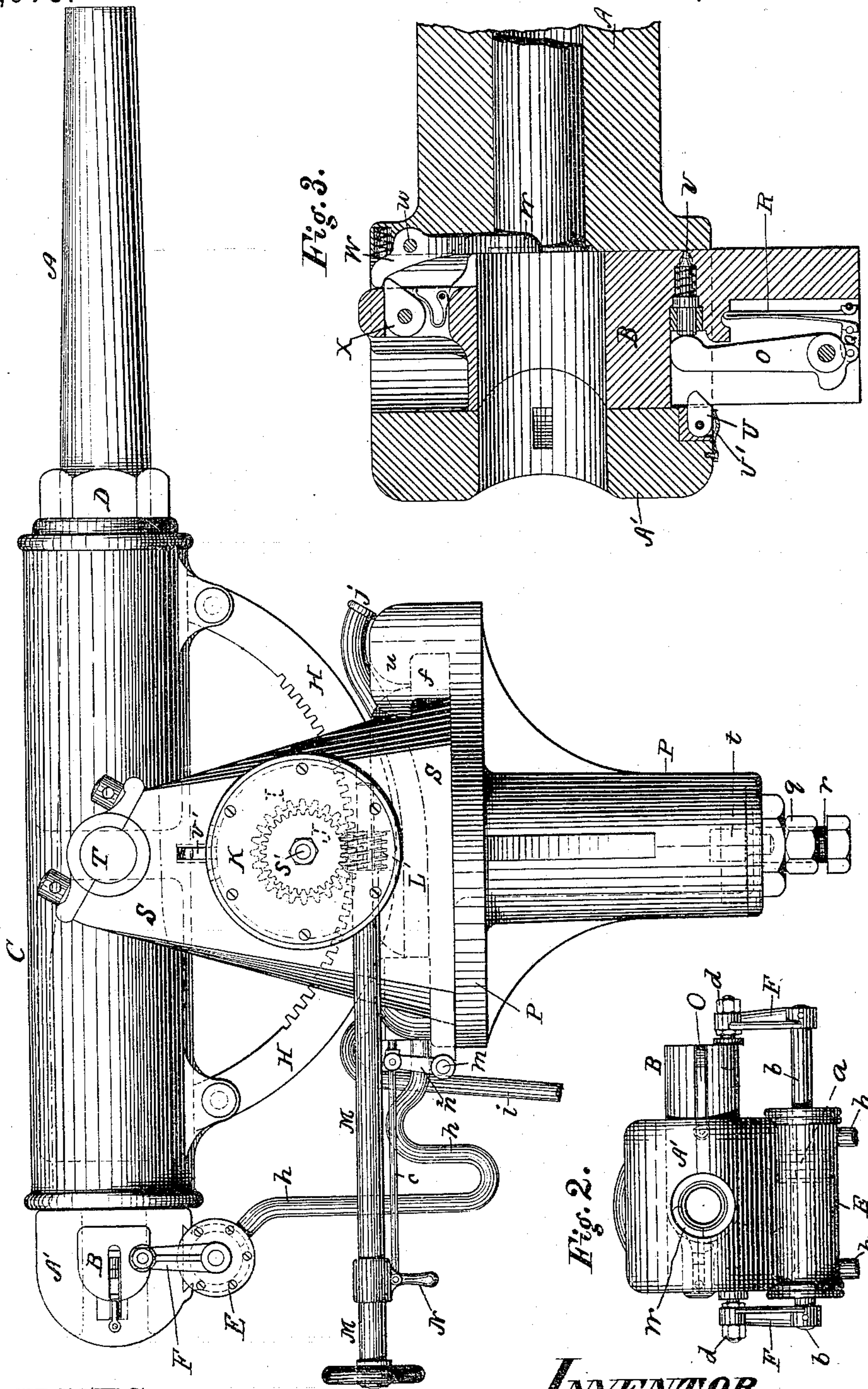


Fig. 3.

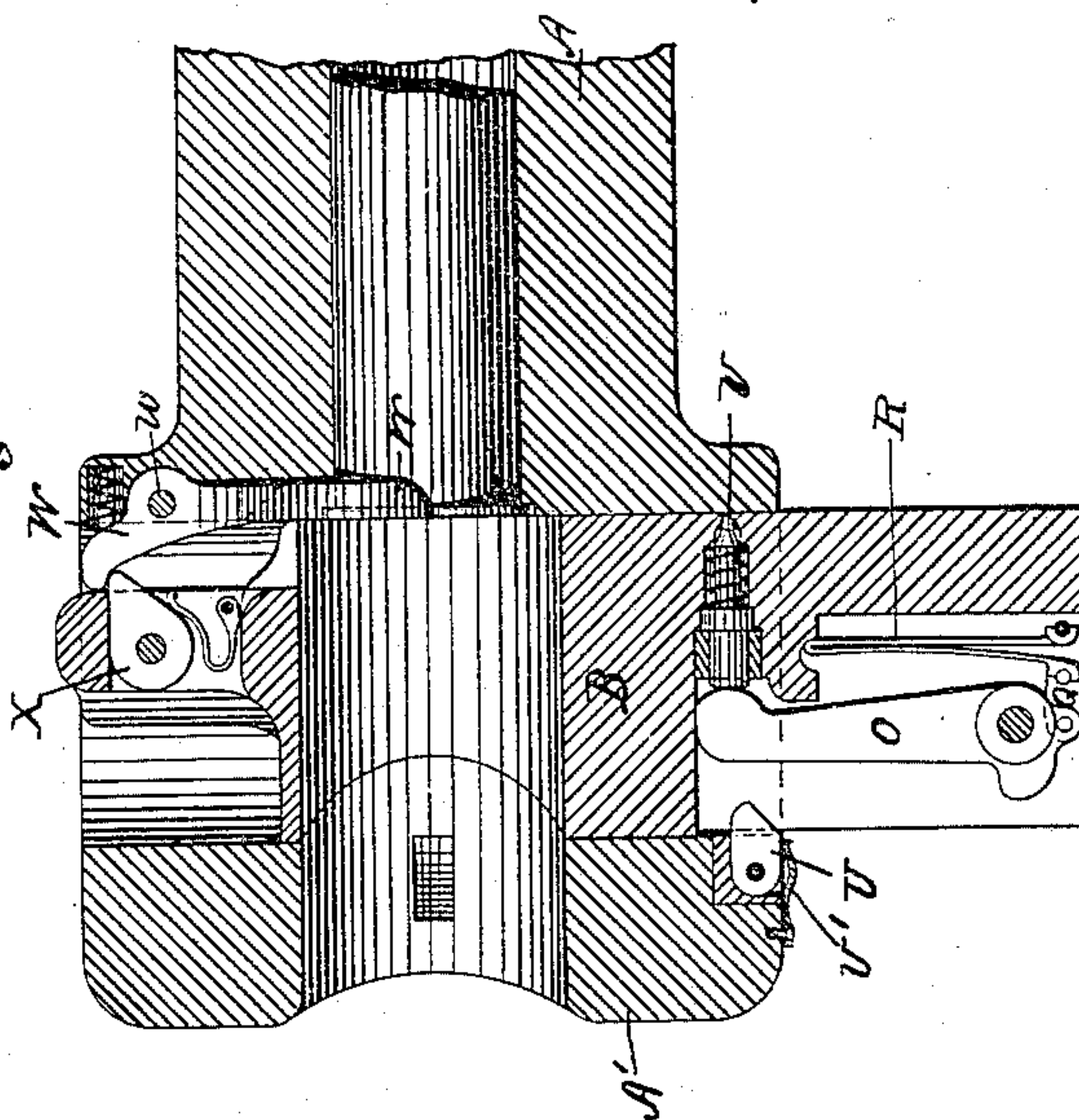
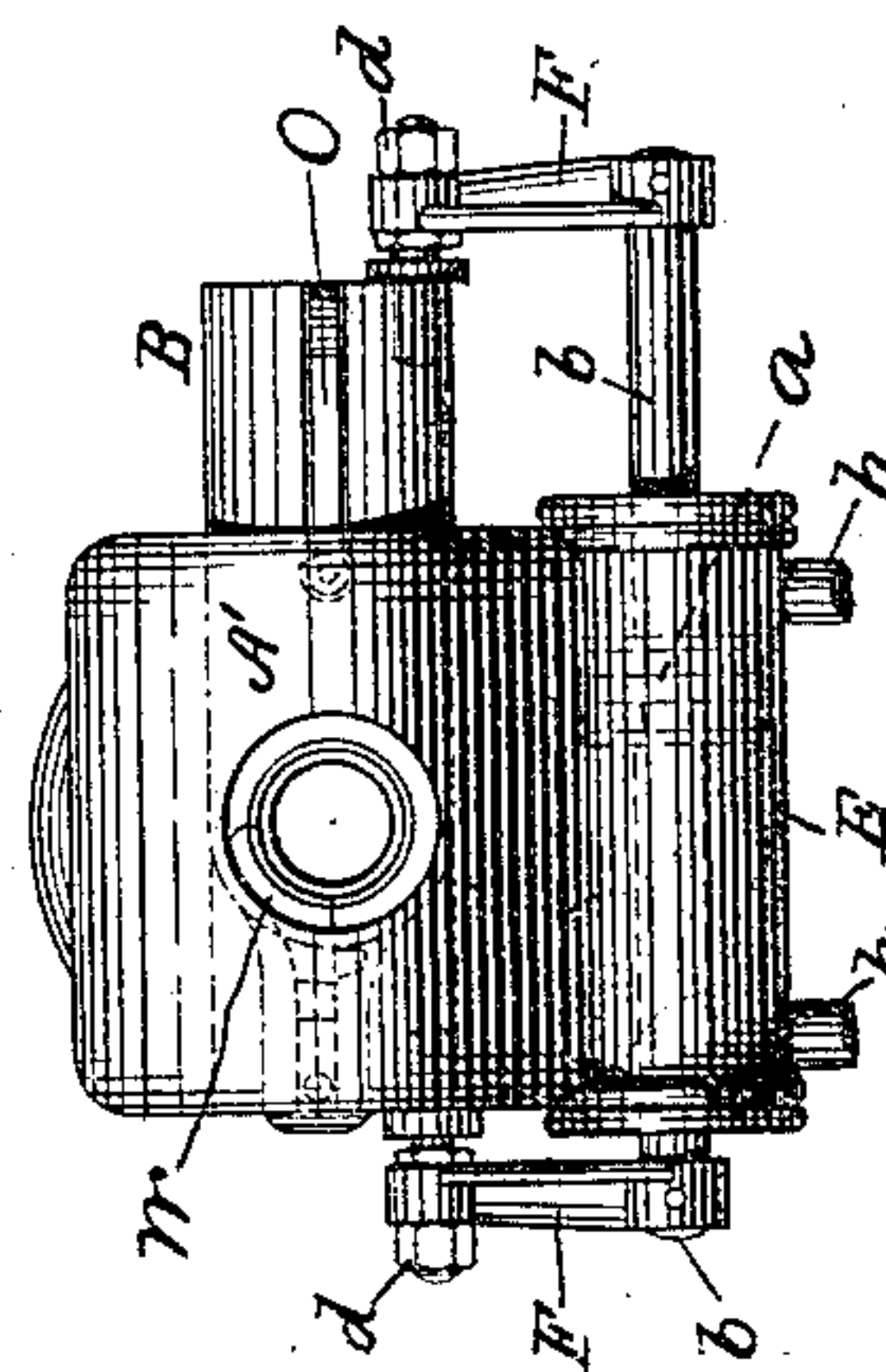


Fig. 2.



WITNESSES.

Edwin F. Dimock.
Wm. J. Yorkman.

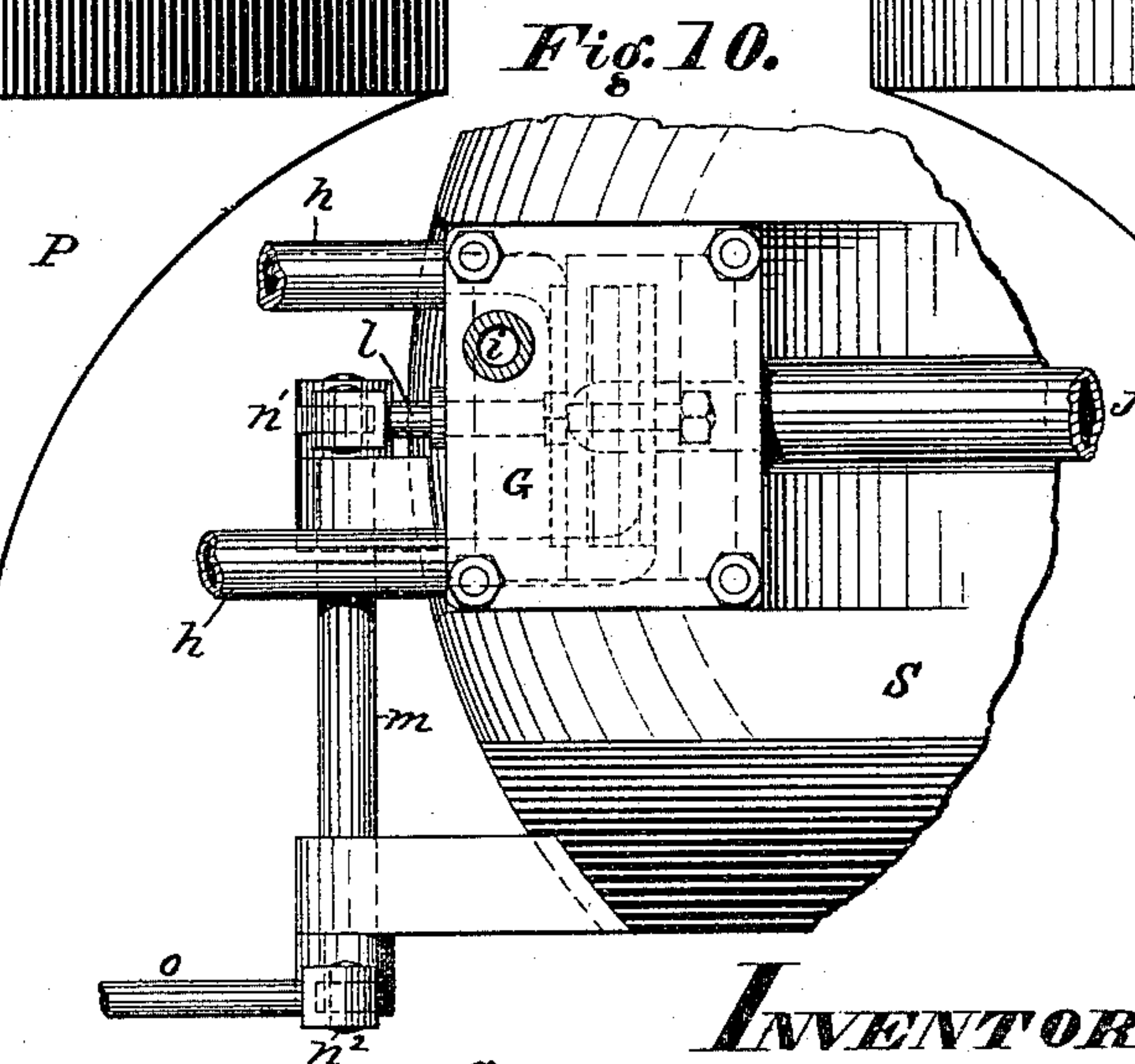
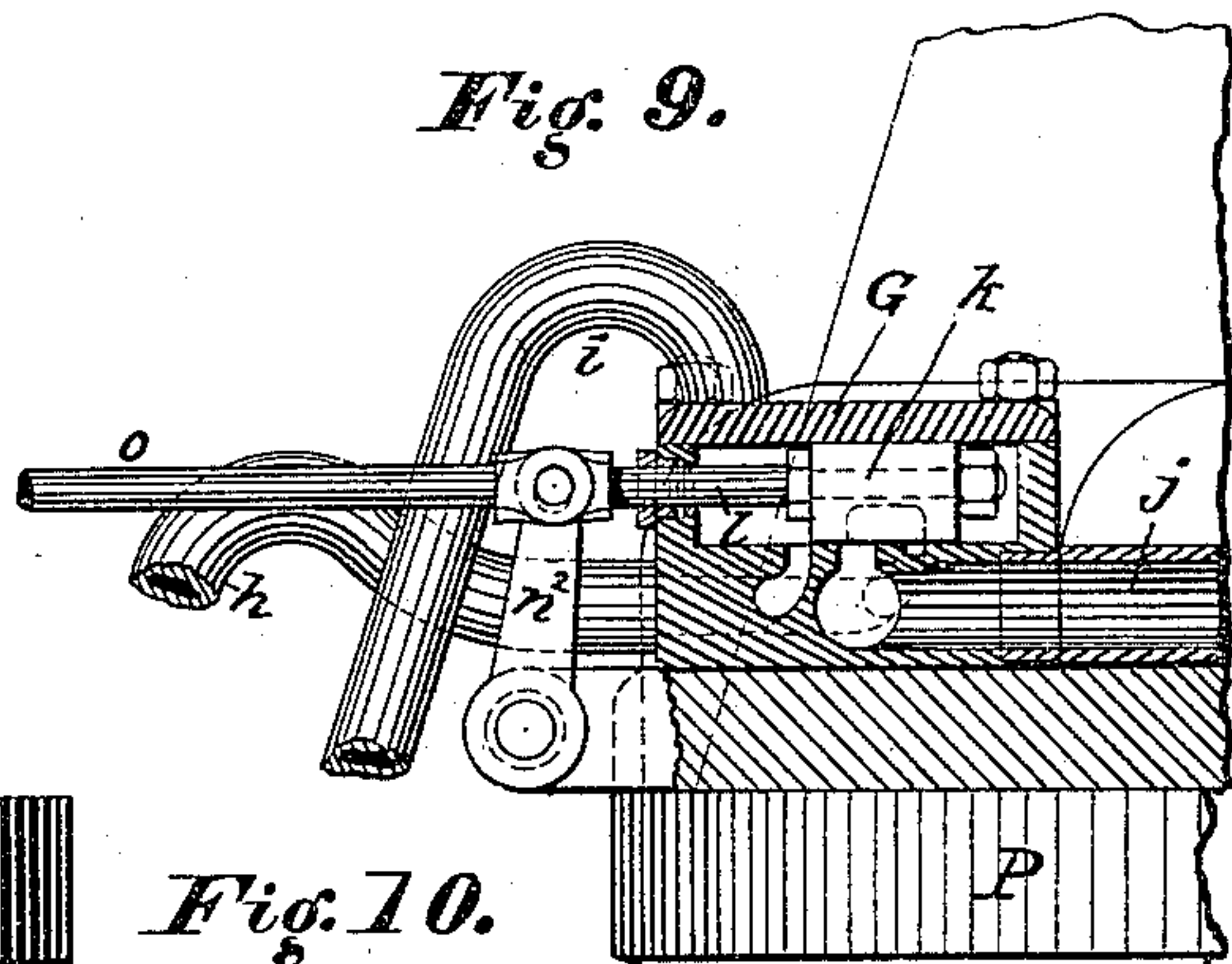
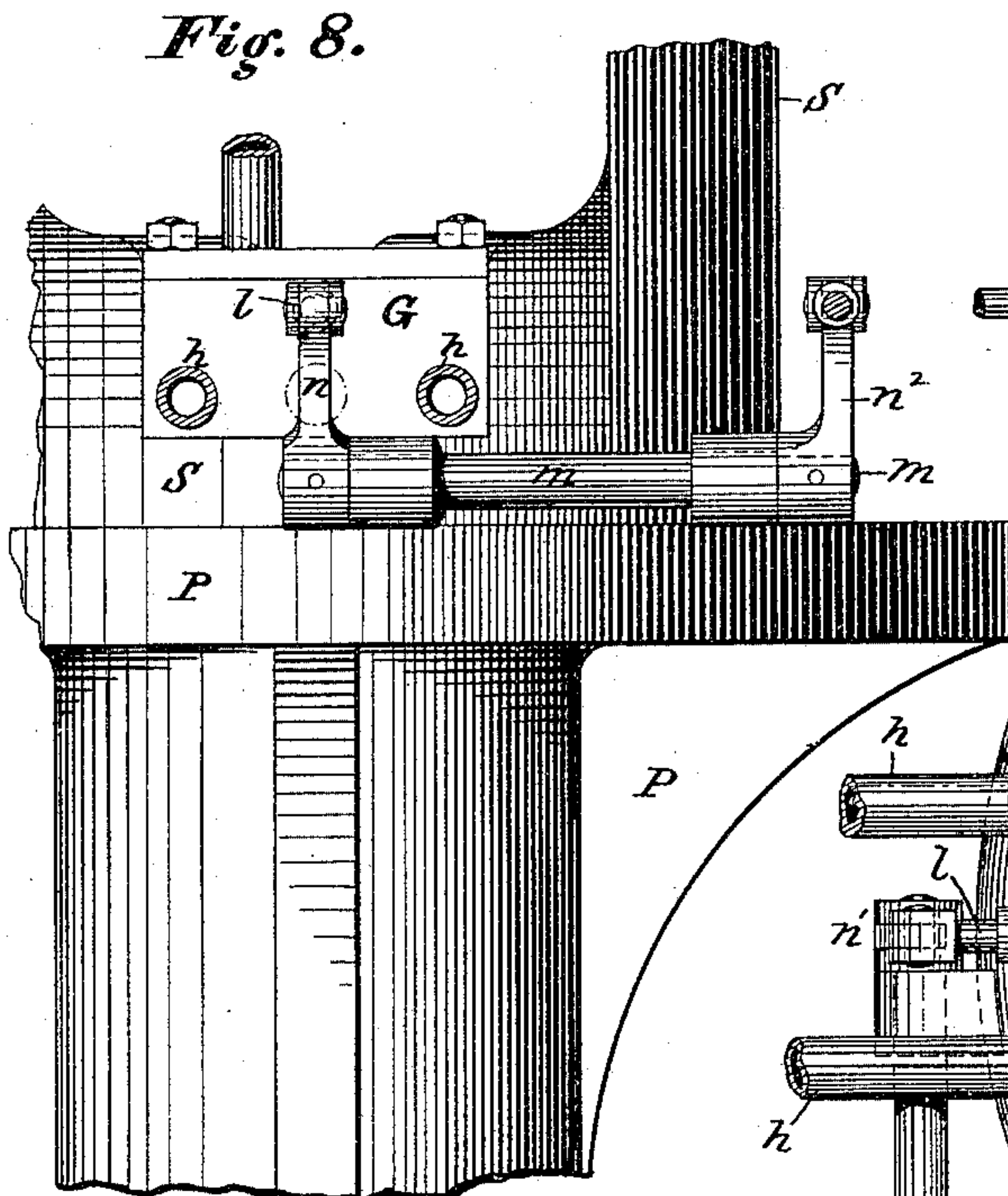
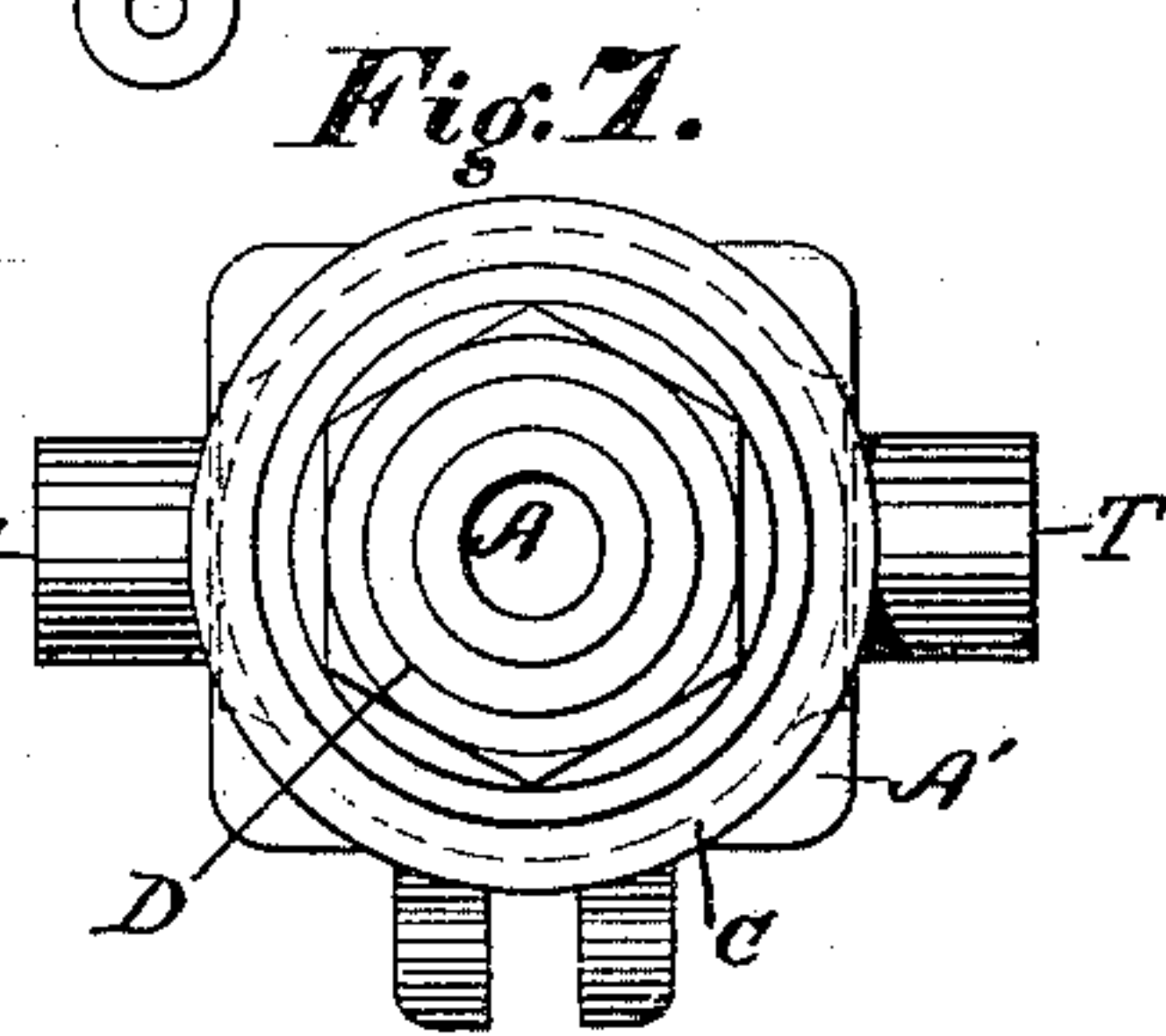
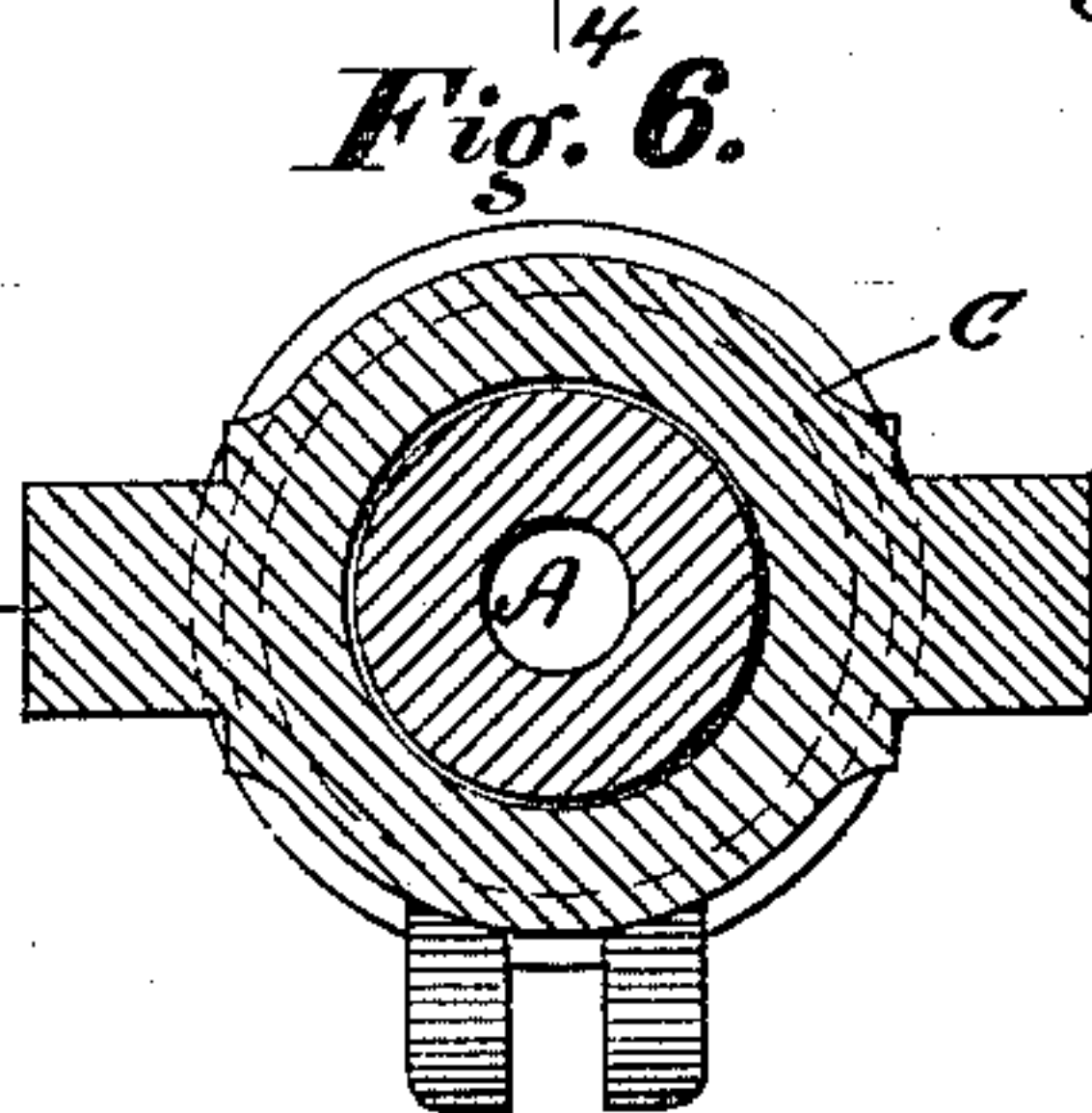
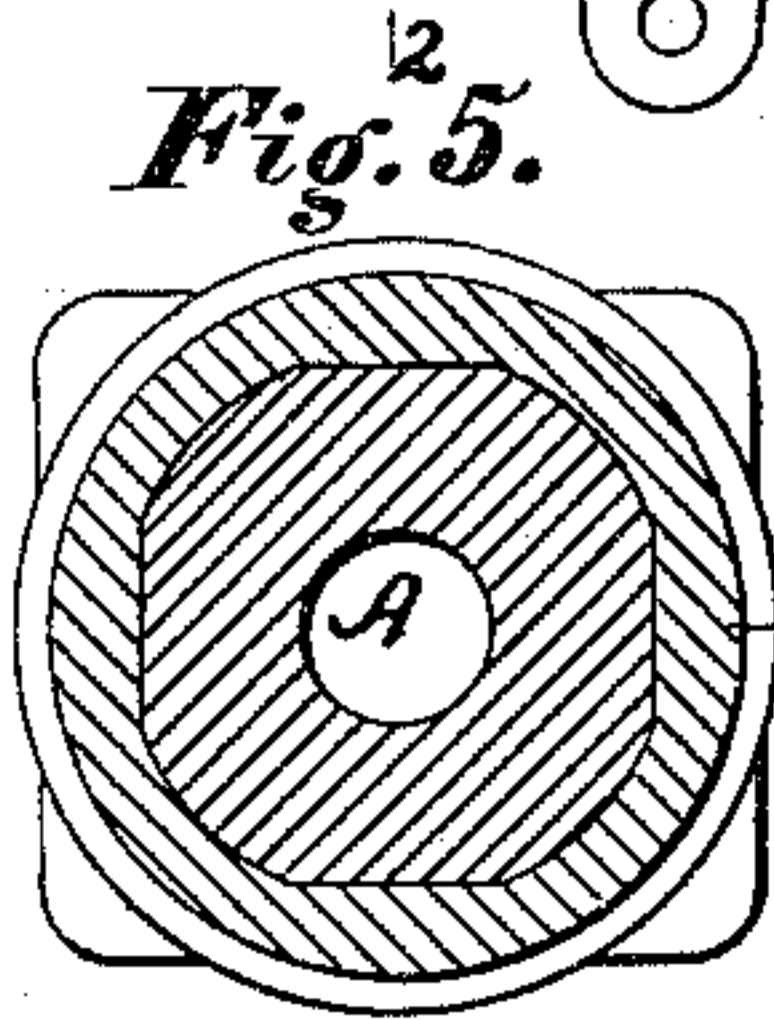
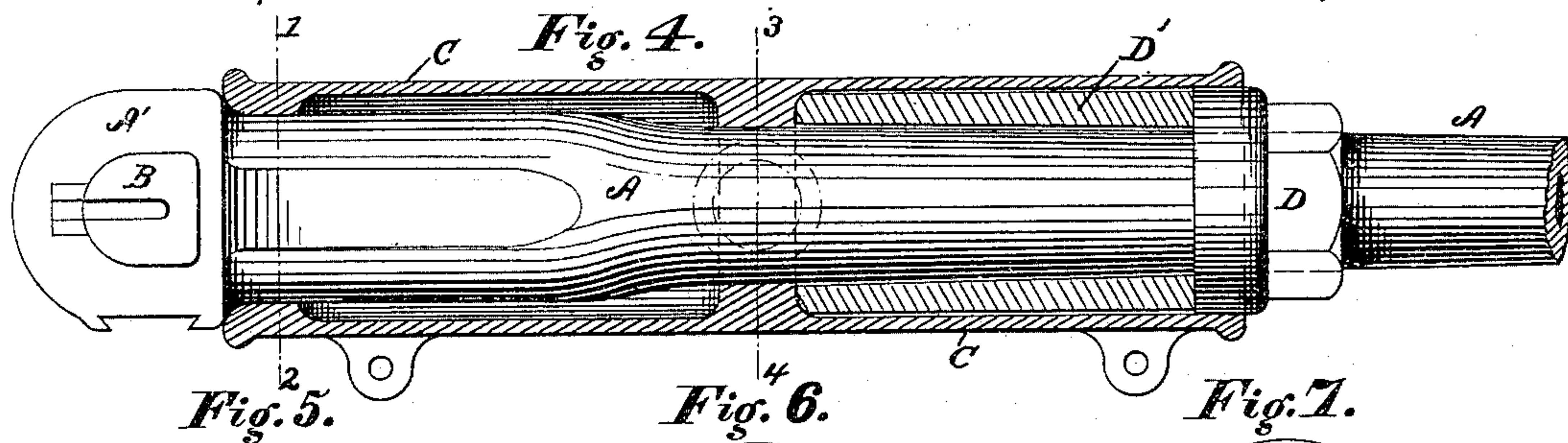
INVENTOR.

Richard J. Gatling.
By Simonds & Burdett,
Attys

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WITNESSES.

Edwin T. Dineen
Wm. J. J. J. J. J.

INVENTOR.

Richard J. Gatling,
By Simonds & Borden,
attys

(No Model.)

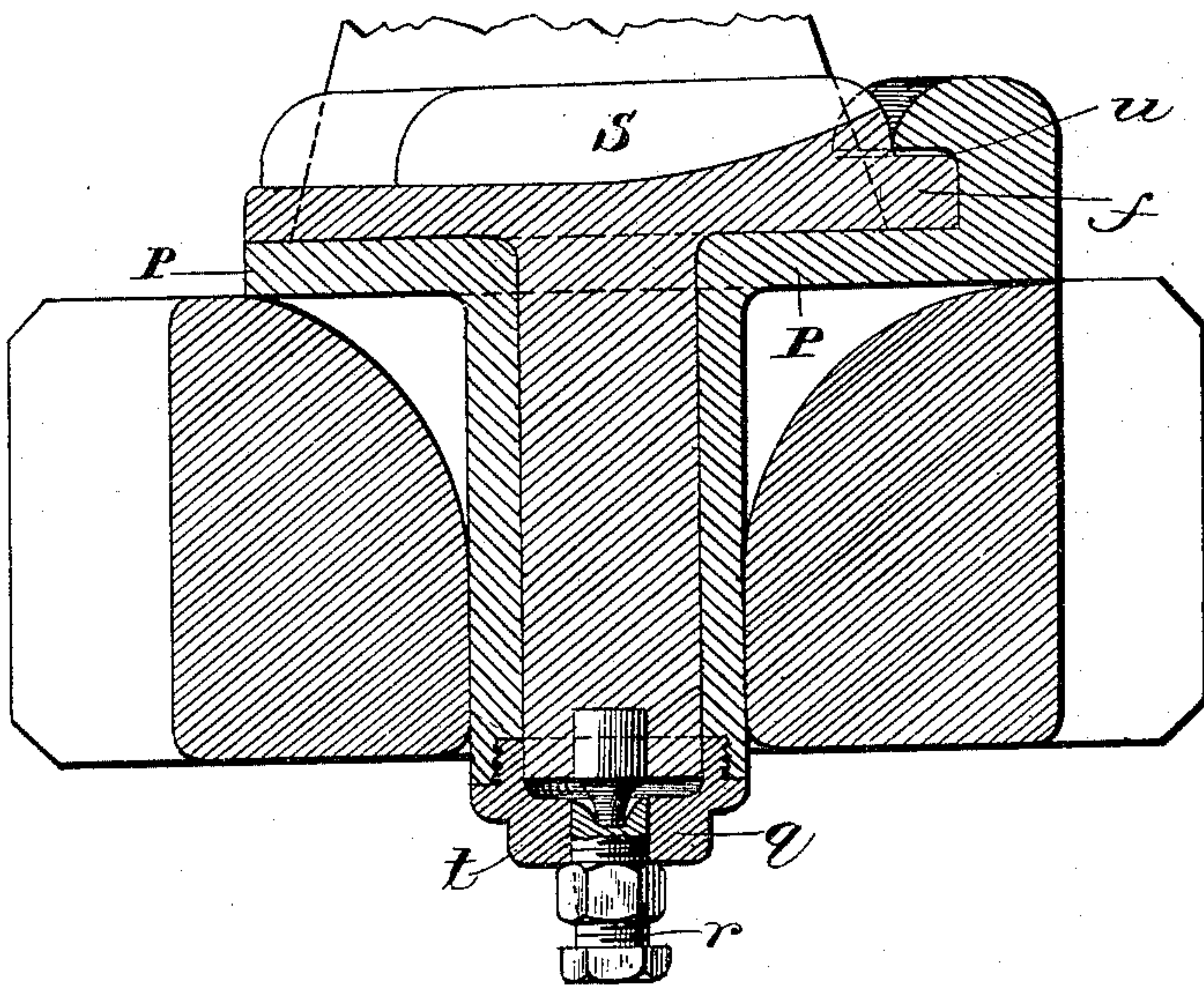
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Fig. 11.



WITNESSES

H. L. Oursaud,
E. T. Pritchard.

INVENTOR

R. J. Gatling
by Simonds & Burdett, N.
Attorneys

UNITED STATES PATENT OFFICE.

RICHARD J. GATLING, OF HARTFORD, CONNECTICUT.

BREECH-LOADING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 311,973, dated February 10, 1885.

Application filed June 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, RICHARD J. GATLING, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Breech-Loading Guns; and I do hereby declare that the following is a full, clear, and exact description thereof, whereby a person skilled in the art can make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Like letters in the figures indicate the same parts.

Figure 1 shows a side elevation of my improved gun with its mount. Fig. 2 is a rear view of the gun. Fig. 3 is a horizontal section of the breech on the axis of the gun. Fig. 4 is a vertical longitudinal section of the casing of the gun, with the barrel shown therein. Fig. 5 is a vertical cross-section on the line 1 2. Fig. 6 is a vertical cross-section on the line 3 4. Fig. 7 is a front elevation of the gun. Fig. 8 is a rear view of the compressed air or steam mechanism for working the gun. Fig. 9 is a view, partly in section, of these parts. Fig. 10 is a plan view of these parts. Fig. 11 is a central section of the lower part of the mounting, showing also the way in which the bed-plate is supported by four beams.

My invention relates, especially, to the class of breech-loading guns adapted for use in such positions as will best afford protection to vessels from the attack of torpedo-boats, and throwing a missile of at least six pounds in weight.

In the accompanying drawings, the letter A denotes the barrel of the gun; A', the breech, bearing the reciprocating breech-block B; C, the casing, which partly incloses the barrel, and is shaped at the rear opening to conform to the outline of the enlarged rear portion of the barrel, (see Fig. 5,) which is a cylinder flattened or slabbed off on top, bottom, and two sides, to prevent the barrel from rotating in the casing. On the outside of the casing are cast the trunnions T, and opposite to them, on the inside, is formed a diaphragm, that strengthens the casing at this part and loosely incloses the barrel of the gun, as shown in Fig. 6. The front end of the casing is closed by the nut D, which fits so as to slide within the casing, and is securely fastened, as by screw-thread or the like, to the barrel of the gun, but in such a way as to admit of longitudinal

adjustment upon the barrel. In the space 55 inside the casing between the central diaphragm and the nut D is placed an elastic packing, D', which may be a hollow cylinder of rubber or other suitable material, or a metallic spiral spring, the ends of which bear on 60 the diaphragm and nut, respectively. By means of this device the shock of the recoil on firing the gun is borne by an elastic substance, and the mountings of the gun thereby protected from any severe shock. This pack- 65 ing also holds the breech A' firmly against the rear of the casing C, and returns it to contact after each recoil.

This gun is designed to be used with metallic cartridges, and the firing and shell-ejecting mechanisms are contained in the reciprocating breech-block B and in its seat in the breech. (See Figs. 2 and 3.) In the normal position of the parts for loading the gun the feed-openings through the breech-block and 75 breech are in the line of the axis of the bore of the barrel, so that a cartridge can be inserted from the rear into the firing-chamber, located in the barrel just in front of the breech-block. This position of the parts and car- 80 tridge in the chamber is shown in Fig. 3, which is a sectional view on a horizontal plane, and to fire the cartridge their operation is as follows: The breech-block is moved to the left, bearing with it in a recess or mortise in the block hammer O, mainspring R, and, in position to be struck by the pivoted hammer on its descent, the firing-pin V. As the block approaches its extreme left position, the heel or projection on the heel of the hammer 90 O strikes against the pivoted cocking-pawl U, which is backed by its seat against motion in this direction, and the hammer is lifted by the onward movement of the block and the mainspring compressed. The mainspring R is a 95 double leaf-spring, one end resting upon a pin fast in the breech-block and the other bearing upon one end of a pivoted stirrup, the other end of which is pivoted to the short arm of the hammer. When the breech-block 100 reaches the end of its left-hand stroke or play, the breech is fully closed, the firing-pin V is in line with the central primer of the cartridge, the heel of the hammer slips over and past the cocking-pawl, and its head is brought 105 sharply down onto the firing-pin, which explodes the primer and cartridge. The firing-pin is made rebounding by means of the

spiral spring arranged about it in its socket, so that its point is drawn back from the face of the block and cannot interfere with the free movement of the latter in its seat. When the breech-block is returned to its right-hand position, the cocking-pawl U is swung outward on its pivot, the spring U' yielding as the heel of the hammer presses against the pawl, but returning the latter to place as soon as the hammer has passed. As the breech-block approaches its right-hand position the breech is opened, and the empty cartridge-shell is ejected by means of the ejector W and the ejector-pawl X. The ejector W is set into the upper left-hand part of the front face of the seat in which the breech-block B slides. (See Figs. 2 and 3.) One arm of the ejector reaches to the chamber, and here forms a quarter of a circle, resting in front of and against the rim or head of the cartridge. The lower edge of the ejector is in line with the horizontal center line of the gun, and extends to the left side of the breech. Here the ejector is pivoted on the vertical ejector-pin *w*, and while all parts of the ejector to the right of this pin are even or flush with the wall of the breech-block seat to the left a short arm or heel of the ejector protrudes to the rear into this seat. A horizontal slot is cut into the left front side of the breech-block, to allow the ejector to swing on its pin when the breech is open.

In the left hand of the breech-block B is pivoted the ejector-pawl X, in such position that when the right-hand stroke of the breech-block has nearly opened the breech the inclined side of this pawl X strikes against the heel of the ejector, and the pawl, not being able to swing out of the way in this direction, presses the heel of the ejector W forward, rotates the ejector on its pin, throws its other arm backward, and so ejects the empty cartridge-shell from the chamber and the breech. The last part of the right-hand stroke allows the ejector-heel to slip over and past the point of the ejector-pawl, and a spiral spring seated under the short arm of the ejector returns the same to its first position and the other arm to its place around the chamber. In case this spring should break or become inoperative, the ejector, not being returned to its seat, would continue to protrude into the bore of the breech-block. To prevent this and the breech-block from crushing against the exposed ejector, there is formed on the lower edge of the ejector a small protruding lug below the horizontal center line of the gun. The rear face of this part inclines to the front and right, and should the long ejector-arm stand in the way of the breech-block the left side of the breech-block, forming the bore or opening, which is slotted only to the horizontal center line, strikes against this inclined part, which extends below the center line, and the breech-block, moving to the right, presses the ejector into its proper seat. The ejecting-pawl X swings on its pin out of the way when it strikes against the ejector-heel at the star

of the right hand or closing stroke, and by its spring is returned to its first position.

From the foregoing description, in connection with the drawings, it will be seen that the breech-block reciprocates laterally in the breech of the gun, and the force or power for operating the breech-block is comparatively equal. The gun is mounted by its trunnions in the trunnion-boxes, which are on the upper part of two uprights of the swivel S. The swivel rests upon the bed-plate P, and its central pivot is inserted into the socket of the bed-plate. The bed-plate is bolted to two timbers running parallel to the bulwark of a ship, and two cross-timbers unite the former and help to carry the gun and mount. (See Fig. 11.) The segment-gear H is fastened under the front and rear end of the casing C, and a horizontal shaft, *s'*, penetrates through the uprights of the swivel S at right angles to the axis of the gun. A spur-gear, I, is splined upon this shaft so as to work into the segment-gear H.

On the right end of the shaft *s'*, and on the outside of the right swivel-upright, is placed the gear-case K, which can turn on the shaft, and is locked in any desired position by a spring catch-bolt, *v'*, placed on the swivel S over the case K, and holding the case K by locking into one of a series of slots cut into the periphery of the case K.

In the case K, fastened on the shaft *s'*, is the worm-gear J, and under it, working into J, is the worm L. This worm is splined and pinned to the sighting-lever M, which, being set in bearings formed for it in the case K, extends to the rear, and carries on its end a hand-wheel. By turning this hand-wheel and lever M and worm L, it is evident that the worm-gear J is revolved, and with it the gear-shafts and the spur-gear I, which works in the segment-gear H, and by this means elevates or depresses the gun. The lateral motion is at the same time given to the swivel S and to the gun by pulling the lever M in the desired side-wise or horizontal direction.

In order to reduce the friction, and consequently the necessary exertion for this lateral training, to a minimum, the bottom of the pivot-socket of bed-plate P is closed by a screw-cap, *q*, (see Figs. 1 and 11,) and in this cap is set a strong screw-bolt, *r*, with a check-nut. In the lower end of the swivel-pivot is fastened the hardened-steel step *t*, the lower end of which finds a seat in a recess or cup turned into the end of the bolt *r*. The pivot of S being slightly tapered, a very small amount of raising it by turning the bolt *r* will free it, so that it works easily in the socket, and when the swivel S is thus slightly raised from the bed-plate P and only works on the step *t*, a small lateral exertion on the sighting-lever M will range the gun as desired. The position of the trunnions is such that the gun is balanced on them. The screw-cap *q* is filled with oil before the pivot is inserted into the socket, and it will exclude dirt from the step and its

bearing, and will lubricate both. A further strengthening against any excessive shock of recoil from extreme charges of powder is the flange *f* on the front edge of swivel S, which fits under a corresponding seat, *u*, of the bed-plate P. The swivel, on mounting it, is set with one of the uprights forward—*i. e.*, the axis of the trunnion-boxes crossing its proper position until the pivot is in its socket—and the flattened side of the upright allows the swivel to take its place on the heel-plate P without striking against the flange-seat *u*. A quarter-revolution of the swivel then brings it into its true position, the flange *f* sliding into its rest *u*. Between the two uprights of the swivel is bolted the valve-chest G, which is connected by elastic tubes *h h* with the ends of the cylinder E, fastened under the breech A' of the gun, parallel to the breech-block B. This cylinder is closed on each end by a cover, and in it works a piston, *a*, fast to a piston-rod, *b*, which penetrates through the cylinder-covers, and is on each end connected with the breech-block B by the connecting-arms F F and bolts *d d*. (See Fig. 2.) The elastic tubes *h h* from the valve-chest connect with ports on either end of the cylinder. In the valve-chest works the slide-valve *k* on the valve-rod *l*, and steam or compressed air is supplied to the valve-chest by the feed-pipe *i*. The steam exhausts forward of the swivel by the exhaust-pipe *j*. The slide-valve rod *l* is connected by the lever-arm *n'* with the rock-shaft *m*, and the lever-arm *n''* on the other end of the rock-shaft *m* connects with the rod *o* under and parallel to the sighting-lever M. The rear end of rod *o* is hung to the firing handle or trigger N, which slides loosely on the lever M. (See Figs. 1, 8, 9, 10.) The slide-valve, cylinder, and piston act like the well-known parts of like names of a steam-engine. When the firing handle or trigger N is pulled to the rear, the slide-valve allows steam or compressed air to enter the right-hand port of the cylinder, and in consequence the piston, and with it the breech-block, travel to the left, closing the breech and firing a shot. After this a push on the firing handle or trigger N in the opposite direction, sending steam or compressed air to the left port of the cylinder, opens the breech, ejects the empty shell, and makes the gun ready for loading again. The elastic tubes *h h* prevent the recoil of the gun from breaking the connections between cylinder and valve-chest.

I am aware that a training mechanism has heretofore been made composed of a segment-rack attached to the under side of the breech of the gun, and arranged to be engaged by a worm carried by a shaft journaled in an arm projecting from a yoke carrying the gun, so that it may swivel in a socket; and I do not broadly claim such device.

I claim as my invention—

1. In combination, the gun-barrel, the ad-

justable nut accessibly and exteriorly attached to the barrel, the casing having the annular diaphragm, and the contained elastic spring-packing held longitudinally between the diaphragm and nut, all substantially as described.

2. In combination, the gun-barrel, the adjustable nut attached to the barrel, the casing formed with the intermediate annular diaphragm, and the contained elastic spring-packing held longitudinally between the diaphragm and nut, all substantially as described.

3. In a breech-loading gun, a breech-block bearing the hammer and mainspring, and arranged to reciprocate laterally of the axis of the gun in firing the charge, all substantially as described.

4. In a breech-loading gun, a breech-block bearing the hammer, mainspring, and firing-pin, in combination with the pawl attached to the breech, whereby the hammer is operated by the motion of the breech-block, all substantially as described.

5. In a breech-loading gun, in combination, the reciprocating breech-block bearing the pivoted ejector-pawl, and the breech-piece bearing the pivoted ejector, all substantially as described.

6. In combination, the breech-piece, the pivoted ejector, and the sliding breech-block with pivoted ejector-pawl, by the transverse motion of which the ejector is operated, all substantially as described.

7. In a device for mounting a gun, the bed-plate P, having a pivot-socket closed by the cap *q*, in combination with the hardened step *t*, the screw-bolt *r*, and the check-nut, all substantially as described.

8. In a gun-mount, in combination, the swivel S, the shaft *s'*, bearing the spur-gear I, and the worm-gear J, the rotary sighting-lever M, bearing the worm L, and the segmental gear H, fast to the gun or its case, all substantially as described.

9. In a gun-mount, in combination, the bed-plate P, the swivel S', mechanism for adjusting the gun, the rotary sighting-lever M, bearing the firing-handle N, and the connected steam, compressed-air, or like mechanism for firing the gun, all substantially as described.

10. In a gun-mount, the combination, with a swivel bearing the gun, of mechanism for adjusting the gun through the medium of a sighting lever carrying a firing-handle, substantially as described.

11. In a gun-mount, the combination, with the swivel S and shaft *s'* and gear-wheels, of the rotary case K, for inclosing the said gear-wheels, and formed with peripheral sockets and a locking device, *r'*, substantially as described.

RICHARD J. GATLING.

Witnesses:

CHAS. L. BURDETT,

W. H. MARSH.