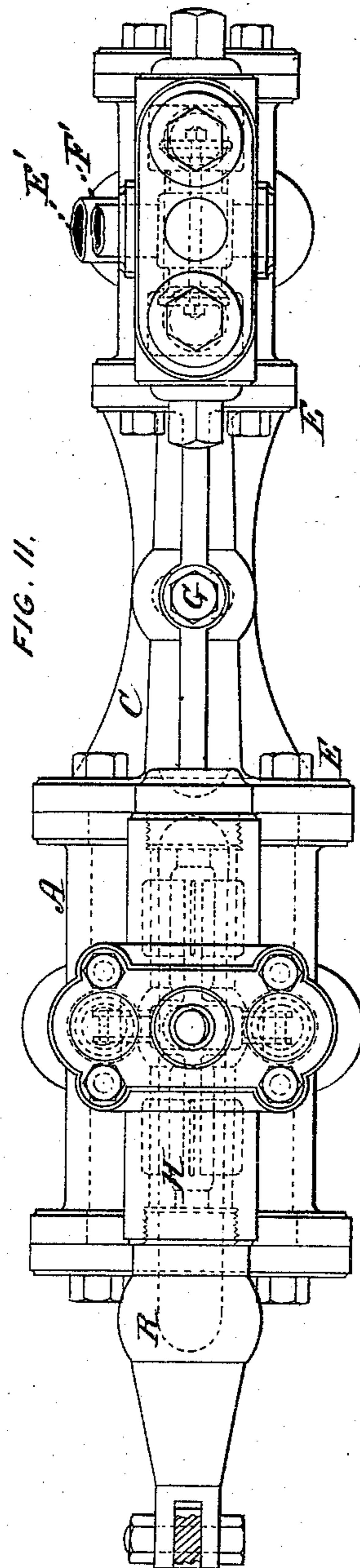
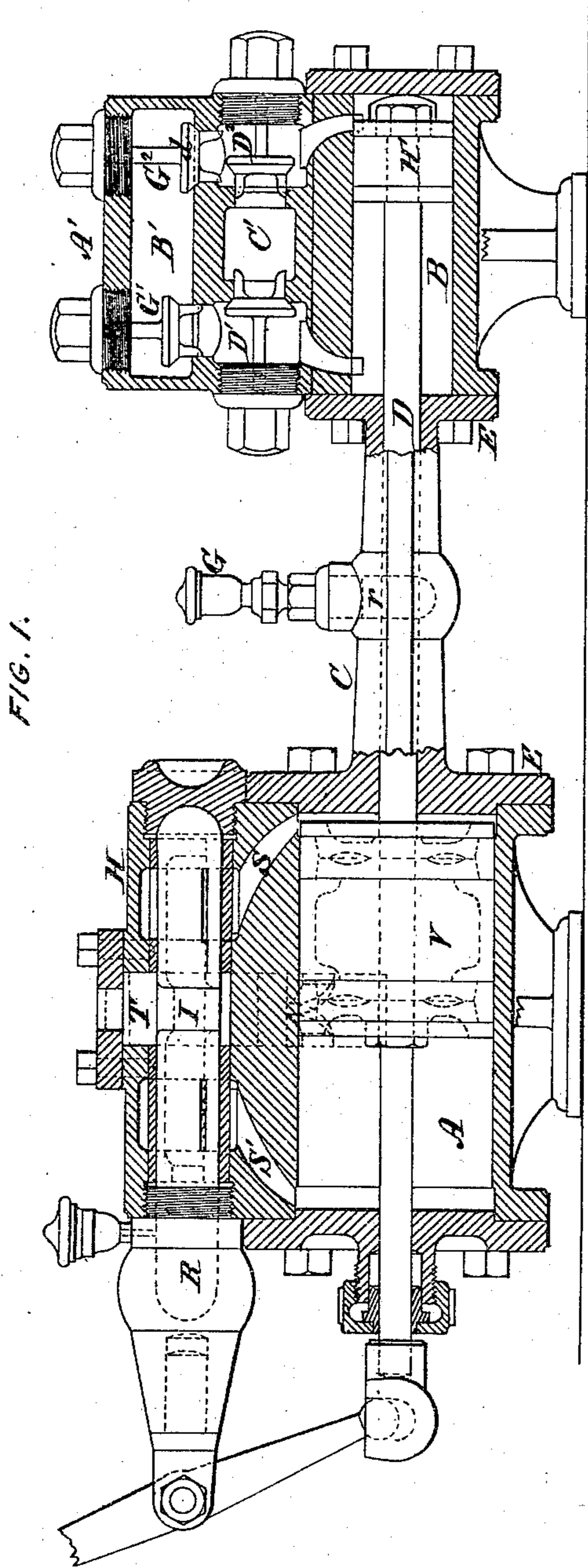


J. NORTH.

Direct Acting Steam-Pumps.

No. 154,072.

Patented Aug. 11, 1874.



WITNESSES:

A. H. Norris,
Geo. Washington

INVENTOR:

John North.
By James L. Norris.
Atty.

J. NORTH.

Direct Acting Steam-Pumps.

No. 154,072.

Patented Aug. 11, 1874.

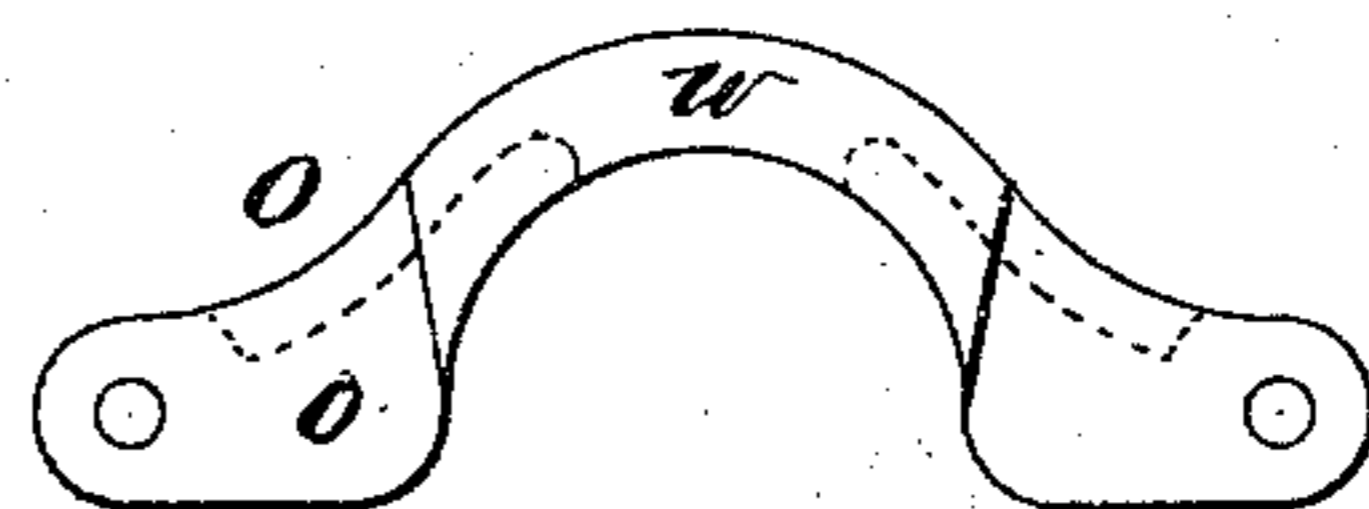
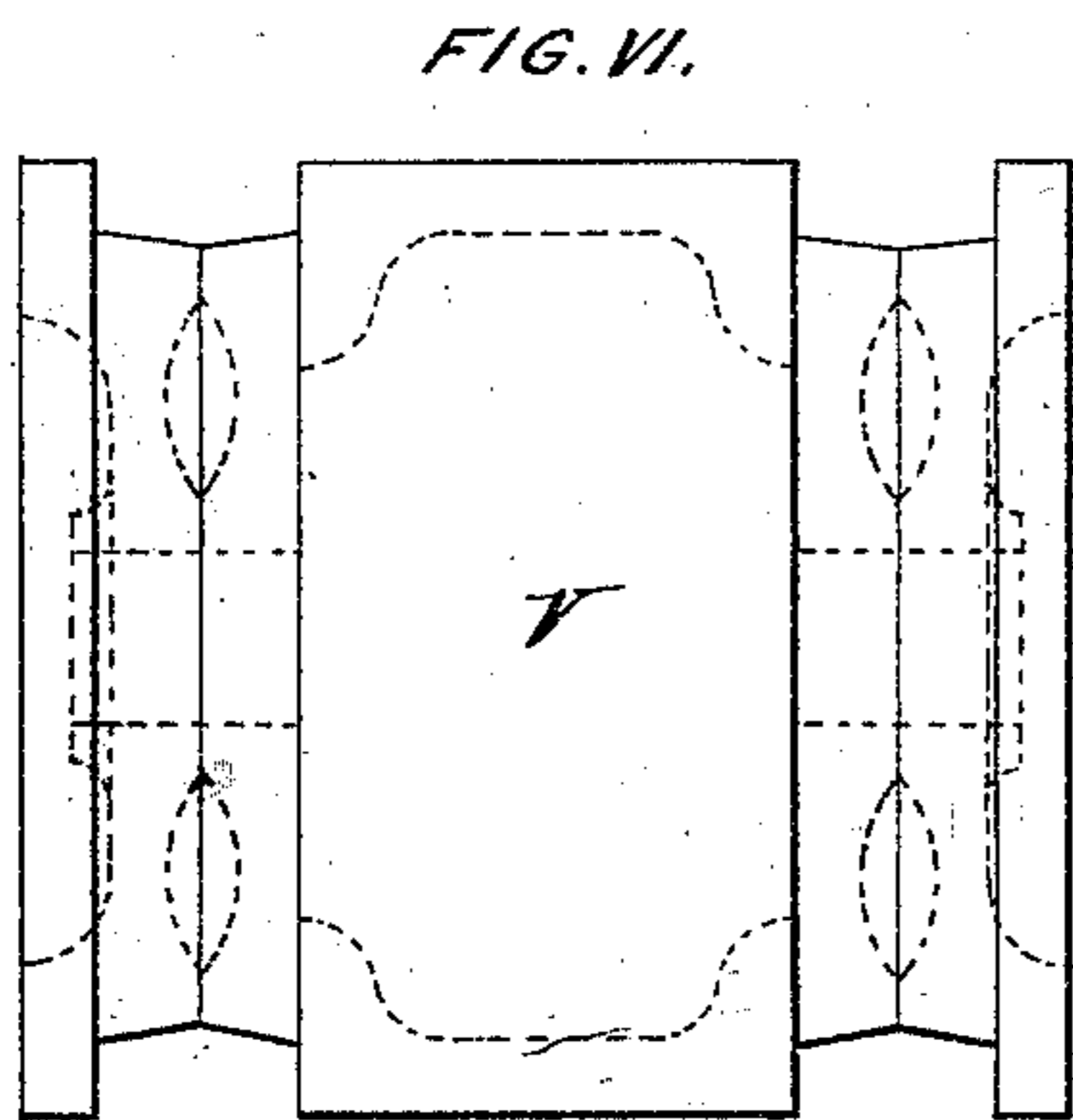
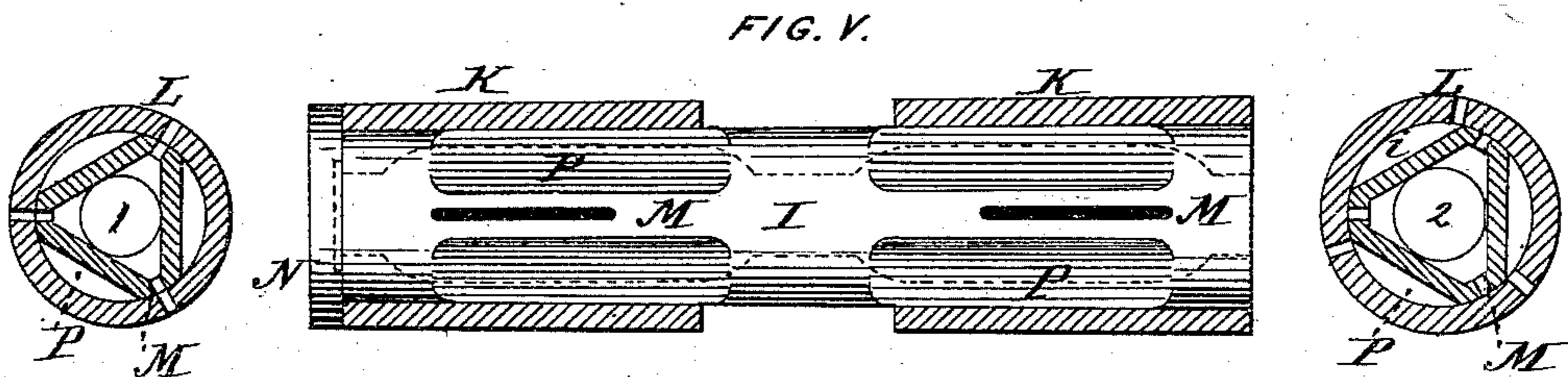
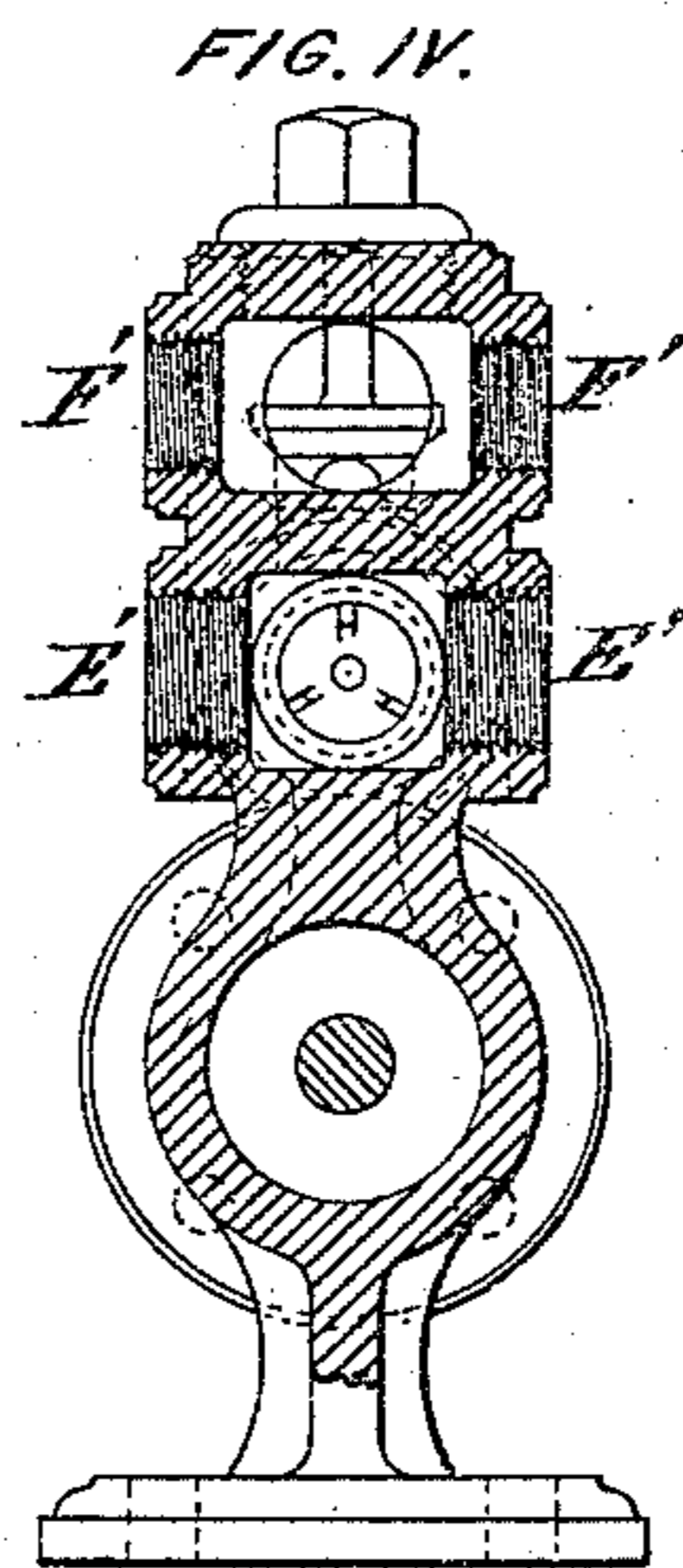
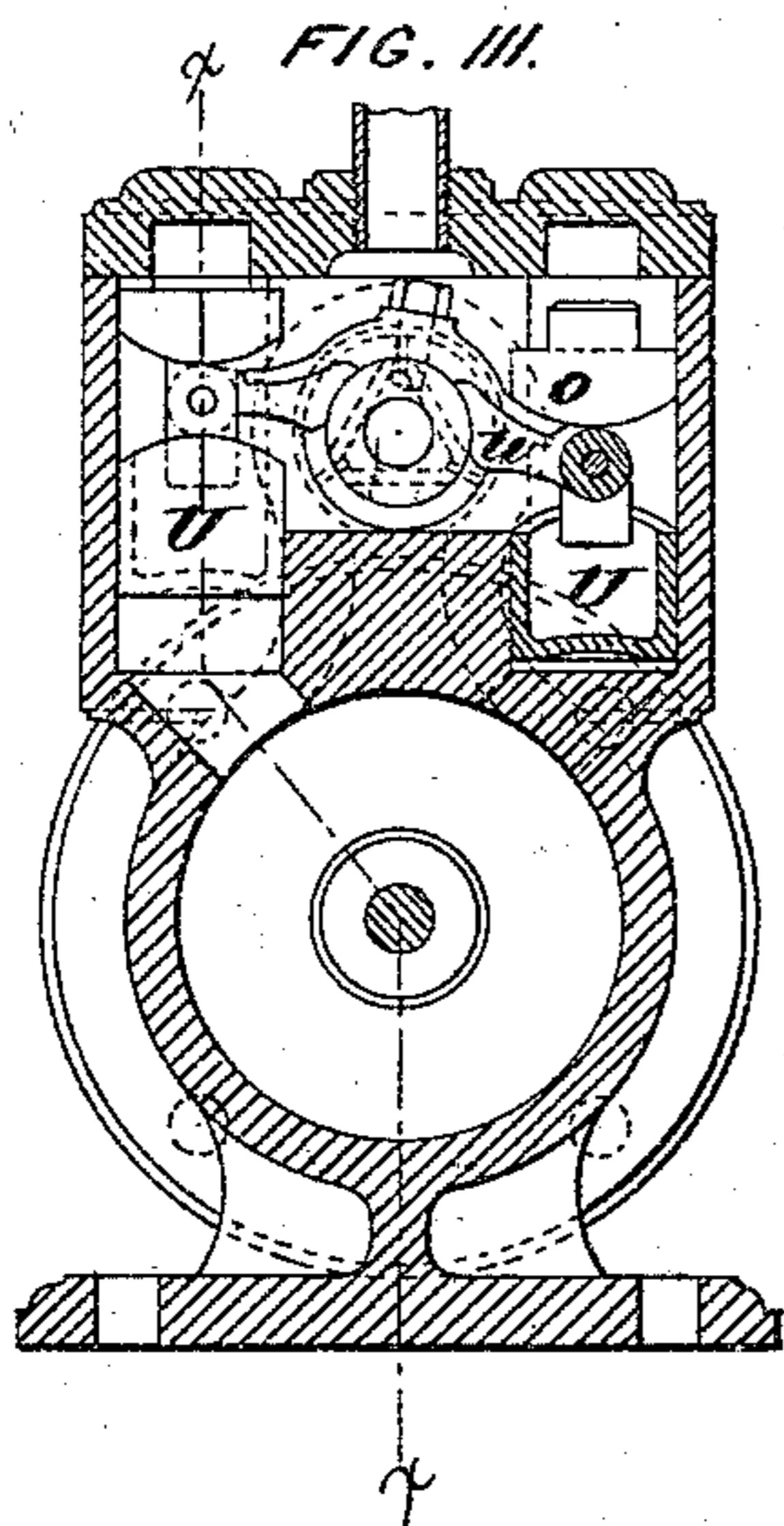


FIG. VII.

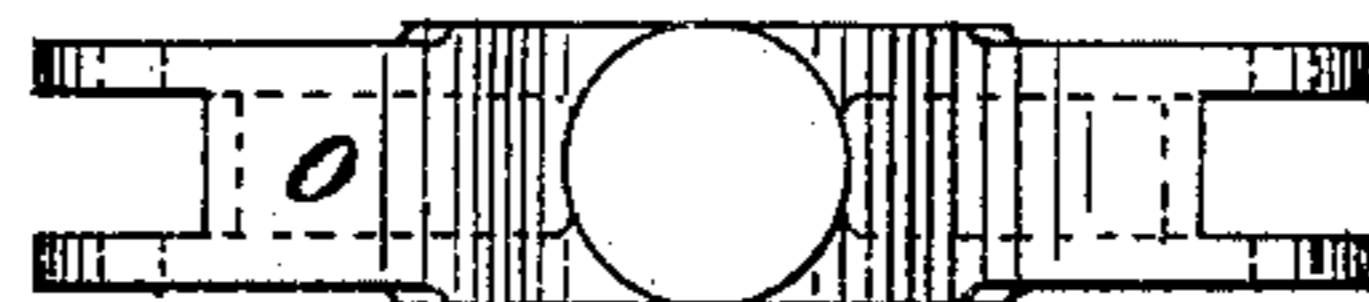
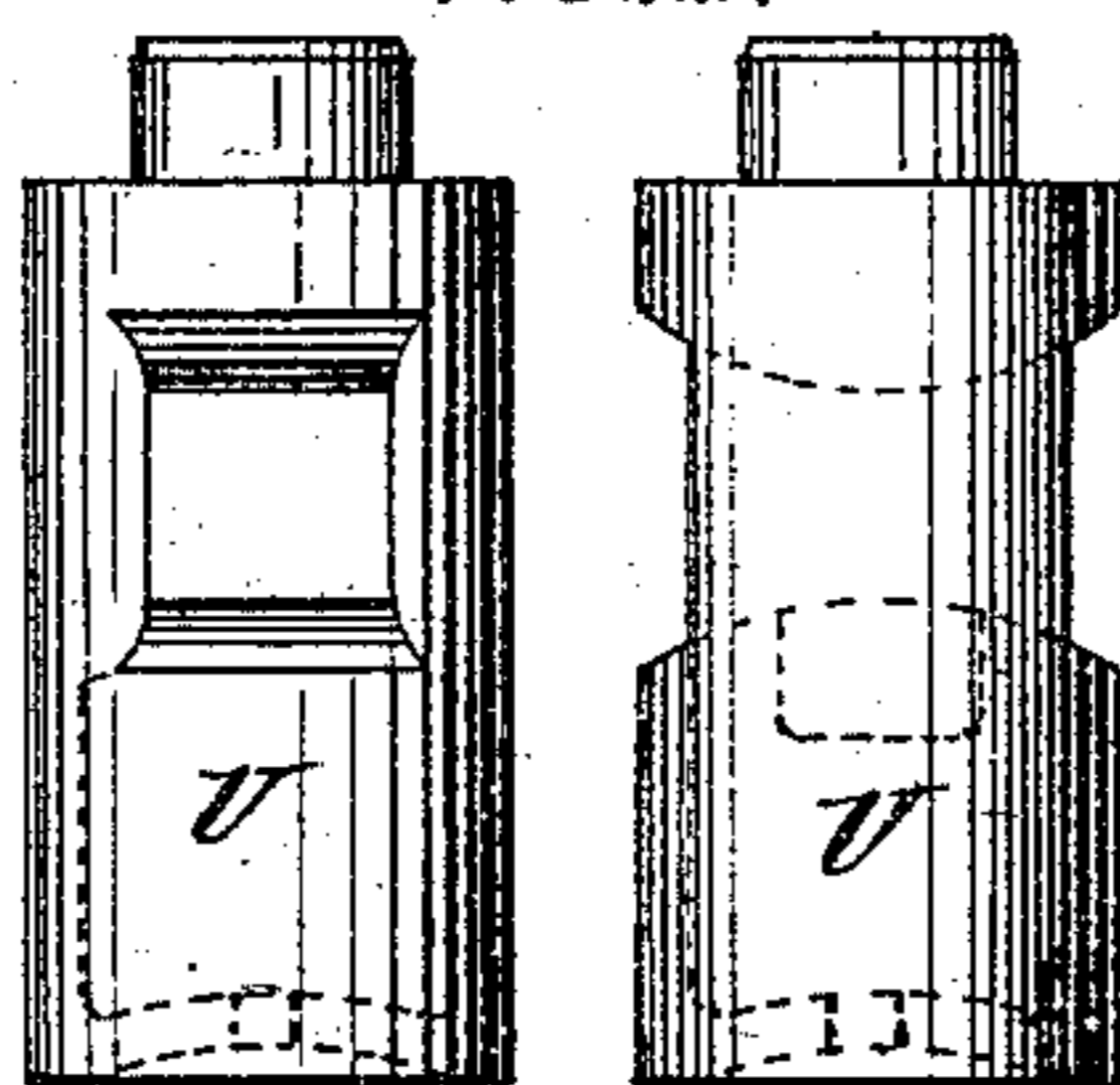
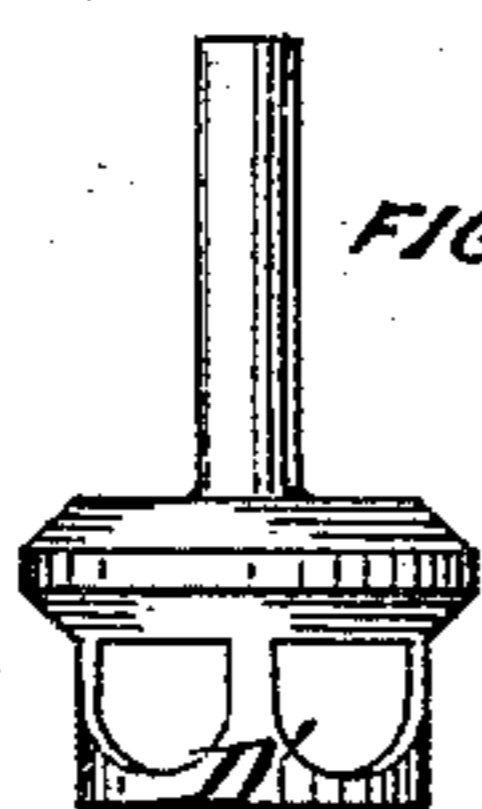


FIG. VIII.

WITNESSES:

A. H. Norris,
Geo. Cushing



INVENTOR:

John North.
By James L. Norris
Atty.

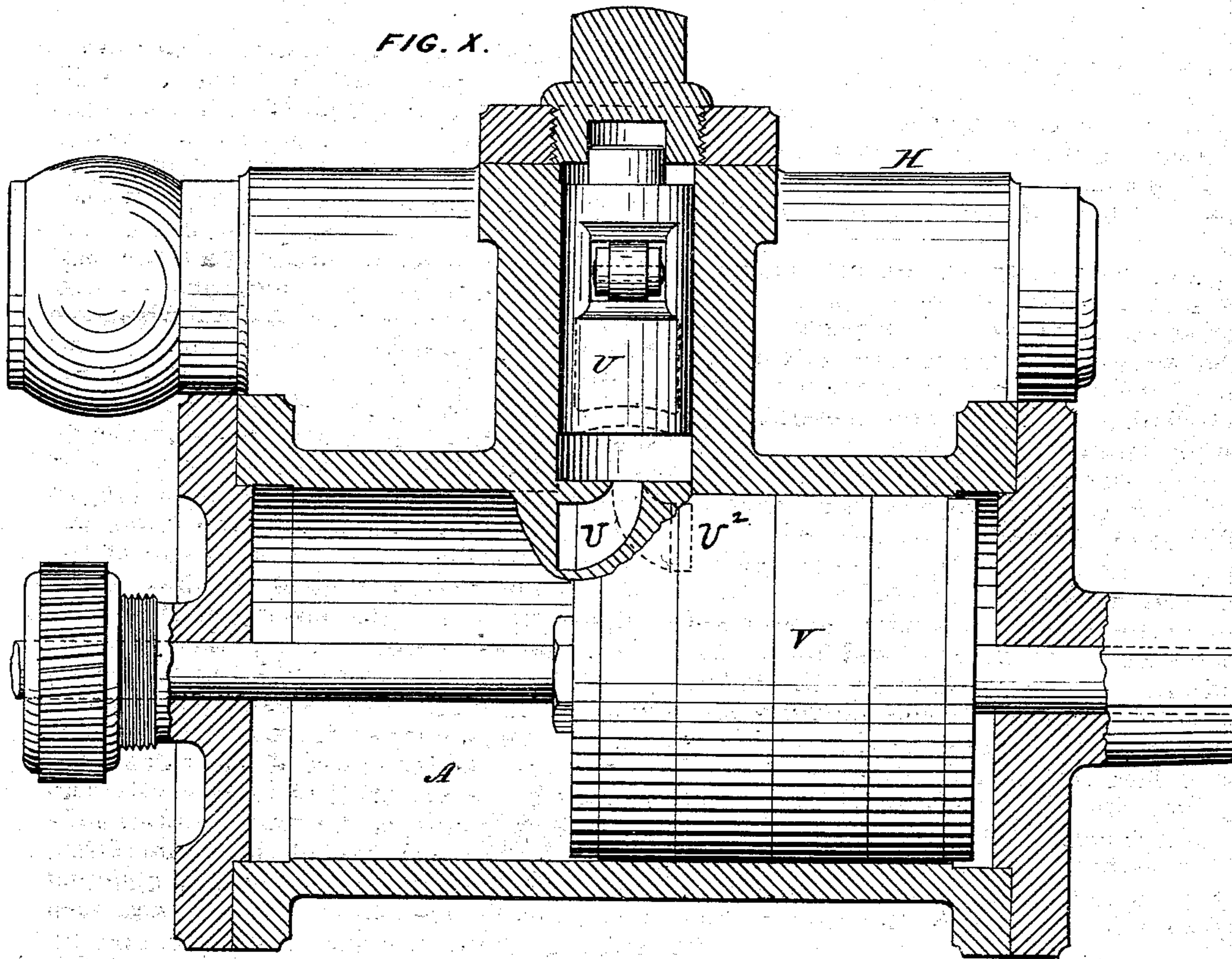
J. NORTH.

Direct Acting Steam-Pumps.

No. 154,072.

Patented Aug. 11, 1874

FIG. X.



WITNESSES:

A. H. Norris.
Geo. W. Luskings

INVENTOR:

John North.
By James L. Norris,
Atty.

UNITED STATES PATENT OFFICE.

JOHN NORTH, OF SOUTHTON, CONNECTICUT.

IMPROVEMENT IN DIRECT-ACTING STEAM-PUMPS.

Specification forming part of Letters Patent No. 154,072, dated August 11, 1874; application filed July 27, 1874.

To all whom it may concern:

Be it known that I, JOHN NORTH, of South-ton, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Direct-Acting Steam-Pumps, of which the following is a specification:

My invention relates to certain improvements in direct-acting steam-pumps, in which the usual stuffing-boxes are dispensed with, and the steam-valves operated directly by the action of the steam, the pump-cylinders and water-cylinders being directly connected together by means of a short metallic section, properly bored for the piston-rod, and provided with a stuffing-box of peculiar construction, as will be fully set forth and described.

My invention consists, first, in a new and improved stuffing-box for the metallic connecting section between the two cylinders, by means of which the piston-rod is packed and lubricated; second, in an improved hollow oscillating valve, operated by a rock-shaft having plungers at or near each end, which are operated by the direct action of the steam at each alternate stroke of the piston, for the purpose of shifting said valve and changing the ports of the cylinder; third, in certain new and improved devices and combinations of the same for operating the steam-valve, as and for the purposes set forth.

In the drawings, Figure 1 represents a longitudinal vertical section of my invention, and Fig. 2 is a top view of the same. Fig. 3 represents a transverse vertical section of the steam-cylinder and valve-box, and Fig. 4 is a similar view of the water-cylinder and valve-box. Fig. 5 represents three detached views of the steam-valve. Fig. 6 is a view of the steam-piston. Fig. 7 is two views of the rock-shaft, which is attached to the steam-valve; and Fig. 8 are the plungers, which are operated by steam, alternately, at each end stroke of the piston, and give motion to the rock-shaft and valve. Fig. 9 is a view of one of the valves used in the water-cylinder valve-box. Fig. 10 represents a transverse vertical section of the steam-cylinder and valve-box at a point midway between the two ends.

A represents the steam-cylinder, and B the water-cylinder, connected together by a metal-

lic section, C, bored longitudinally for the reception of the piston-rod D, as shown. Said section is cast with the heads E E on each end, by which it is attached to the cylinders, and it has a recess, r, cast or formed at right angles to the longitudinal bore for the piston-rod, and crossing it, for the reception of packing. Said recess is closed by means of a screw-cap, provided with an oil-cup, G, by means of which oil can be supplied to the piston-rod whenever desired. H represents the valve-box on top of the steam-cylinder, and I the valve working therein. Said valve is made hollow and slightly tapering, and is provided with glands or bushings K K, in which it moves; said glands having openings L, corresponding to openings M in the valve, as shown in the sectional views, Fig. 5. The smaller end of the valve rests against a plate, N, which bears against the edge of the bushing or gland, and keeps the valve from binding therein. The glands or bushes are secured in the valve-box, one over each port of the steam-cylinder, with which it communicates through the openings or ports L. To the center of said valve is rigidly secured a rock-shaft, O, which receives an oscillating motion as the steam is alternately introduced on each side of the steam-piston. This rock-shaft gives a corresponding motion to the valve. The valve is provided near each end with three openings or ports, M, and between these ports the exterior of the valve is cut away longitudinally, as shown in Fig. 5, from near each end toward the center, the cut portions terminating beyond the central ends of the glands, as shown. These central ends of the glands terminate at the exhaust-port of the valve-box, and the cut portions of the valve leave spaces P P between the inner surface of the glands and the valve, which connect the exhaust-port at proper intervals with the exhausting side of the cylinder. The steam passes into the valve at the induction-port R. When the piston is in the position shown in Fig. 1, the end of the valve over the port S will be in the position shown at 1, Fig. 5, with the openings or ports in the valve and gland together, allowing the steam to enter behind the piston and push it forward. The exhaust steam will escape through the port S', through the apertures or ports in the gland or bush-

ing, into and through the spaces P P, and then into the eduction or exhaust port T at the center. This end of the valve will be in the position shown at 2 in Fig. 5, the ports in the bushing or gland opening into the spaces P P, as shown. The rock-shaft O is provided at each end with a plunger, U, working in a small cylindrical cavity at each side of the cylinder, which communicates with the same. The plungers are made hollow, and provided with small apertures at their bottom for the escape of steam when returning after their upward strokes, to prevent rebounding or reaction. These apertures are not large enough, however, to interfere with the action of the steam when let on in full volume beneath the plungers, and prevent said plungers from being thrown upward thereby. The steam which escapes through said apertures finds its way into the exhaust-port T in the valve-box. To one side of the rock-shaft O I attach a rod, O', passing through the upper side of the valve-box, by means of which the said shaft may be put in motion by hand, to shift or operate the valves when starting the engine. The cylindrical cavities in which the plungers U work communicate with the steam-cylinder by means of short passages U¹ U², opening into said cylinder at each side of a point midway between the two ends, so that the long piston V will clear either one or the other at the end of each stroke, and admit the steam beneath the plunger to shift the valve. In the drawing, as represented at Fig. 10, the piston is shown at the end of its stroke, leaving the end of the passage U clear. As the piston traverses the cylinder, after leaving either end, it closes both of the passages U and U¹, and keeps them closed until it reaches the other end, as will be readily perceived.

As the steam is alternately let into and discharged from each side of the piston, the plungers are raised and depressed, giving the proper motion to the valve, and changing its ports, as above described. The piston V, attached to the piston-rod D, is made hollow, and is provided with the ordinary packing-rings. The piston-rod D extends through a stuffing-box on the front head of the cylinder, and is connected to a hand-lever, by means of which the pump may be operated, temporarily, in the absence of steam.

A' represents the valve-box attached to the water-cylinder. Said box is made in two compartments, B' C'. The lower compartment, B' is connected to the induction-port E', and is provided with two puppet-valves, D¹ D², opening toward the ports leading to the oppo-

site side of the piston. The chamber C' is provided with similar puppet-valves, G¹ G², seated upon apertures leading to the cylinder-ports, but opening upward into said compartment, which communicates with the escape-ports F'.

The operation of these valves will be readily understood. As the piston H' moves forward with the piston-rod a vacuum is created behind it, and the water flows in through the induction-port E', pushing the valve D², and entering behind the piston. The water previously drawn in on the other side of the piston will be forced out, through the opposite port, into the eduction port or chamber, lifting the valve G¹ automatically. The pressure of the water will keep the valves D¹ and G² in place during the entire stroke of the piston. On its return-stroke these valves will operate in a manner similar to that of the valves D², and G¹ will remain closed.

The peculiar construction of my improved pump enables me to dispense with the usual stuffing-boxes and much of the machinery hitherto necessary for operating the steam-valves, and also to lubricate the various working parts by the action of the steam and water alone during the action of the pump. I attach oil-cups, however, to various parts of the apparatus, in order to oil the parts when about to stop the engine, to prevent rust or injury from the water while the engine is at rest.

What I claim as new, and desire to secure by Letters Patent, is—

1. The improved stuffing-box and oiler, in combination with the connecting section of a direct-acting steam-pump, the heads of which are formed with the sections in one piece, for the purpose of packing the piston-rod and lubricating it, as herein described.

2. The combination of the oscillating slotted valve with a rock-shaft and plunger, operated by the direct action of the steam, as described, for the purpose of admitting and discharging the steam at each alternate stroke of the piston, as herein described.

3. The combination of the oscillating piston, rock-shaft, and the plungers at each end of same, operated directly by the steam from the cylinder, for the purpose of imparting the proper motion to the valve, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand.

JOHN NORTH.

Witnesses:

JAMES L. NORRIS,
ALBERT H. NORRIS.