

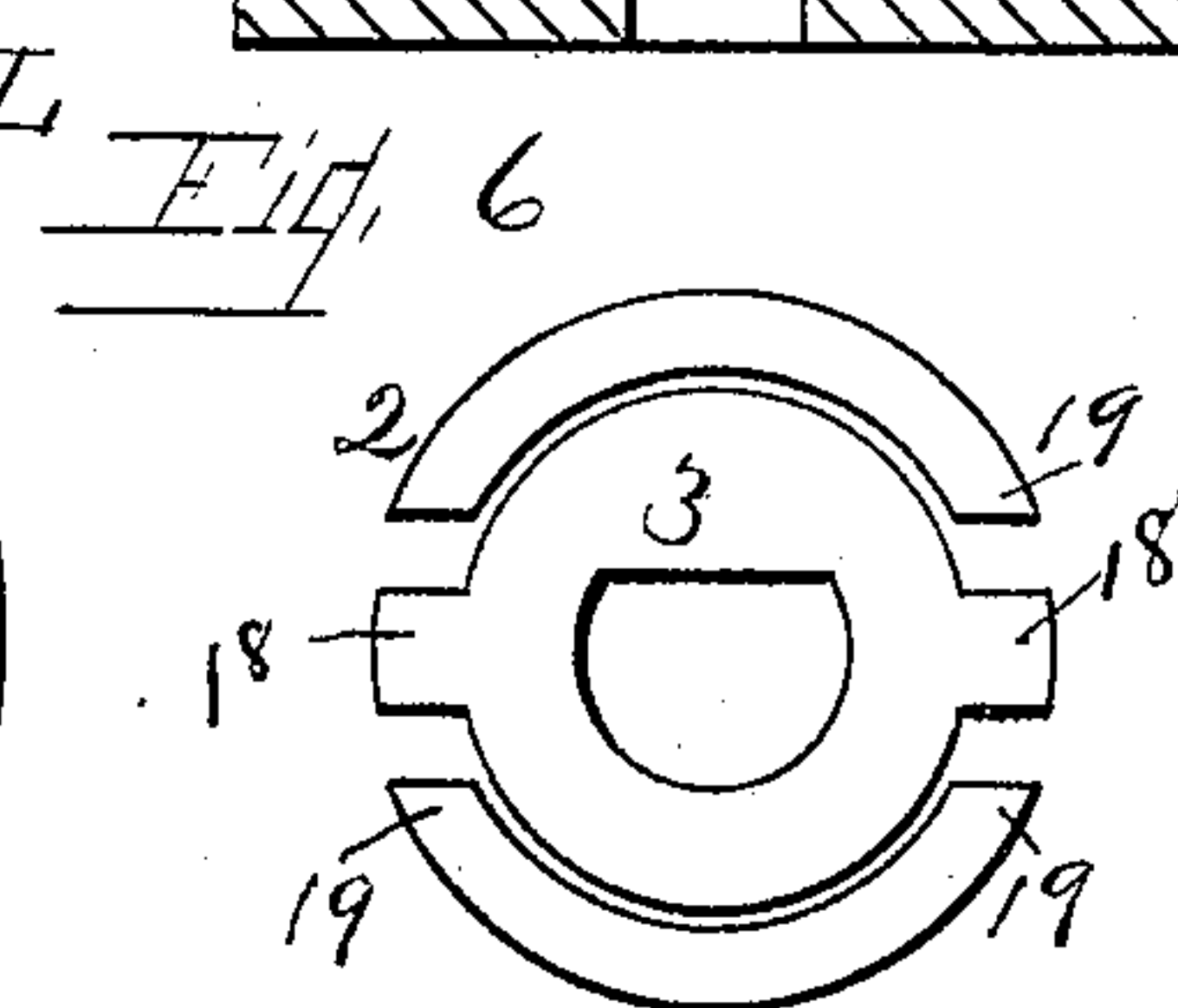
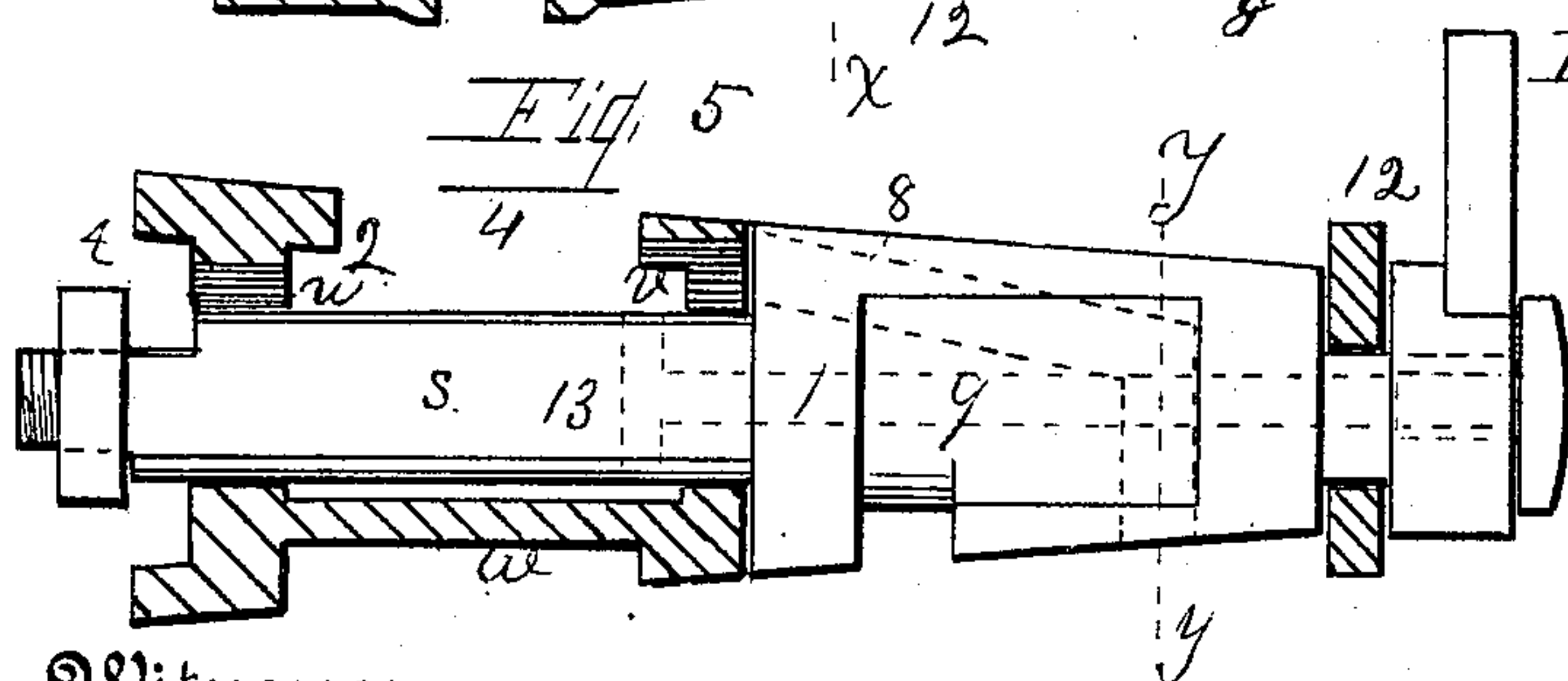
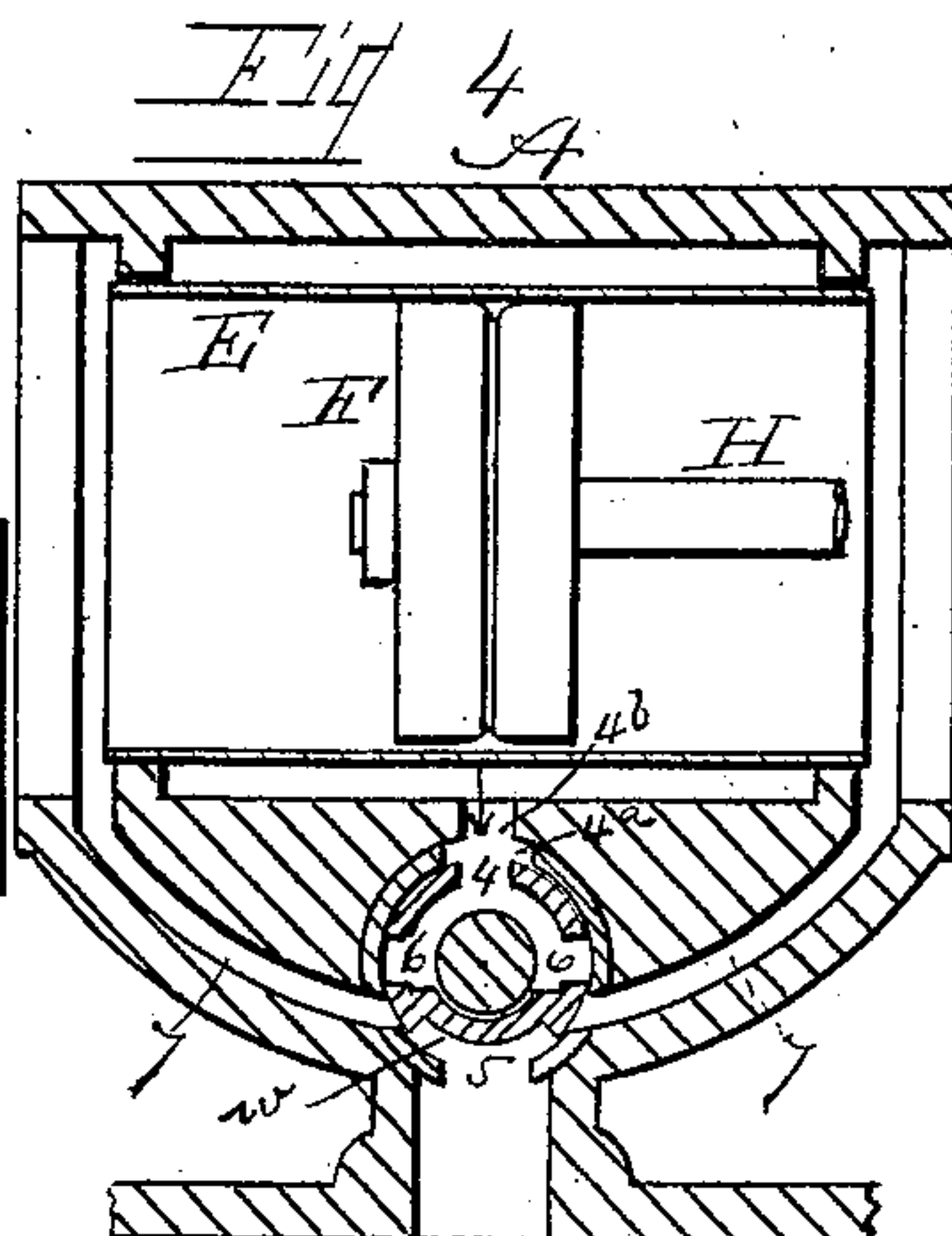
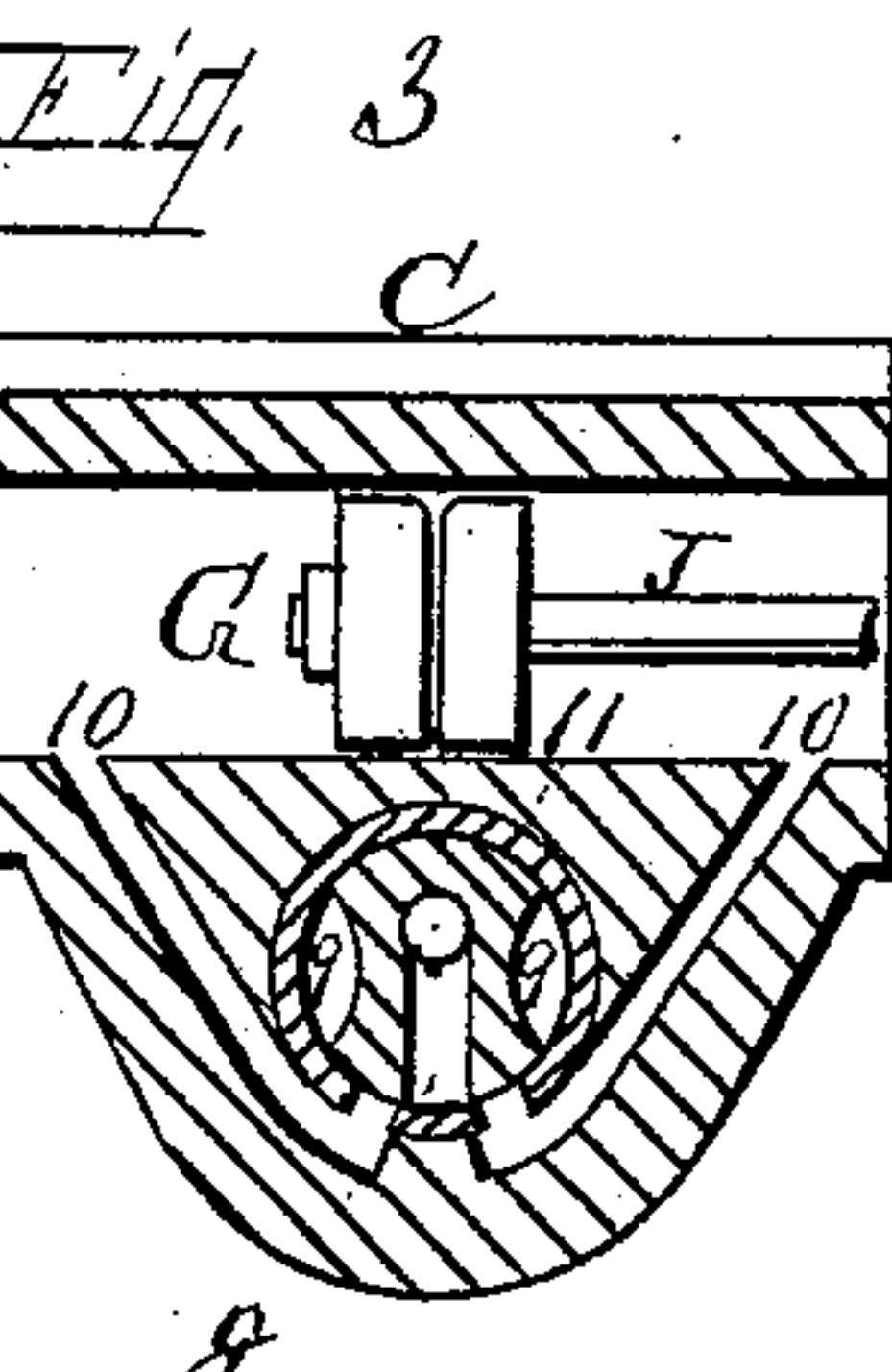
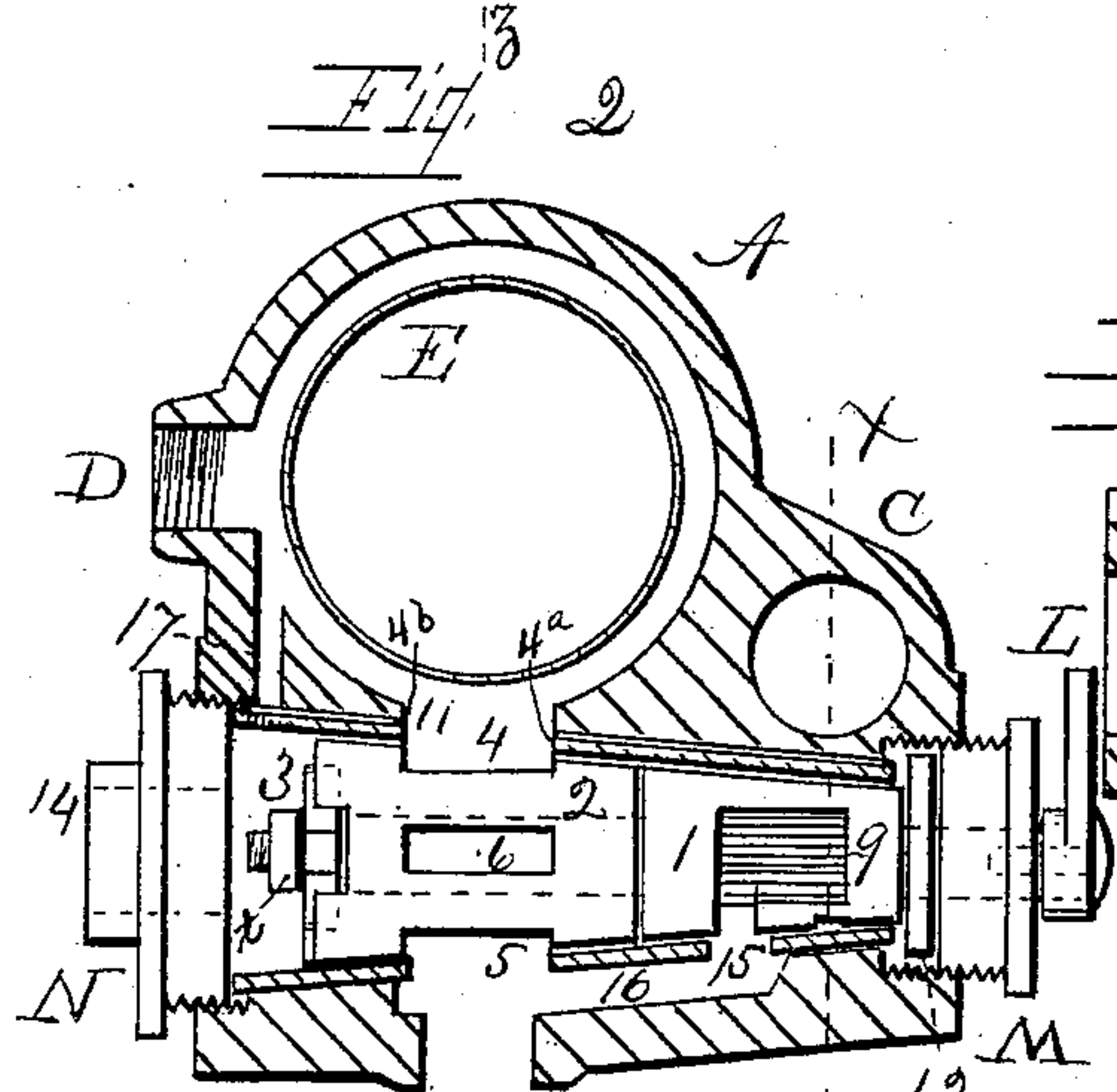
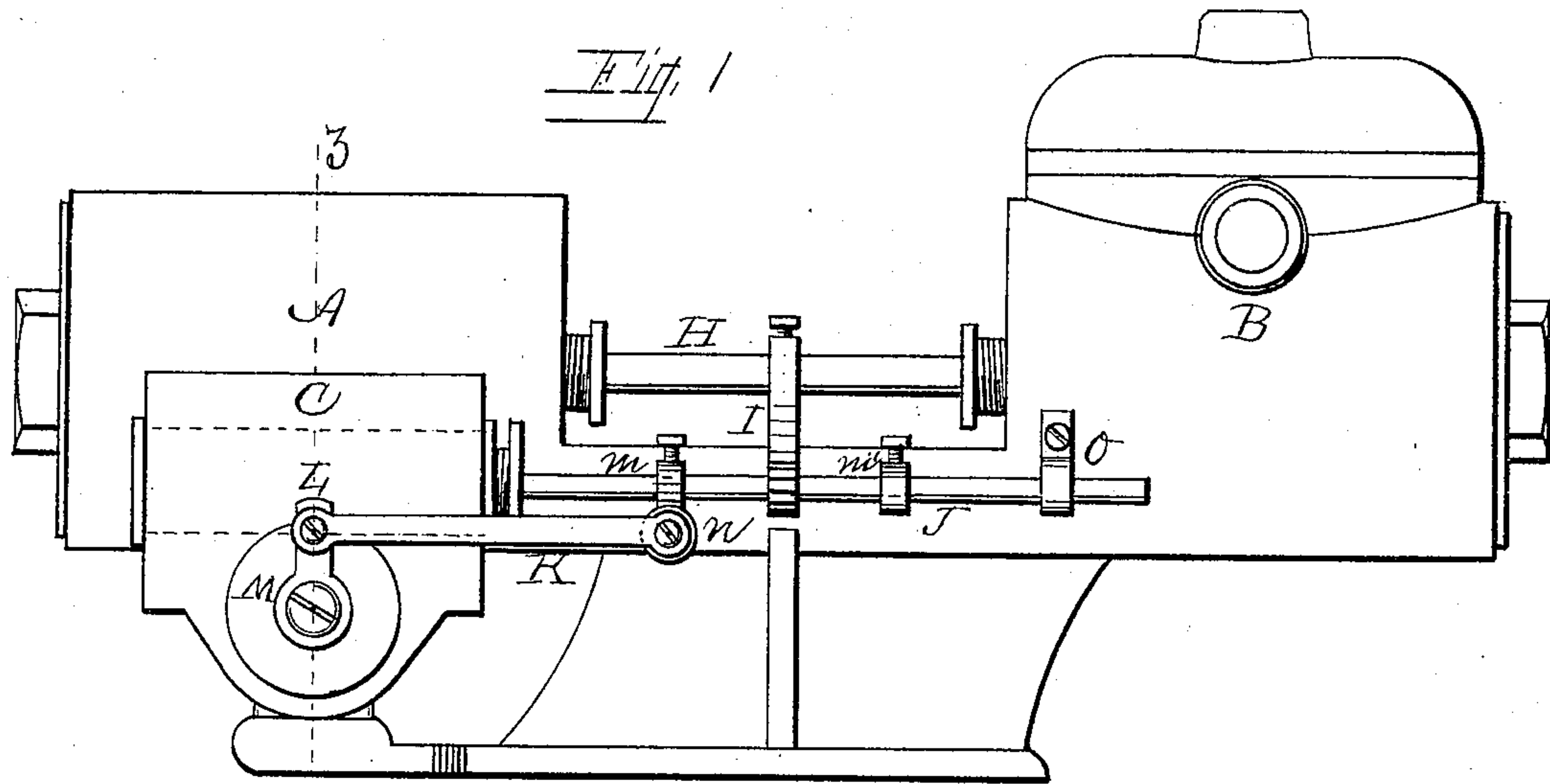
No. 616,138.

Patented Dec. 20, 1898.

B. PICKERING.
WATER MOTOR.

(Application filed Jan. 21, 1895.)

(No Model.)



Witnesses

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UNITED STATES PATENT OFFICE.

BARTON PICKERING, OF DAYTON, OHIO.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 616,138, dated December 20, 1898.

Application filed January 21, 1895. Serial No. 535,651. (No model.)

To all whom it may concern:

Be it known that I, BARTON PICKERING, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Motors; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in water-motors, the several features of which will be fully hereinafter described and claimed.

The object of my invention is the production of an automatic reciprocating motion by means of a compound valve comprising a principal valve to direct the movement of the piston in the main cylinder and a supplementary valve to operate a piston in a minor parallel cylinder, which operation completes the movement of said principal valve, the initial being derived from the piston-rod, and which has only this function.

The object of my invention is accomplished by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the water-motor. Fig. 2 is chiefly a transverse section of the same on line *z*, Fig. 1. Fig. 3 is a longitudinal section of the minor cylinder on line *x x*, Fig. 2. Fig. 4 is a central longitudinal section of the motor-cylinder and the principal valve. Fig. 5 is an enlarged side view of the compound valve, the principal valve being in section. Fig. 6 is an enlarged end view of the valve, showing the carrying-plate.

Like letters and numerals designate like parts in the several views.

The cylinder B is the pump part, which may be used for gases or fluids, and as it is not involved in the invention a further description is unnecessary.

The cylinder A is mounted on a base in common with the pump, and as an integral part thereof is the cylinder C, and to these parts belongs the cone-shaped valve-seat. Both cylinders are closed at their outer and

inner ends, the latter being provided with the usual form of stuffing-boxes. The large cylinder is lined with the brass tubing E, and the smaller may be similarly lined. The larger cylinder is provided with ports 7 7, extending to the valve-seat, as shown at Fig. 4, and the small cylinder is provided with similar ports 10 10, as shown at Fig. 3.

F is the piston of the larger cylinder, and G the piston of the smaller. H and J are the piston-rods of their respective pistons.

To the boss D is attached the inflow-pipe, and the outflow-pipe is attached to the base central to the principal valve. The inflow-pipe can be attached to the closing-nut N, as indicated at dotted lines 14, and the supply be directly into the valve instead of through the influent valve-port 4, the coincident valve-seat port 4^a, and cylindrical port 4^b, the parts shown in Figs. 2 and 4. These several openings are only necessary when the water is received through the boss D. The supply of water to the small cylinder is through the interior of the supplementary valve and the exhaust is through the side recesses of the same. The tapering bush 11 is nicely fitted into the cored space, and this forms the seat for the compound valve. The bush is provided with the opening 4^a, when the supply is through the boss, openings for the ports 7 7, the opening 5, and the opening 15 for the escape of the water. The nut N closes the rear orifice and bears against the outer end of the bush to hold the same firmly in its seat. The nut M closes the forward end and serves to hold the valve from being pressed too tightly into its seat by the water-pressure. To give an increased bearing-surface, the plate 12 is put on the neck of the valve against the shoulder, and said nut bears against the same. This plate may be dispensed with and the nut engage the shoulder of the valve. The valve is held to its seat by the sole agency of the water. At 16 is shown the port which conveys the water from the supplementary valve to the main outlet.

The compound valve comprises two principal parts, the supplementary valve 1 and the principal valve 2. The former comprises the body, the neck for the arm L, the stem s, on which is held the principal valve, the supply-orifice 8, as shown by dotted lines 8, Fig.

5, and lines 8, Fig. 3, the exhaust-recesses 9 9 in the sides and terminating in a transverse recess uniting the ends of said side recesses. On the end of this stem is placed the carrying-plate 3, which engages shoulders in the ends of the principal valve and is secured in place by the nut *t*. The water entering this valve passes through orifice *v* of the principal valve to enter the inner port 8 of the supplementary valve. An orifice may be drilled through the center of the latter valve and be intersected by a radial orifice in the stem *s*, as shown at 13, Fig. 5, and used instead of the orifice 8, as above described. The essential condition is that the port shall open at one central point to supply alternately the two lateral ports, as shown at 8, Fig. 3. The exhaust-ports are 9 9 in the side of the valve. At the time of receiving on one side it exhausts on the other. The principal valve 2 has an opening 4 in the top, side openings 6 6 above the ports, the recess *w* for the exhaust, the supply-orifices *u* and *v*, and the shoulders in the end of the valve to engage the carrying-plate 3. This valve moves freely on the stem of the other and is only moved by the agency of said carrying-plate. The shoulders 19 of the principal valve being wider than that of the engaging lugs 18 of said plate, the consequence is that the supplementary valve moves in advance of the principal valve. To the piston-rod *H* is attached the arm *I* at the center of its movement, and this arm at its outer end is provided with an orifice which embraces the piston-rod *J*. The outer end of this rod is held in the support *O*. On this rod are firmly attached the two tappets *m* and *m'* at such a distance that the arm engages them alternately as the rod reciprocates. To the tappet *m* is an arm extension *n*, and the bar *K* connects this part to the valve-arm *L*. By means of these parts motion is communicated to the compound valve from the principal piston.

The operation may be thus described: The water under pressure enters the valve, as specified, and passing through the port in the side of the valve the piston is made to move from that side. The principal piston carries the supplementary valve in the opposite direction and would continue until the port is closed, but the play of this valve on the stem of its fellow causes the flow to enter the small cylinder on the opposite side, which movement of the small piston completes a full movement of the principal valve and the movement of the principal piston is reversed, and so automatically as long as the power is applied. Steam, water, or gas may be used as the propelling agency.

The essential feature as regards the coupling of the two valves or the two parts is that they shall be so coupled that the initial movement resulting from the movement of the principal piston shall be so arranged that the part of valve coupled outside shall have a movement in advance of the inner valve, and

any mechanical construction which will effect this relative movement would be effective.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a compound tapering valve the combination of the supplementary valve provided with the rear supporting-stem and having a central port and exhaust-recesses in the side, the principal valve held on said stem and having central side ports and exhaust-recess on the under surface and shoulders in its outer end, and the engaging plate held on said stem and provided with lugs to engage said shoulders, and the large and small parallel cylinders with their respective pistons and rod connections, substantially as described.

2. A compound tapering valve adapted to a water-motor having two integral cylinders with transverse valve-seat, the principal cylinder provided with the usual piston and ports, the auxiliary cylinder provided with piston and ports, the piston-rod of the former connected substantially as described to the valve of the latter; the compound tapering valve held in said seat and provided with inlet and outlet ports adapted to said cylinders, the auxiliary valve having a neck for the attachment of the operating-arm and a stem, the principal valve held on said stem and provided with shoulders in its rear end, the engaging plate held on said stem and adapted to engage said shoulders to oscillate said principal valve.

3. In a water-motor the combination of the principal cylinder with the usual piston and rod, the supplementary cylinder parallel and integral with the former with the piston and rod thereof, said cylinders having suitable ports, the two tappets held on the latter piston-rod, the compound tapering valve adapted to said two cylinders, the valve-arm, the rod connecting said arm to the inner tappet and the arm on the principal piston-rod adapted to play between the two tappets, substantially as described.

4. In a water-motor the integral body comprising two parallel cylinders with suitable inlet outlet and cylinder orifices, the transverse tapering-valve orifice suitable for a valve-seat, the compound tapering valve provided with inlet-ports and exhaust-recesses adapted to said cylinders, and said valve deriving movement from the principal piston-rod, substantially as described.

5. In a water-motor the auxiliary valve provided with a central longitudinal orifice the radial inlet-orifice, the recessed sides united at their inner ends, and the outlet-orifice in the valve-seat, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

BARTON PICKERING.

Witnesses:

MICHAEL CAHILL,
JOHN HOFFMAN.