

No. 767,330.

PATENTED AUG. 9, 1904.

A. B. DENSON.
RECIPROCATING CYLINDRICAL VALVE.

APPLICATION FILED APR. 22, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.

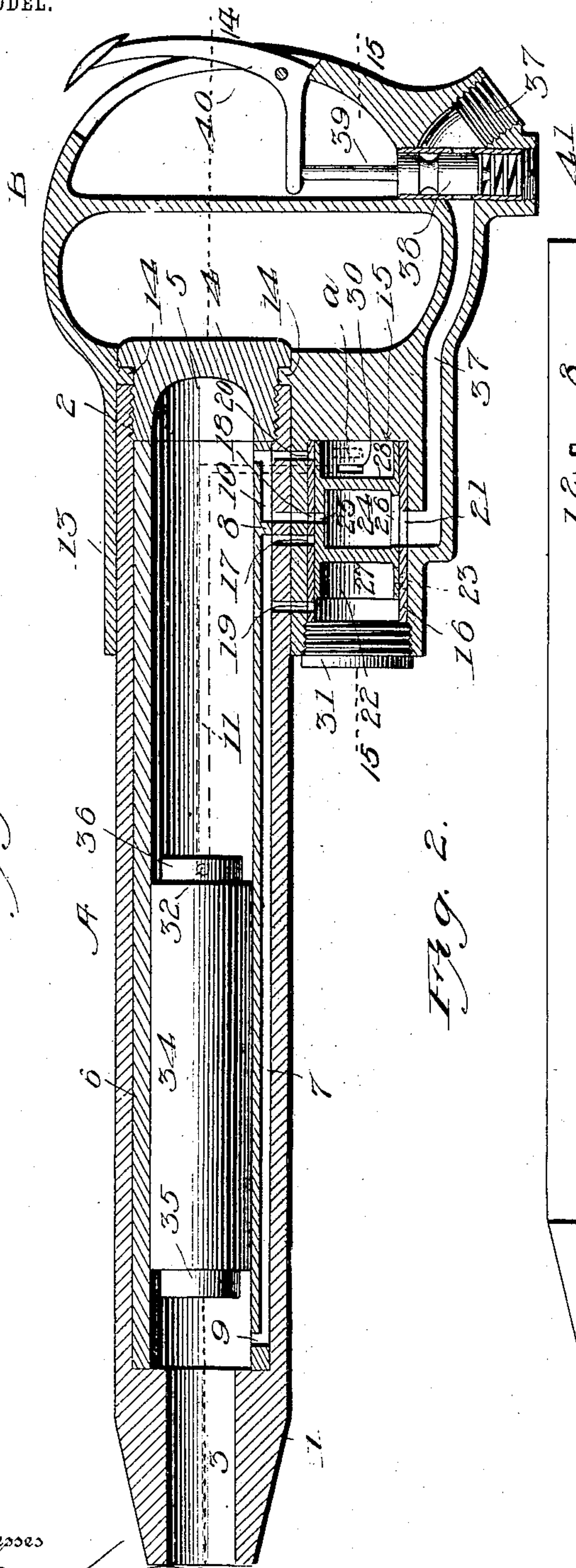


Fig. 2.

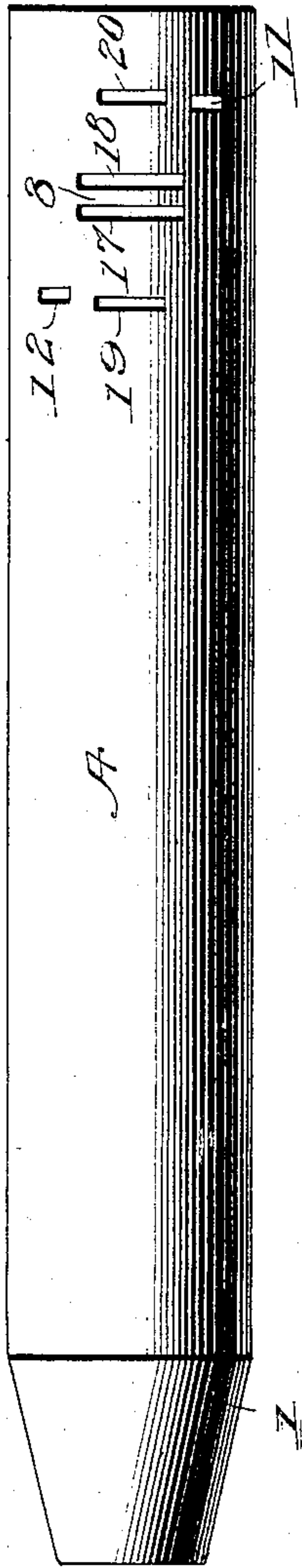
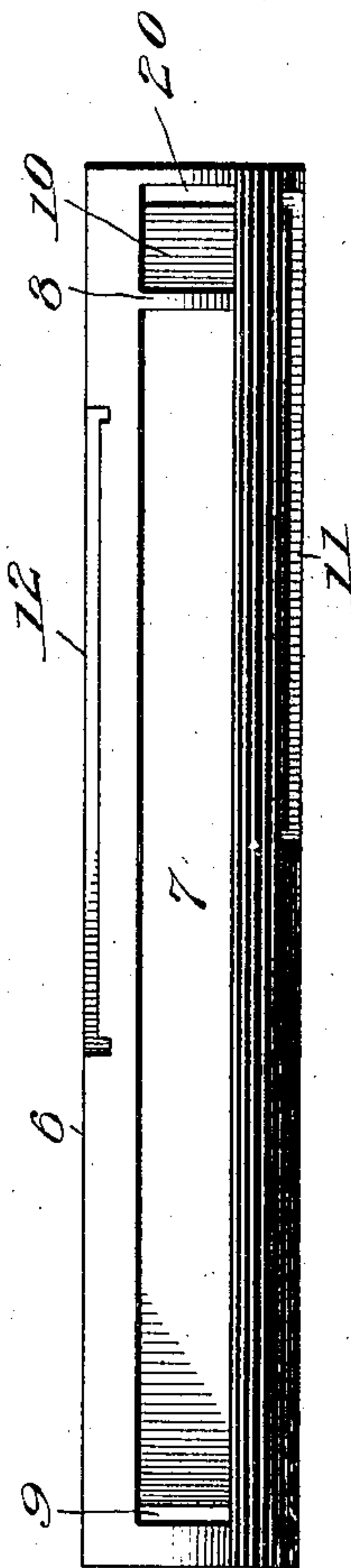


Fig. 3.



Witnesses

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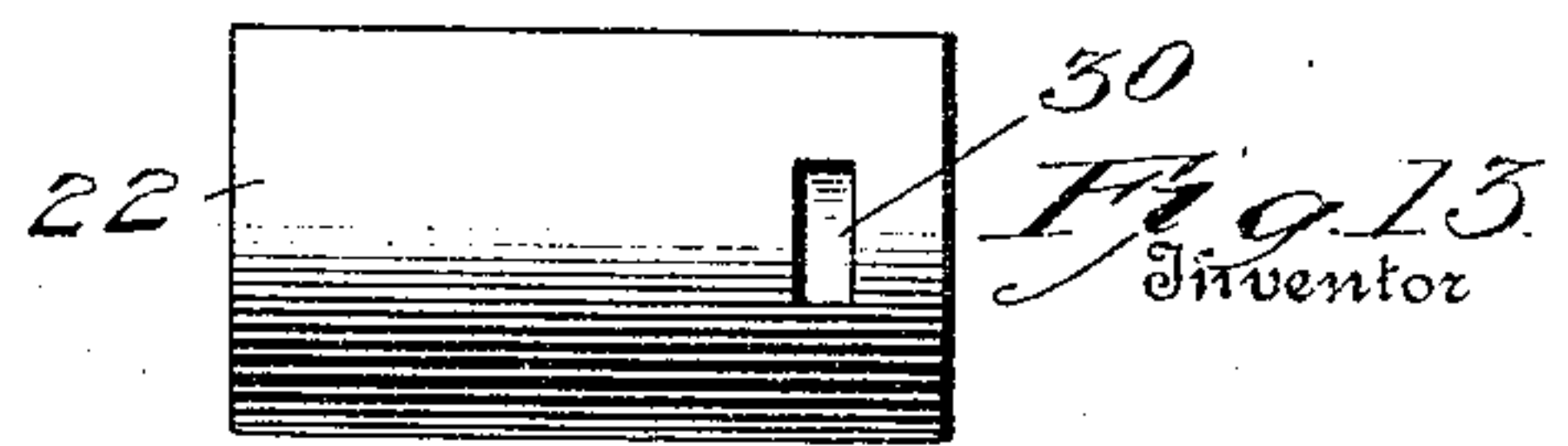
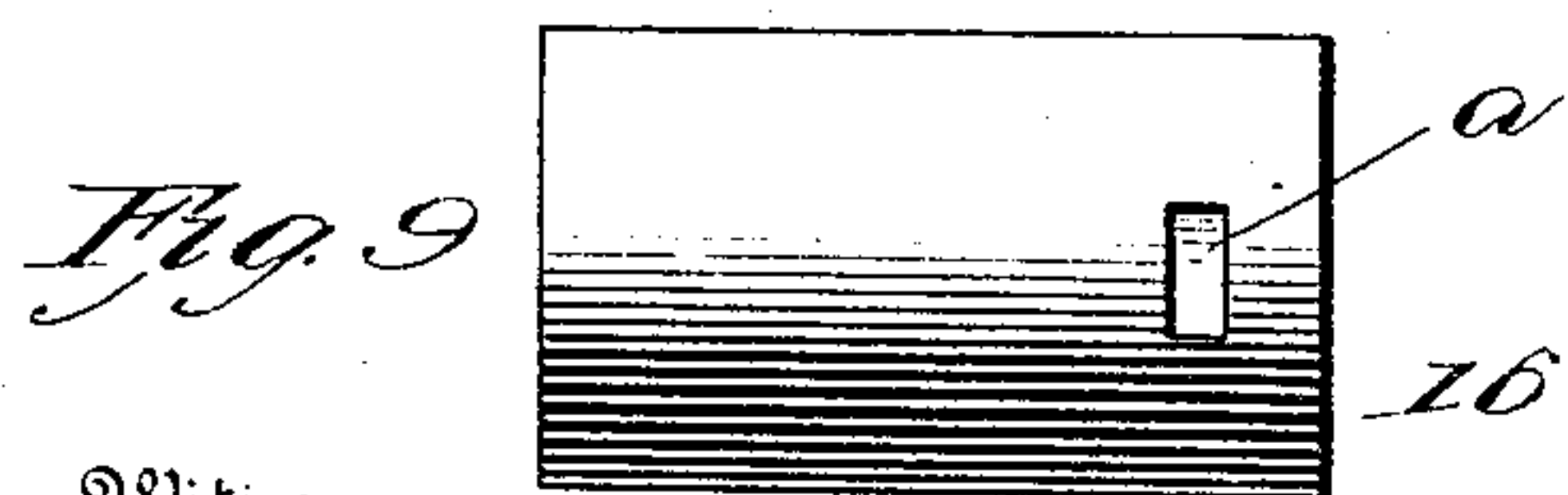
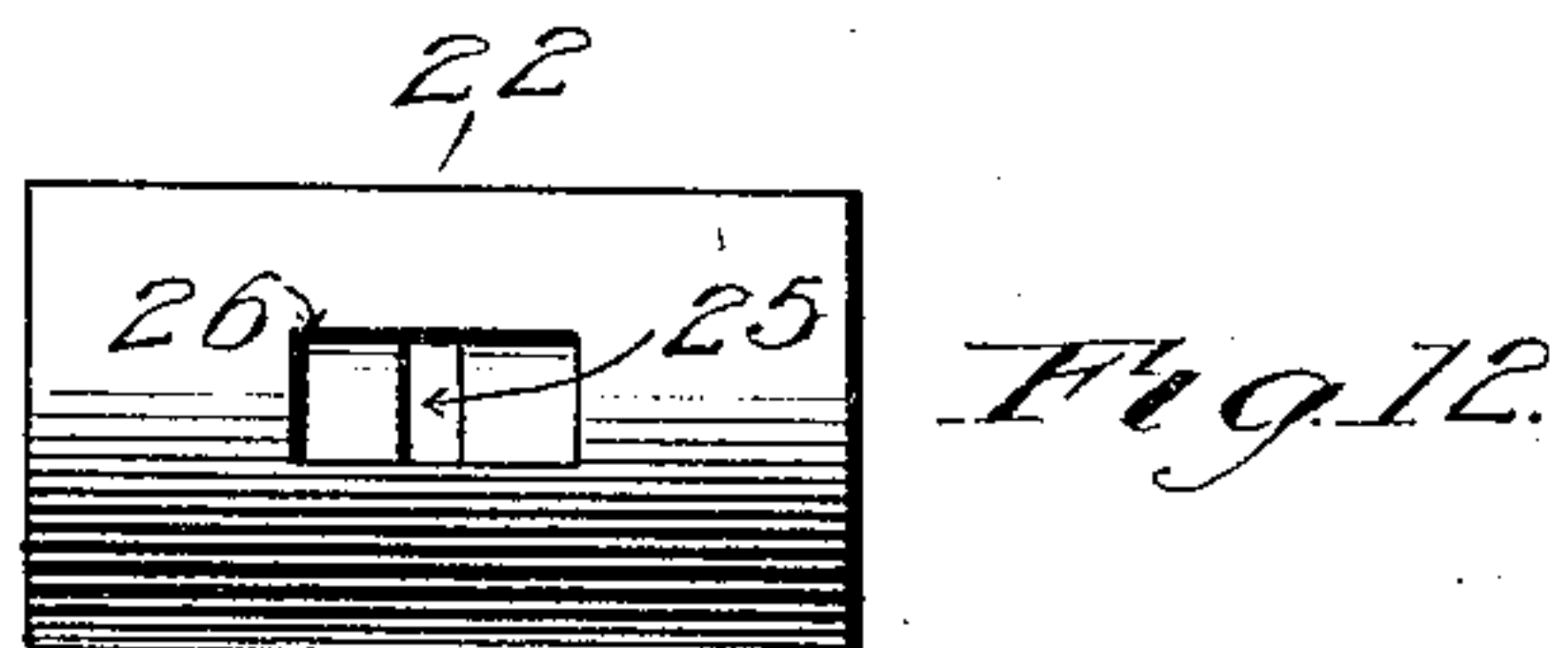
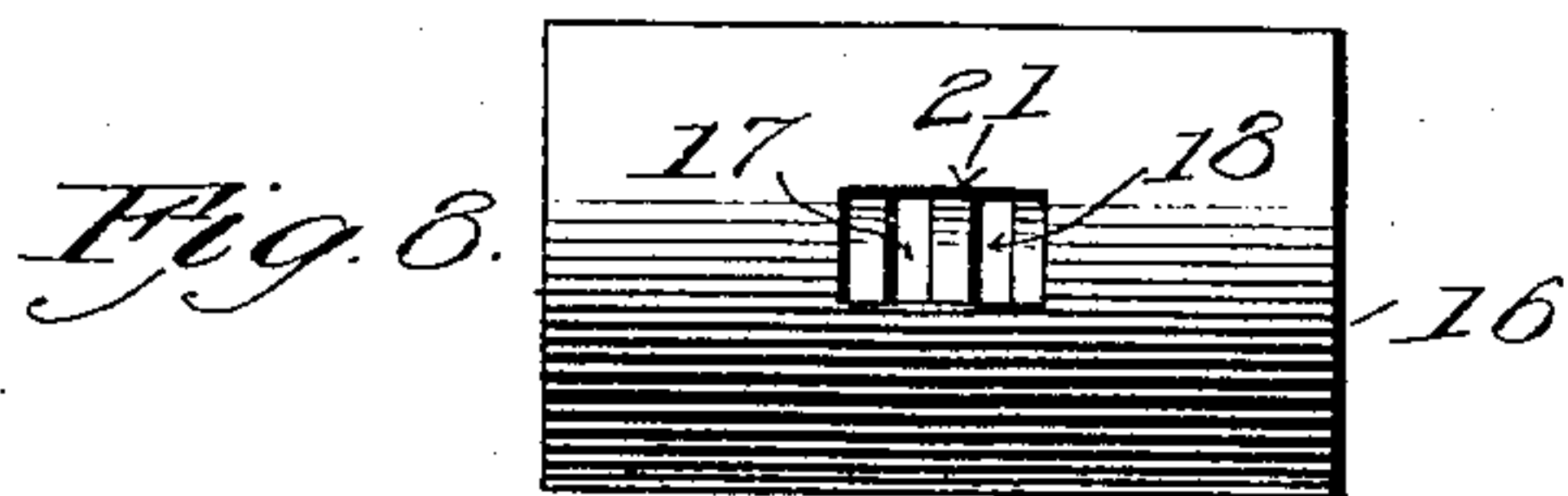
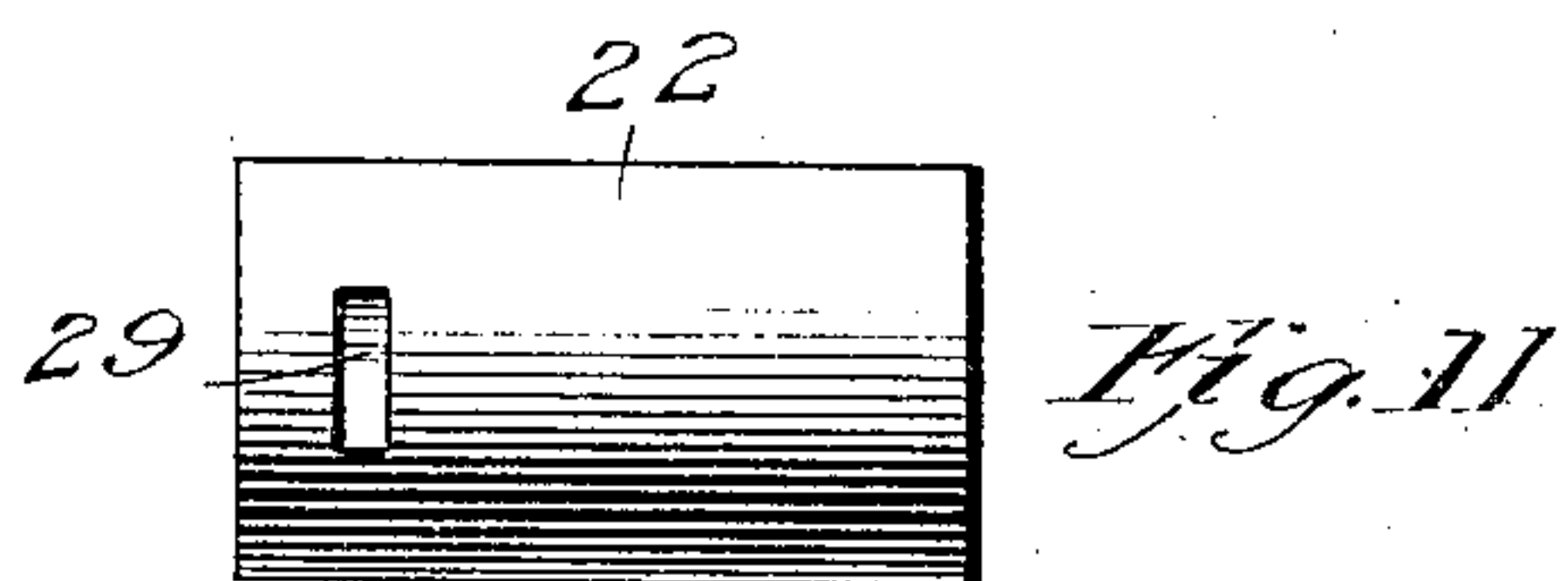
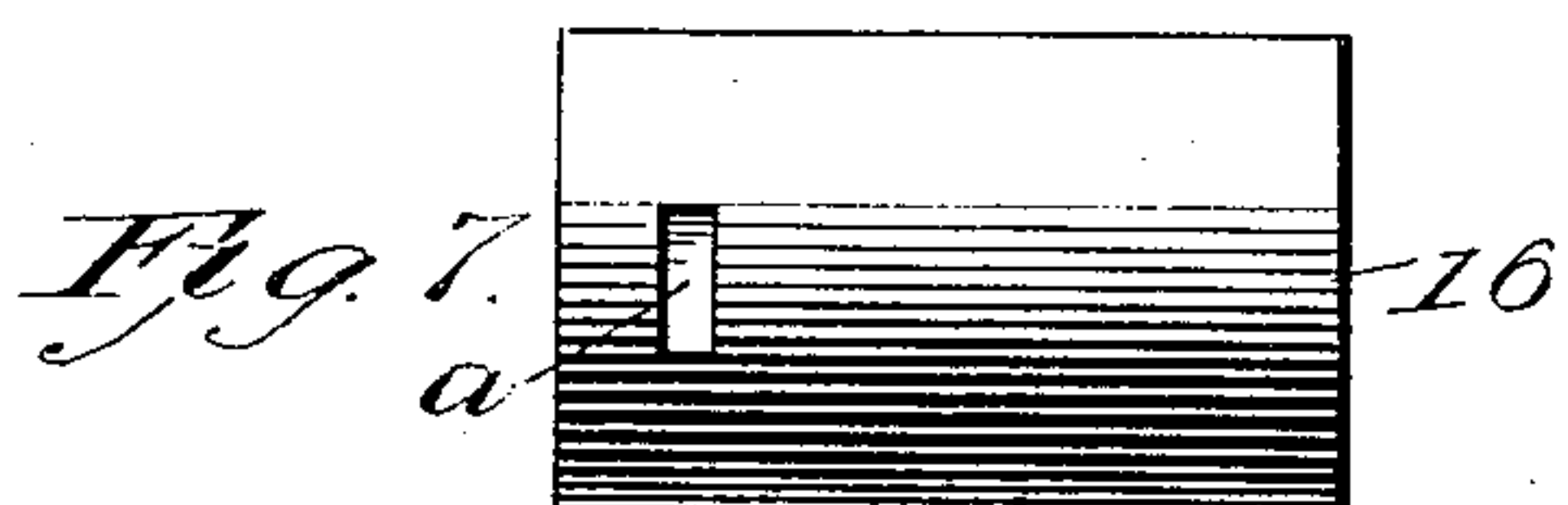
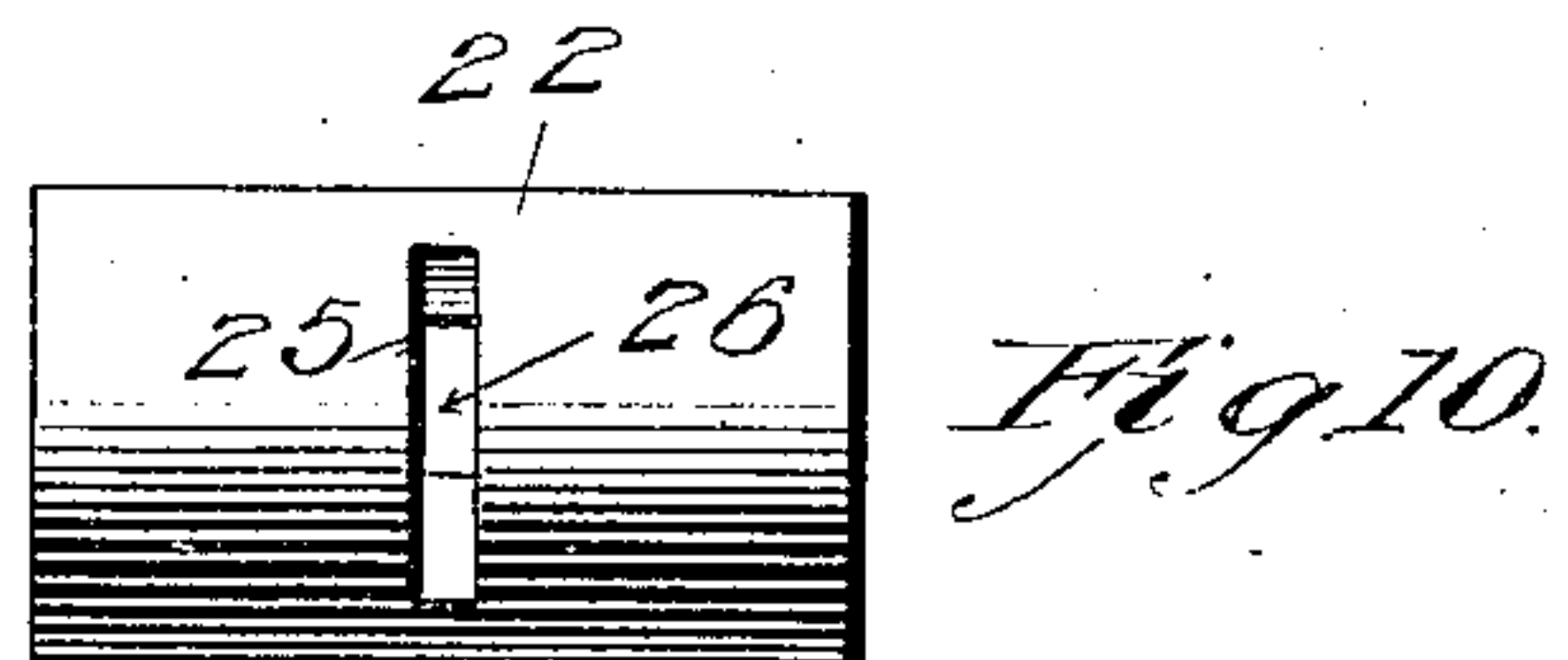
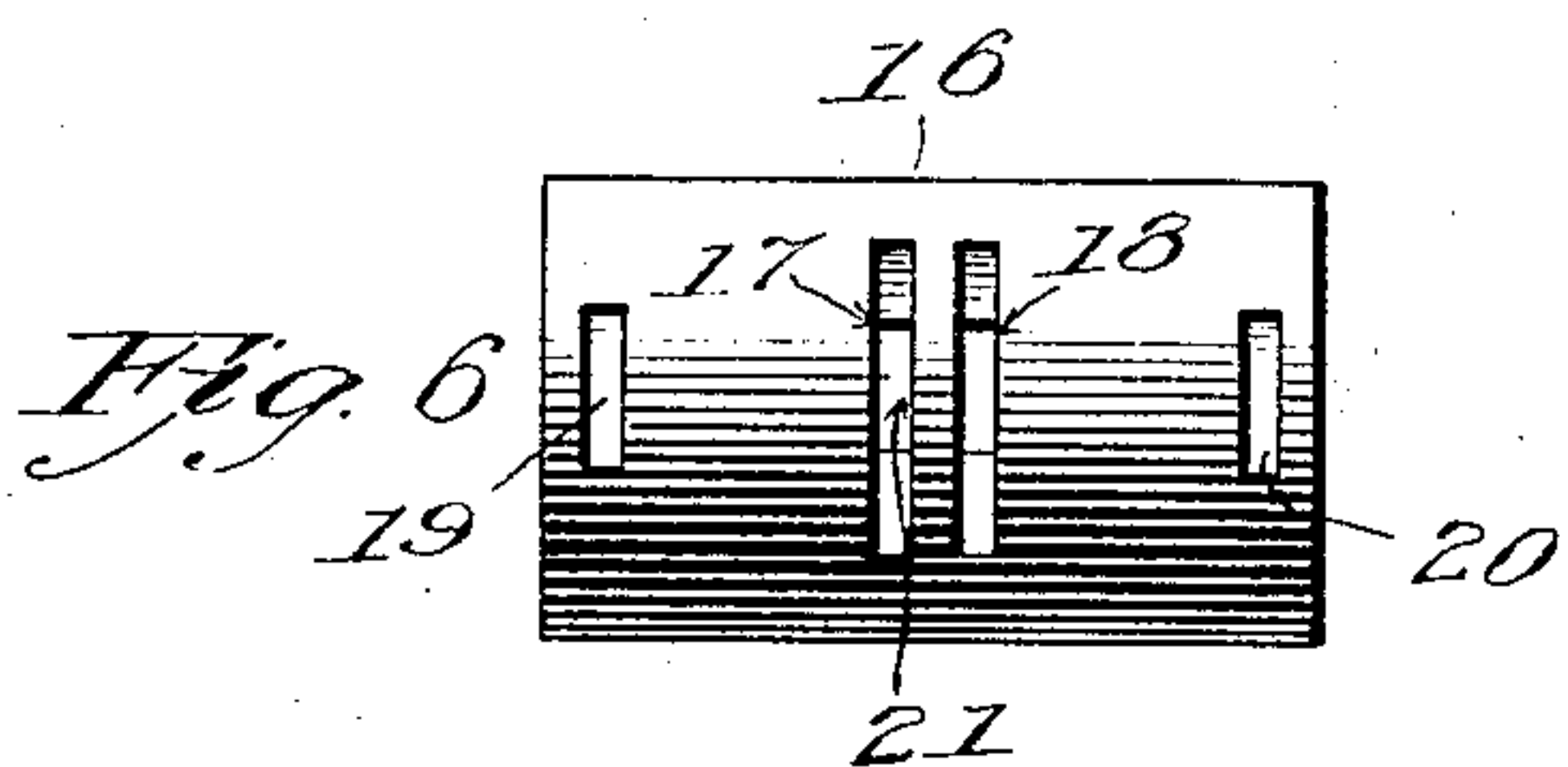
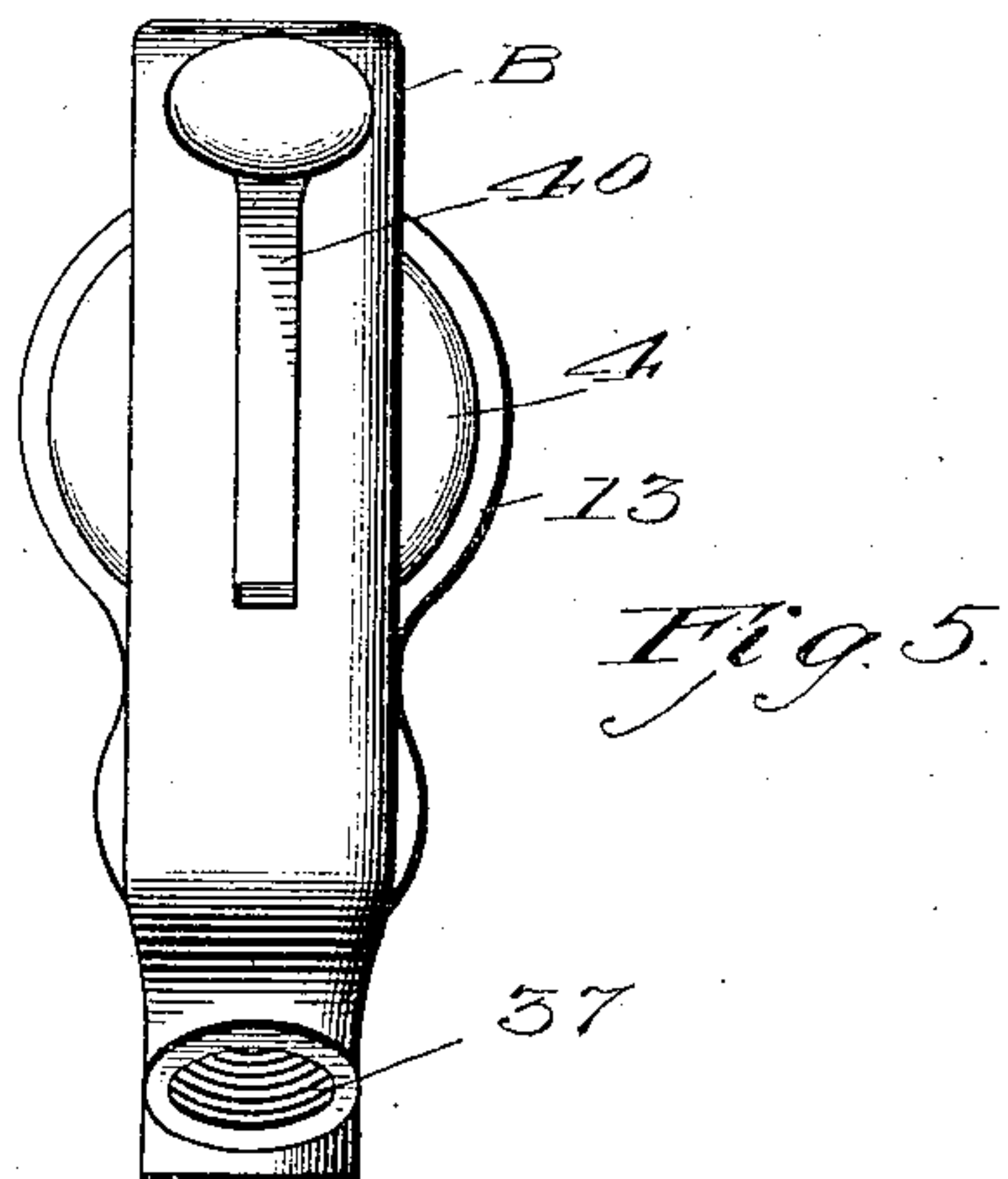
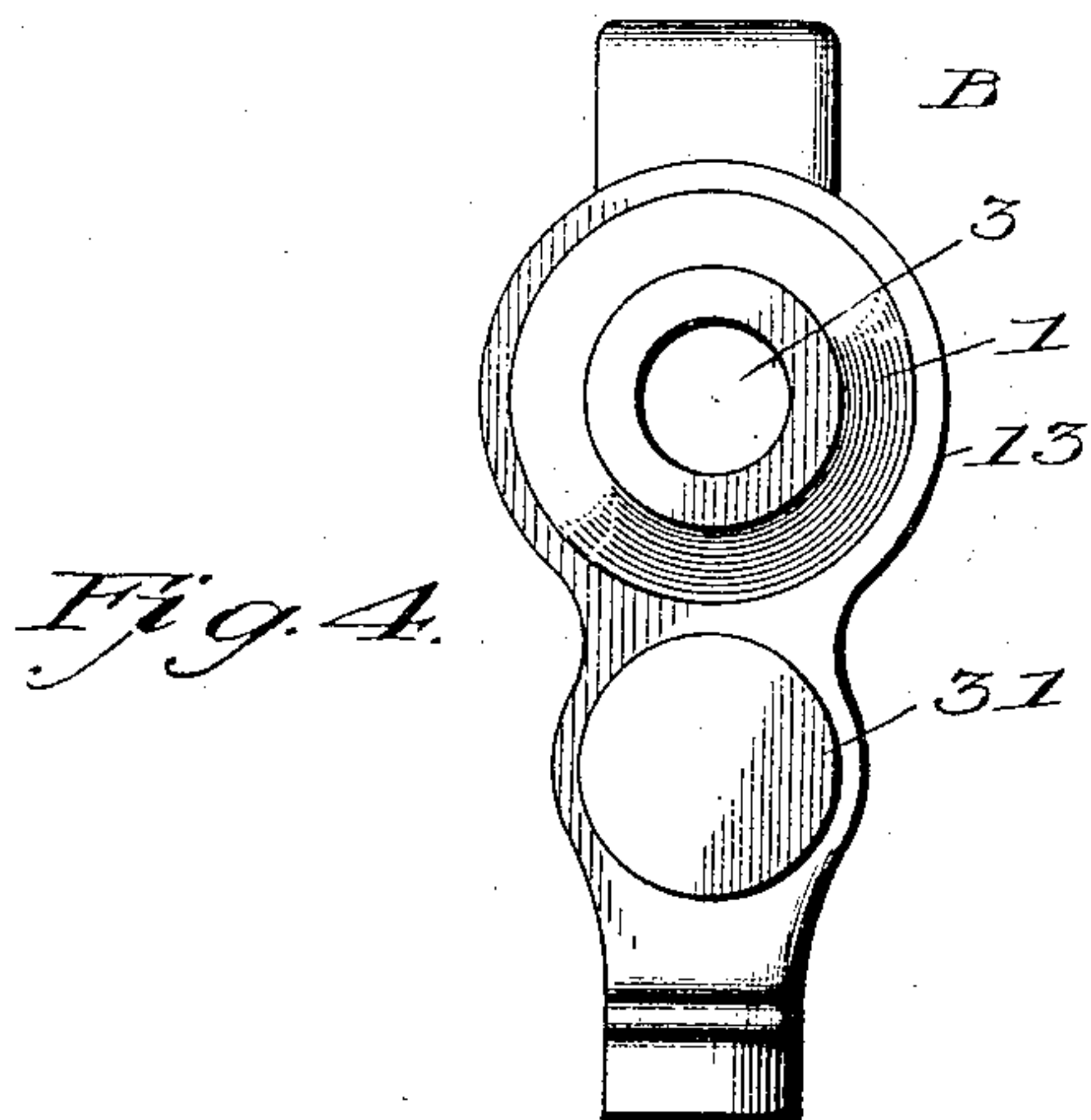
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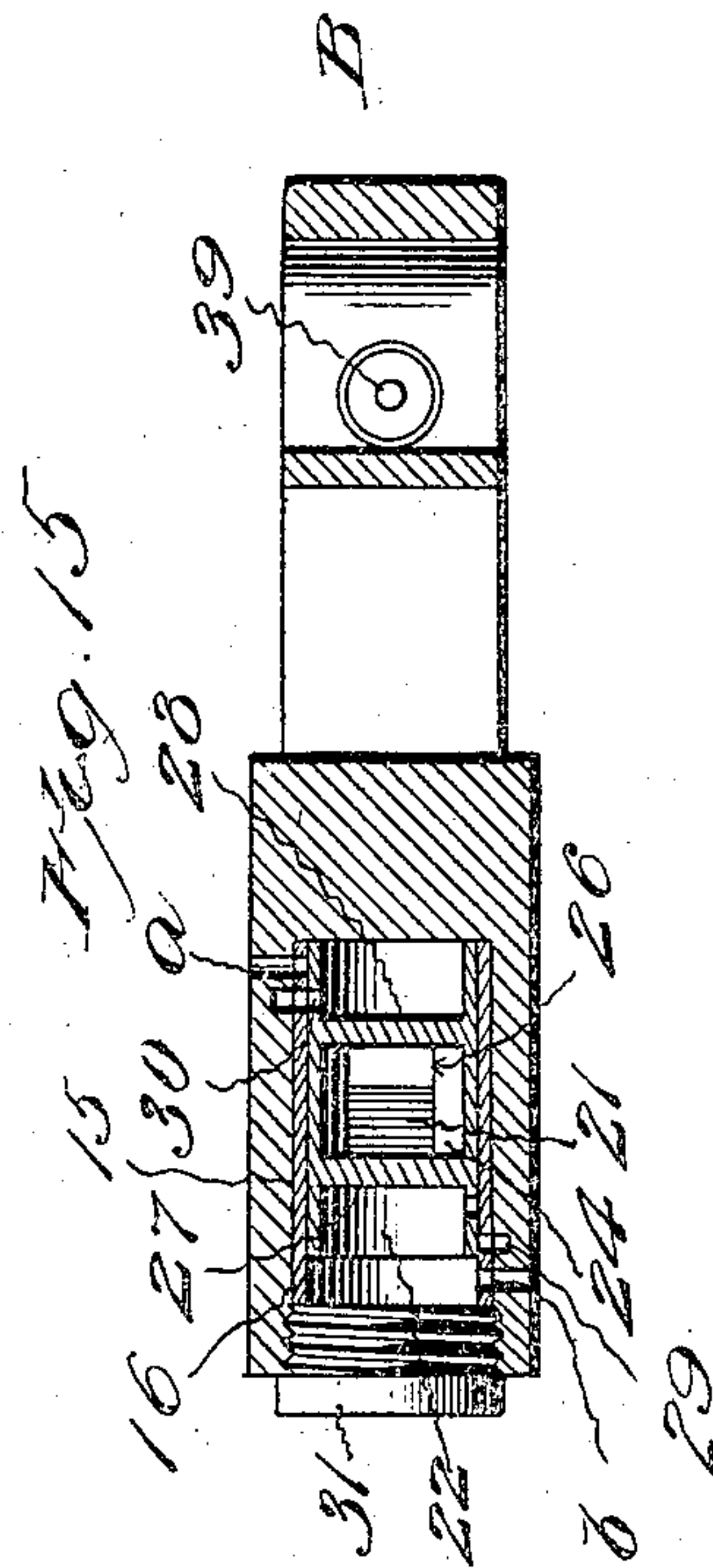
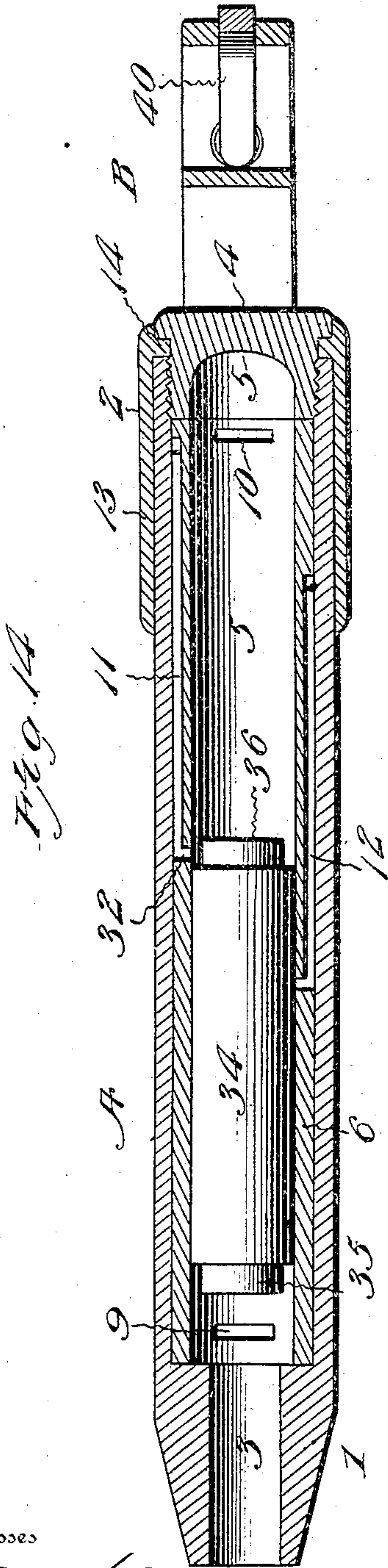
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3 SHEETS—SHEET 3



Witnesses

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UNITED STATES PATENT OFFICE.

ARTHUR B. DENSON, OF BELOIT, WISCONSIN.

RECIPROCATING CYLINDRICAL VALVE.

SPECIFICATION forming part of Letters Patent No. 767,330, dated August 9, 1904.

Application filed April 22, 1902. Serial No. 104,176. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR B. DENSON, a citizen of the United States, residing at Beloit, in the county of Rock and State of Wisconsin, have invented new and useful Improvements in Reciprocating Cylindrical Valves, of which the following is a specification.

My invention has relation to improvements in reciprocating cylindrical valves adapted to reciprocatingly actuate a piston, and while the valve may be utilized for this purpose whenever or wherever such results may be required it is particularly adapted to operate the piston of a pneumatic hammer, and for this reason I have shown and illustrated the valve as operatively associated with a pneumatic hammer.

The object is to provide an improved reciprocable cylindrical valve of simplified construction which is certain and efficient in action and durable in use.

With these objects in view the invention consists in the novel construction of parts and their arrangement and aggroupment in operative combination, as will be hereinafter specified, and particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my improvements in the accompanying drawings, forming a part hereof, and wherein—

Figure 1 is a view in longitudinal central section of a pneumatic hammer, showing the piston within the barrel or cylinder, the valve in the valve-chamber, and the means for controlling the admission of air to the valve. Fig. 2 is a side view of the barrel or cylinder of the hammer, showing the air-ports therein. Fig. 3 is a detail view of the piston-chamber, showing the main air-channel and the oppositely-arranged exhaust-channels. Fig. 4 is an end view in elevation of the hammer-handle, taken from the inner end. Fig. 5 is an end view of the hammer-handle, taken from the outer end and showing the lever for actuating the air-inlet valve, also showing the air-inlet. Fig. 6 is a plan view of the valve-casing, showing the central ports and the exhaust-ports. Fig. 7 is a detail view of the valve-casing, showing one of the ports through which the air escapes into the atmosphere.

Fig. 8 is a detail bottom view of the valve-casing, showing the inlet-port through which the air enters to the valve. Fig. 9 is a detail view of the valve-casing, showing the exhaust-port at the end opposite to that shown in Fig. 7. Fig. 10 is a detail view of the valve-cylinder, showing the main port therein. Fig. 11 is a similar view showing one of the exhaust-ports. Fig. 12 is a detail bottom view of the valve, showing the air-inlet port. Fig. 13 is a similar view of the valve, showing the exhaust-port at the right-hand end chamber. Fig. 14 is a horizontal longitudinal section taken on the line 14 14 of Fig. 1. Fig. 15 is a section taken on the line 15 15 of Fig. 1, showing the respective ports of the valve and its casing.

Referring to the drawings, A designates the barrel of the implement, consisting of a cylindrical shell of such length and diameter as may be required and formed with a tapering or conical end portion 1 and provided with interior screw-threads 2 for a distance in its open end. A tool-holding passage 3 is made through the conical end portion, wherein the end of the tool engages. The upper or open end of the barrel is closed by a threaded plug 4, having a flanged head, as shown, and a recess 5 in its inner end, into which the reduced end of the piston projects when at its limit of movement in that direction.

Within the hollow or chamber of the barrel is fitted the piston-cylinder 6, of such length as to extend over the respective ports opening through the barrel, as seen in Fig. 1 of the drawings, and formed with a suitable air-passage 7, leading from a shoulder or partition 8 and extending down adjacent to the lower end of the cylinder, where it opens into the piston-chamber at 9 below the piston. A second air-passage 10 opens into the piston-chamber at the upper end thereof to admit air to force the piston down to strike the tool, and on opposite sides of the piston-cylinder are formed exhaust-ports 11 12, disposed one in advance of the other, as shown in Fig. 3 of the drawings, the exhaust-port 11 being provided to relieve the pressure on the piston at its downward stroke and the other, 12, at its upward stroke.

B designates the handle of the hammer, formed with a sleeve 13 to fit snug over the upper end of the barrel, and adjacent to the upper end of the sleeve has an interior annular flange 14, which lodges against the end of the barrel and is clamped by the threaded plug 4, whereby the handle is held firmly to the tool, as shown in Fig. 1. In the shank of the handle is formed a cylindrical chamber 15, in which is accurately fitted a cylindrical valve-casing 16, provided with ports 17 18 and exhaust-ports 19 20, registering and alining with those of like designation in the barrel of the hammer and extending through the partition-wall in the shank of the handle, as shown in Fig. 1 of the drawings. The valve-casing is also provided with an inlet-port 21, through which the air enters.

Within the valve-casing 16 is slidably disposed the valve 22, held against turning in the casing by means of a screw 23, let through a slot in the end chamber of the valve. The valve 22 consists of a cylinder made shorter than the casing within which it is fitted to provide for reciprocation and is divided into three apartments, a central apartment 24 having an outlet-port 25, which registers alternately with the ports 17 18 to admit air successively to the piston-chamber at opposite ends thereof, and is also provided with an elongated inlet-port 26, which remains open under any position that the valve may assume. The partitions 27 28 divide the valve into the apartments, the respective end apartments being open at the ends, and cover the exhaust-ports 19 20 at stated periods, and also provided with ports 29 30, coinciding with ports in the valve-casing and handle-shank to lead the air alternately into the ends of the cylinder and start the valve. The valve-casing is held in position and the valve confined in the casing by means of a threaded plug 31, let into the end of the shank of the handle. By reference to Fig. 1 it will be seen that the valve is in its upper position and the piston has been driven down in its chamber, with its upper end uncovering the exhaust-port 32, which leads through the passage 11 to the exhaust-port 30 in the upper end of the valve, thus relieving the pressure in the upper portion of the piston-chamber, as indicated.

It will be perceived that when the actuating fluid is admitted through the port 30 it acts on the upper apartment of the valve with sufficient force to start it downward and, uncovering the exhaust-port α , permitting the air to escape through the shell and then bringing the port 25 of the valve into aline-

ment with the port 17, which communicates with the channel 7 and port 9 and forces the piston upward in the chamber. Then as the piston 34 is pushed upward the mouth of channel 12 is uncovered, permitting the air to pass through the port 19 into the apartment defined by the partition 27 of the valve, forcing the valve in upward direction and uncovering the exhaust-port β , through which the air escapes.

To admit air to the valve, an air-channel 37 is made through the handle, which opens into the middle chamber or apartment of the valve, which is always open. In the channel 13 is interposed a valve 38, having a stem 39, on the end of which a lever 40, fulcrumed in the handle, bears, as shown, and under the valve 38 is an expansive spring 41, which returns the valve to closed position after it has been released from the pressure.

Having described my invention, what I claim is—

1. The combination with a piston-cylinder provided with ports at its opposite ends, and a reciprocable piston therein, of a cylindrical valve-casing provided with ports communicating with the piston-cylinder, and a cylindrical valve in the casing consisting of a hollow cylinder having transverse partitions dividing the valve into a middle apartment having an inlet-port always open and an outlet-port leading into the piston-cylinder and open end cylindrical extensions to alternately open and close the ports leading from the valve-casing into the piston-cylinder, and means substantially as described to actuate the valve.

2. The combination with a piston-cylinder provided with ports at its opposite ends, and a reciprocable piston therein, of a cylindrical valve-casing provided with ports communicating with the piston-cylinder, and constituting alternately induction and eduction passages, a longitudinally-reciprocable valve in the valve-casing having a middle apartment provided with an inlet-port constantly open, and a port communicating with the opposite ends of the piston-cylinder and open end extensions to alternately open and close the ports leading into the piston-cylinder, and means substantially as described to actuate the valve.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR B. DENSON.

Witnesses:

STEPHEN F. CAMPBELL,
FRANK F. LIVERMORE.