

(No Model.)

F. CHASE.  
REVERSING AND CUT-OFF VALVE.

No. 279,912.

Patented June 26, 1883.

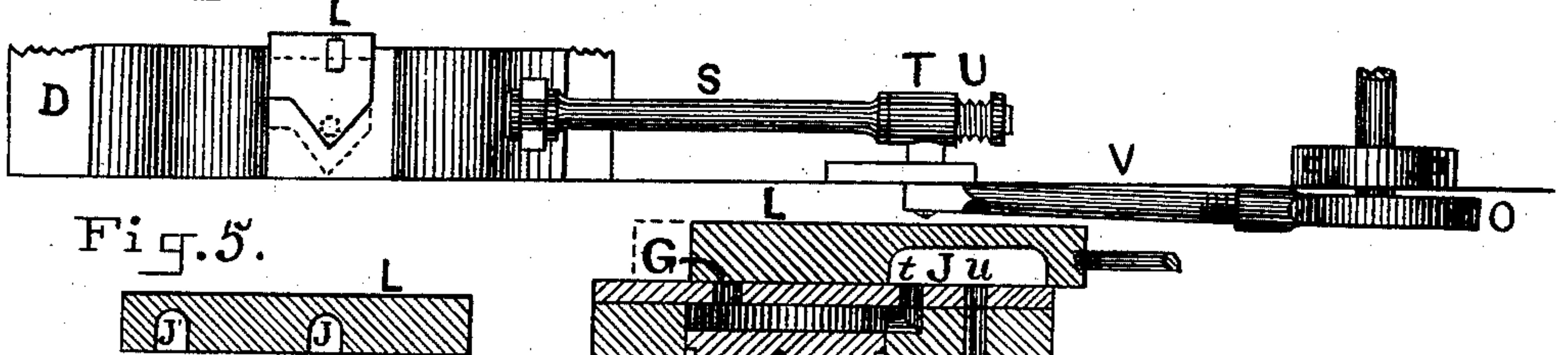
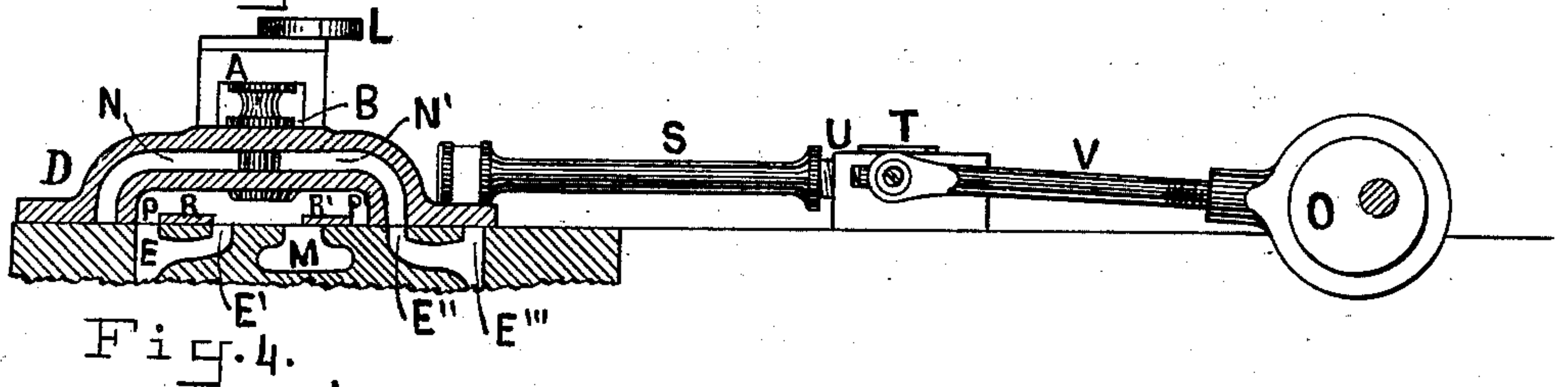
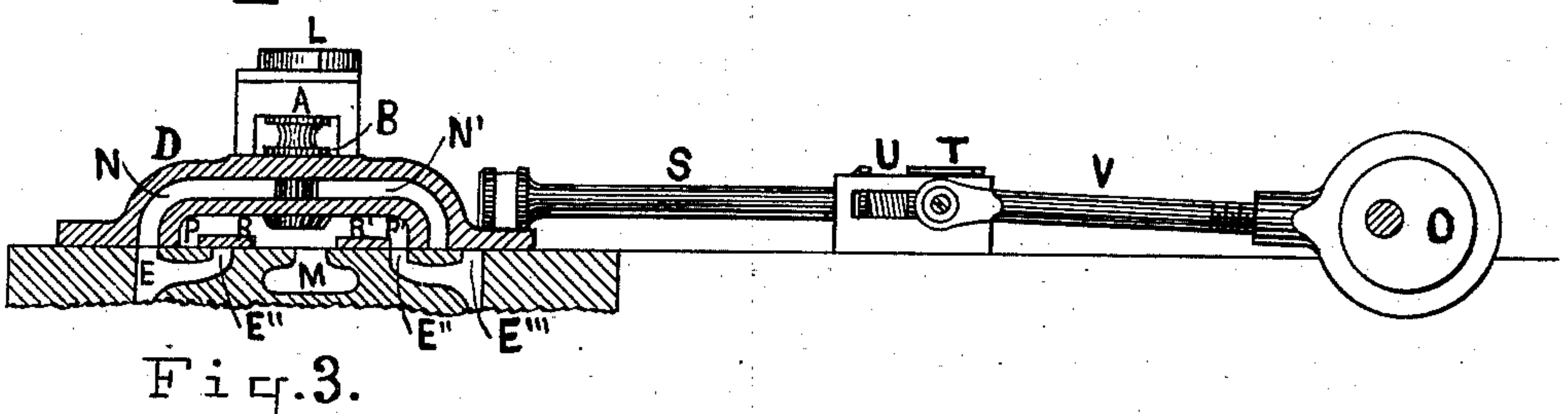
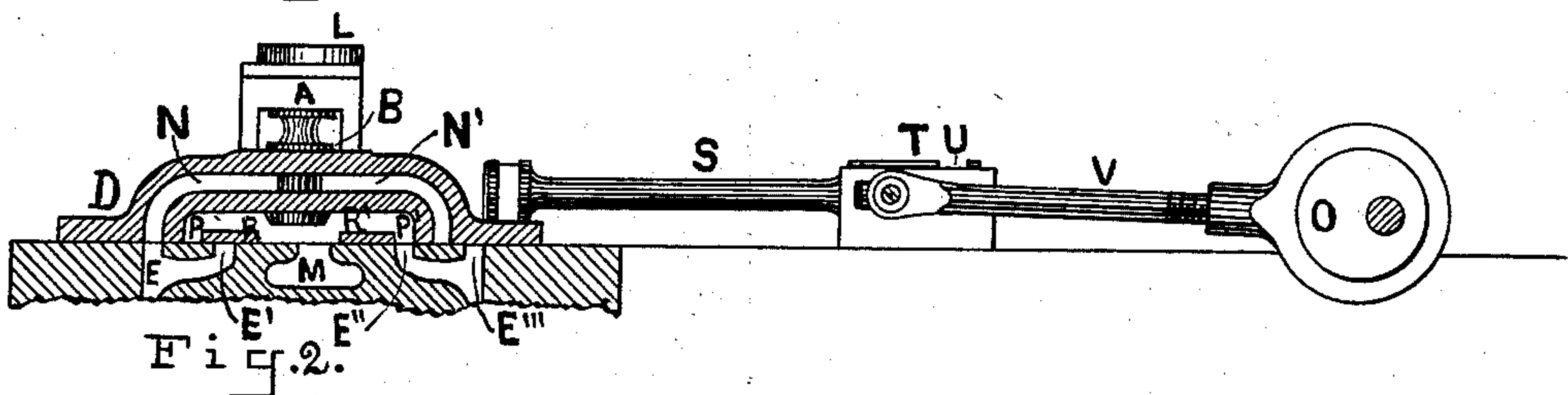
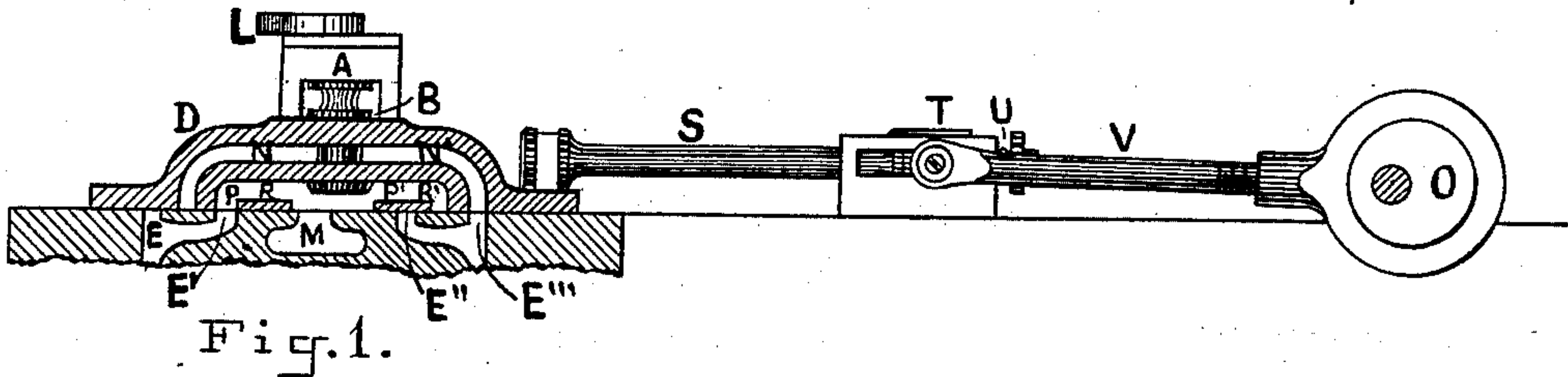


Fig. 7.

WITNESSES.

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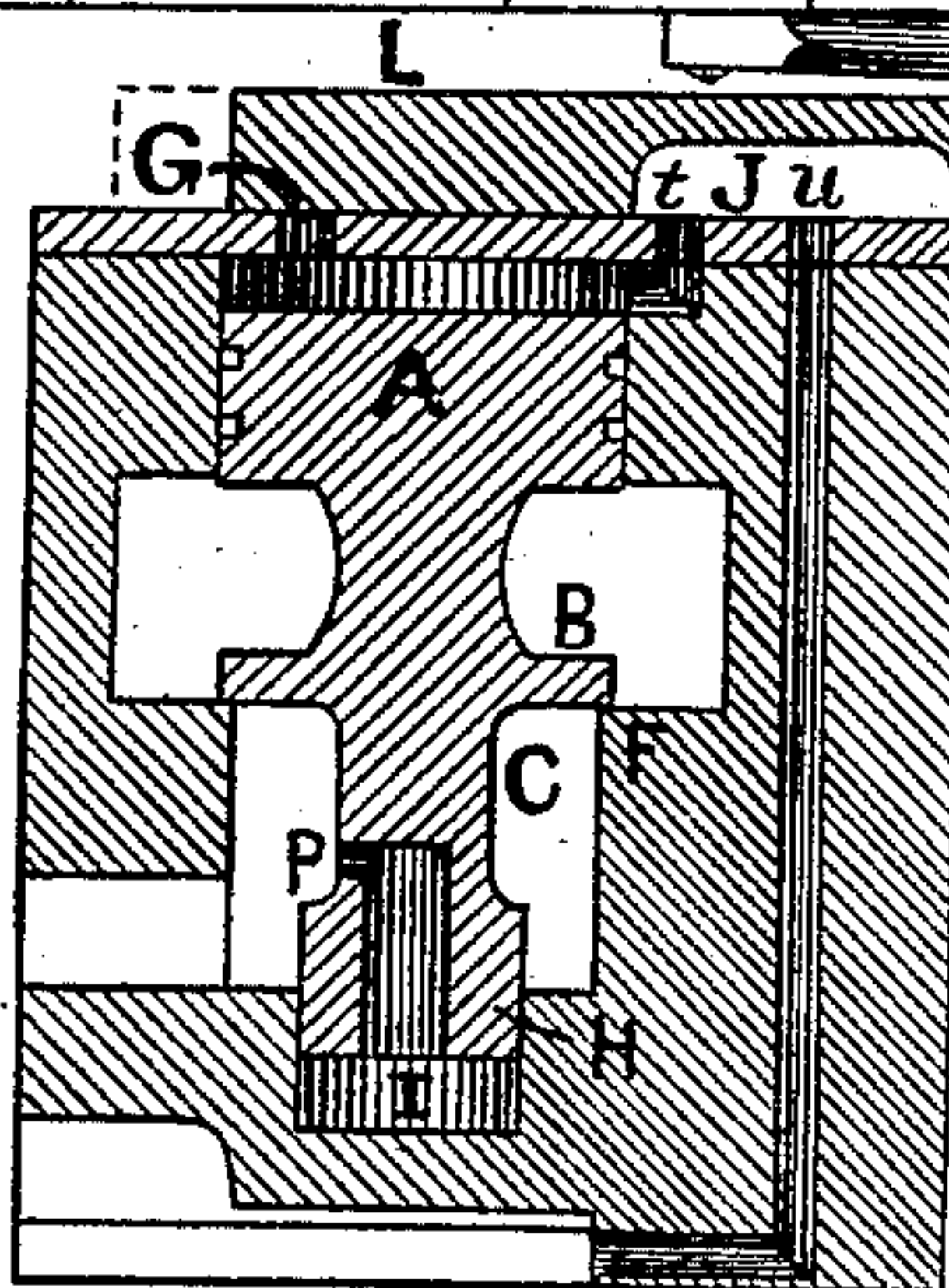


Fig. 6.

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# UNITED STATES PATENT OFFICE.

FRANK CHASE, OF BOSTON, MASSACHUSETTS.

## REVERSING AND CUT-OFF VALVE.

SPECIFICATION forming part of Letters Patent No. 279,912, dated June 26, 1883.

Application filed October 2, 1882 (No model.)

*To all whom it may concern:*

Be it known that I, FRANK CHASE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Reversing and Cut-Off Valves, of which the following is a specification.

The object of my invention is to provide a cheap, simple, and efficient valve-motion, which may be driven by a single eccentric keyed to its driving-shaft, whereby the engine may be reversed in an easy and expeditious manner; and it consists in the construction, combination, and arrangement of a double slide-valve, provided with two steam-passages and two exhaust-passages, which operate in connection with a puppet-valve and cylinder having four steam-ports and an exhaust-port, as hereinafter more fully described, and set forth in the claims.

Figure 1 represents a vertical section of a slide-valve and steam-ports embodying my invention. Fig. 2 represents a similar view of the same with the opposite extreme position of the slide-valve. Fig. 3 represents the first position of the slide-valve with the valve-stem lengthened. Fig. 4 represents the opposite extreme position of the slide-valve with stem lengthened. Fig. 5 represents a top or plan view of valve-stem in its shortened position. Fig. 6 represents a vertical central section of the puppet-valve and governor-valve. Fig. 7 represents a vertical cross-section of the governor-valve.

In order to construct a valve-motion which may be driven by a single eccentric keyed to its driving-shaft, which shaft may be reversed, I construct the cylinder (not shown) with four steam-ports, E, and an exhaust-port, M, which ports are adapted to be opened and closed by a double slide-valve provided with two steam-passages, N N', and two exhaust-passages, P P', and two plates, R R', which valve is also provided with an adjustable stem, S, having a screw-thread, T, connecting with a corresponding threaded nut, U, attached to the end of the eccentric-rod V in any suitable manner, so as to permit the said valve-stem S to be rotated about its own axis, and thereby lengthen or shorten the same when desired to change the relative longitudinal position of the said slide-valve to the actuating-eccentric O and steam-ports E E', thereby causing a direct opposite

communication of steam to the piston, thus producing a reverse motion of the crank-shaft of the engine.

The operation of this valve and connections are as follows: Reference being had, first, to Fig. 1, steam being admitted into the passage N between the outer valve and inner valve enters through port E''' to the main piston and exhausts from the opposite side of the piston through the port E' and passage P to the outlet M, while the plate R' covers the port E'', and thus prevents the escape of steam from the pressure side of the piston. In Fig. 2 is shown the same relative position of the valve admitting steam into the opposite end of the cylinder, in Figs. 1 and 2 the valve being shown at the positions when at the extreme end of the stroke. It will be seen in Fig. 3 the said valve-stem S has been lengthened, so as to cause the steam to enter from the said passage N through the port E to the main piston, and exhaust through the port E'' and passage P' into the outlet M from opposite sides of the piston, as before, the said plate R covering the inner port, E', thereby preventing the steam from escaping from the pressure side of the piston, as above described, referring to Figs. 1 and 2. In Fig. 4 is shown the opposite position of the valve, in which steam enters into the passage N between the outer and inner valves, and is admitted through port E'' to the main piston, and exhausts from opposite sides of the piston through the two ports E and E' and passage P into the outlet M.

It will be observed and understood that in Figs. 1 and 2 are shown the valve in its extreme travel with the valve-stem S in its shortened position; and in Figs. 3 and 4 the valve is shown in the same positions, the valve-stem S being lengthened. In the first positions (shown by Figs. 1 and 2) the steam-ports are opened and closed by the movement of the outer or external portion of the valve at such point in the stroke of the piston as to cause the engine to run in one direction, and in the second positions (shown in Figs. 3 and 4) the steam-ports are opened and closed by the movement of the internal portion of the valve at such point in the stroke of the piston as to cause the engine to reverse, or to run in the opposite direction, thus accomplishing the desired result. The



slide-valve D, being on its center covering all the ports, brings the opening J of the governor-valve L into position, so as to connect the ports *t* and *u*, leading to the main exhaust, and thus relieve the upper end or top of the piston A of the "piston puppet-valve" B from any pressure. Consequently the pressure on the under side of the said piston A will raise the said valve B (on account of the differential area of the said piston and valve) from its seat F. Then the steam enters the steam-port C below the said valve B within the slide-valve D, when the steam is transmitted to the cylinder-ports E by the movement of the said slide-valve D to the end of its stroke, during which movement the small steam-port G is opened to the top of the piston A, admitting steam to the upper end of the same, thereby overcoming the pressure of steam on the under side of the said piston-head A sufficiently to force the said valve B to its seat F, by which means the supply of steam is cut off from the cylinder, and the piston is carried to the end of its stroke by the expansion of steam contained therein. At the same time the lower end, H, of the said valve is forced against the steam contained within the "dash-pot" I, (having a suitable relief or outlet, P,) whereby it is cushioned in its downward movement; and its upward end is similarly cushioned by the piston-head A in its upward movement closing the exhaust-port J just before the piston completes its stroke.

The governor-valve L is formed pointed or V-shaped at its forward end, so as to permit the said port G to open variably through the varying longitudinal movements of the said governor-valve L, which may be operated by

any suitable means, either by hand, or by a common ball-governor, so as to close the said port G variably, whereby a variable degree of expansion of steam in the cylinder is produced.

It will be observed that the governor-valve L is made double, as regards its width, and is provided with an extra opening, J', so as to connect the said ports *t* and *u* when the valve-stem is lengthened, as shown in Figs. 3 and 4.

Having thus described my invention, what I claim is—

1. A double slide-valve having two steam-passages, two exhaust-passages, and two plates adapted to operate with a steam-cylinder having four steam-ports and an exhaust-port, as and for the purposes set forth.

2. The combination, with the double slide-valve having two steam-passages, two exhaust-passages, and two plates adapted to operate with a steam-cylinder having four steam-ports and an exhaust-port, of the adjustable valve-stem, as and for the purposes set forth.

3. The combination, with the double slide-valve having two steam-passages, two exhaust-passages, and two plates, of the adjustable valve-stem S, connected with a single eccentric, and adapted to reverse the engine, substantially as described, as and for the purposes set forth.

4. The combination of the governor-valve, piston puppet-valve, double slide-valve, and adjustable valve-stem, substantially as described, as and for the purposes set forth.

FRANK CHASE.

Witnesses:

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