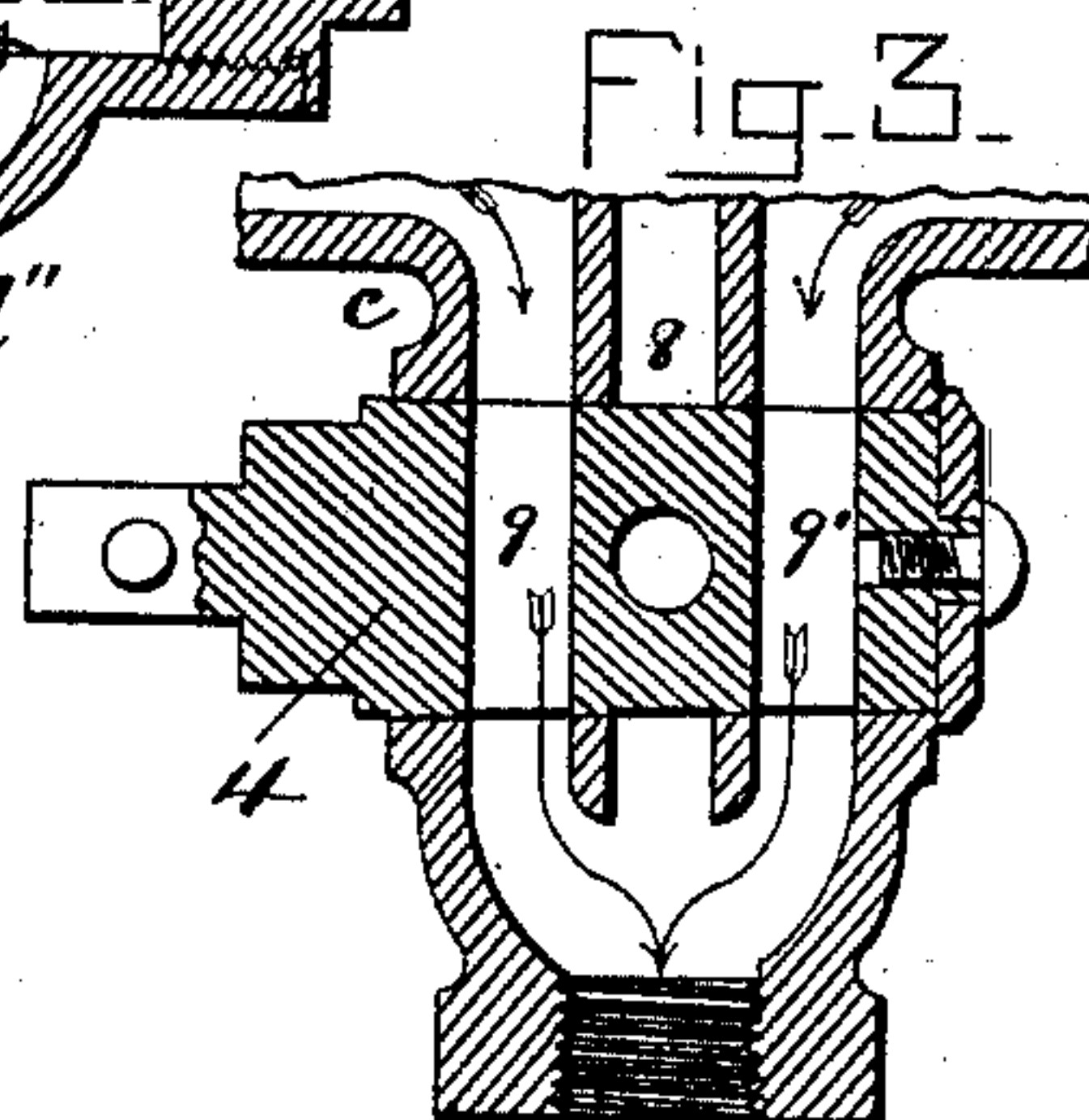
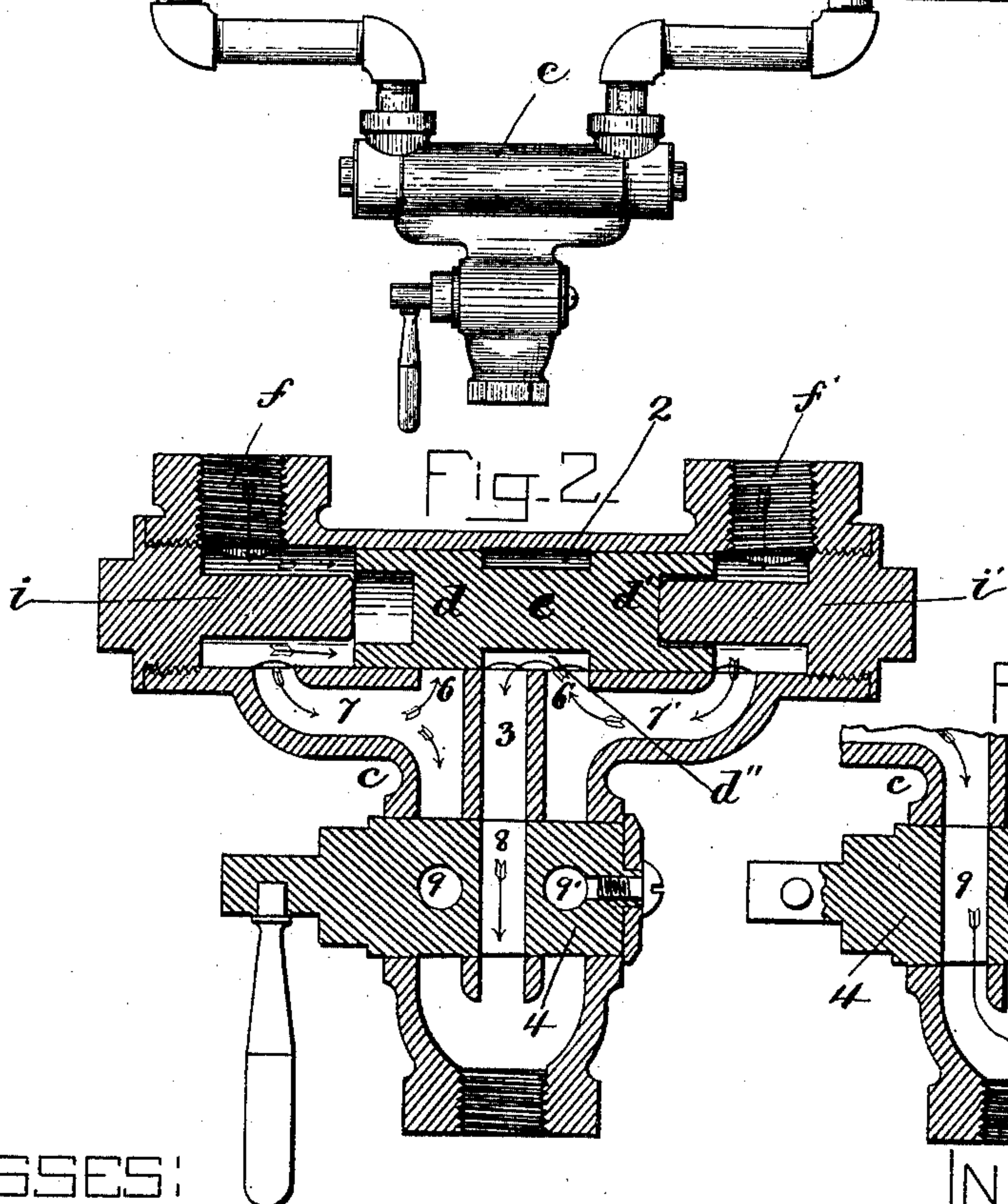
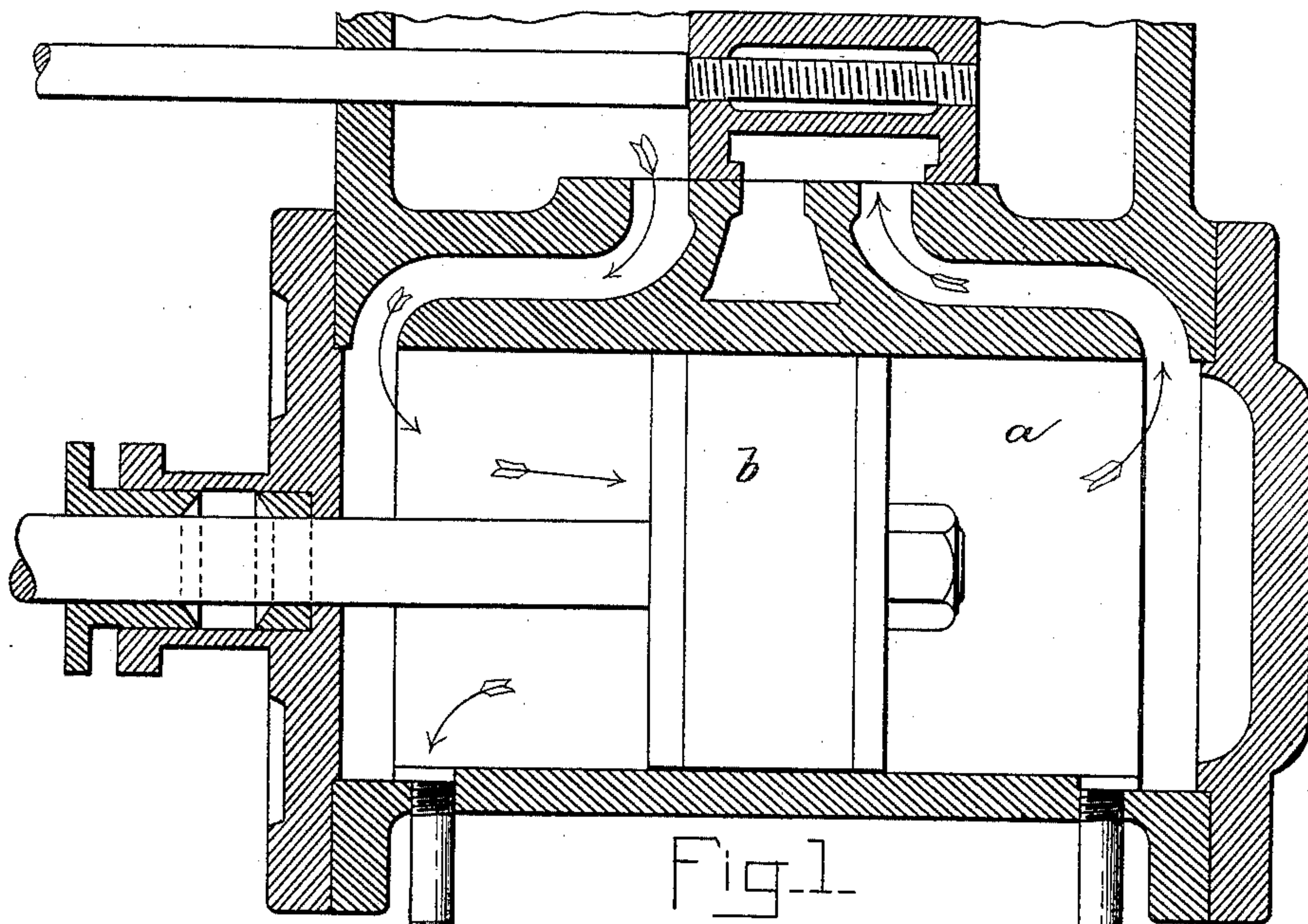


(No Model.)

F. B. HOW.
CYLINDER COCK.

No. 434,870.

Patented Aug. 19, 1890.



WITNESSES:
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UNITED STATES PATENT OFFICE.

FRED B. HOW, OF BOSTON, MASSACHUSETTS.

CYLINDER-COCK.

SPECIFICATION forming part of Letters Patent No. 434,870, dated August 19, 1890.

Application filed January 18, 1890. Serial No. 337,288. (No model.)

To all whom it may concern:

Be it known that I, FRED B. HOW, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Cylinder-Cocks, of which the following is a specification.

This invention relates to cocks to permit the escape of water of condensation from the cylinders of locomotive-engines, and particularly to cocks in which two connected valves in one casing are operated automatically by steam-pressure from the cylinder, so that the water of condensation from one end of the cylinder will be released by the automatic opening of the valve controlling the outlet from that end by the pressure of steam admitted to the other end of the cylinder, the said casing being connected by pipes with the opposite ends of the cylinder.

The invention has for its object to provide an automatic cock of this class of improved construction whereby compactness of form and efficiency of operation are insured, and to provide improved means whereby the outlets from both ends of the cylinder may be left simultaneously open, if desired.

To these ends the invention consists in the improvements which I will now proceed to describe and claim.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal section of a locomotive-engine cylinder provided with my improved cock. Fig. 2 represents an enlarged sectional view of the cock detached from the cylinder and showing its outlet-valve adjusted to permit the escape of water of condensation only through the central channel. Fig. 3 represents a similar section, showing the outlet-valve adjusted to permit the escape of water and steam from both ends of the cylinder simultaneously.

The same letters and numerals of reference indicate the same parts in all the figures.

In the drawings, *a* represents the cylinder of a locomotive, and *b* the piston therein.

c represents the casing of my improved cylinder-cock. Said casing has a longitudinal cylindrical chamber 2, in which are fitted to reciprocate two valves *d d'*, which are connected by a stem *e*.

f f' represent inlet-passages, which are con-

nected by pipes with the opposite ends of the cylinder, said passages communicating with the opposite ends of the chamber 2. From the center of the chamber 2 extends an outlet-passage 3, which connects said chamber with the seat of a rotary valve 4, which is located in an arm or branch of the casing *c*, through which the water of condensation from the cylinders escapes.

6 6' represent ports in the chamber 2 at opposite sides of the central outlet-passage 3. With said ports communicate passages 7 7', which extend from the ends of the chamber 2.

The valves *d d'* are formed so that when at the extreme of their movement (shown in Fig. 2) the valve *d* will close the port 6, and at the same time the opening *d''* between the valves *d d'* will coincide with the outlet-passage 3 and port 6', so that water escaping from the right-hand end of the cylinder through the pipe *f'* will pass through the passage 7', port 6', and outlet-passage 3. The valves are held in the position shown in Fig. 2 by steam-pressure in the left-hand end of the cylinder, said pressure forcing the valve *d'* outwardly toward one end of the chamber 2 and the valve *d* inwardly toward the center of said chamber. When the piston is moving in the opposite direction by the admission of steam to the right-hand end of the cylinder, the valves *d d'* will be reversed, and the valve *d'* will close the port 6' and the opening *d''* will connect the port 6 with the outlet-passage 3, so that water from the left-hand end of the cylinder through the pipe *f* will pass to the outlet-passage 3 through the passage 7, port 6, and opening *d''*.

The movement of the valves *d d'* is limited by stop-studs *i i'* at the ends of the chamber 2, said studs coinciding with cavities or dash-pots *j j'* in the outer ends of the valves. Said studs and dash-pots cushion the valves at the ends of their movements and prevent them from striking violently against their stops.

The outlet-valve 4 is provided with a central port 8, which is arranged to coincide with the outlet-passage 3 when the valve 4 is turned to the position shown in Fig. 2, the water from both ends of the cylinder passing through said port 8.

Extending through the valve 4 at opposite sides of the port 8 and arranged at a suitable

angle therewith, as hereinafter described, are the ports 9 9', which are arranged to coincide with the passages 7 7' when the valve 4 is turned to the position shown in Fig. 3. This adjustment of the valve 4 provides two continuously-open outlets, so that water and steam from both ends of the cylinder may escape without hinderance by the valves $d d'$, or either of them, the water, &c., from one end of the cylinder passing through the pipe f around the stop-stud i , and through the passage 7 and port 9, while the water from the other end of the cylinder passes through the pipe f' around the stud i' and through the passage 7' and port 9'. When the valve 4 is in the position shown in Fig. 2, the passages 7 7' are closed, so that the water from the cylinder is obliged to pass through the central passage 3 by the described operation of the valves $d d'$. The valve 4 may be moved by devices connecting it with the cab of the engine, and said devices may be similar to those now in use for operating ordinary cylinder-cocks, the engine-man being enabled to give a continuous outlet to each end of the cylinder by turning the valve to the position shown in Fig. 3, and an alternating outlet by turning the valve to the position shown in Fig. 2.

It will be seen that the arrangement of passages and ports and the construction of the valve 4, whereby the valves $d d'$ are made inoperative when the valve 4 is one position and operative when the valve 4 is in another position, enables the device to be converted readily from a cock which automatically affords an outlet from each end of the cylinder alternately to one which affords an outlet from each end at the same time, and vice versa. If it is not desired to provide two simultaneously-open outlets, the passages 7 7' may be extended only to the ports 6 6', so that there will be no escape for water from the cylinder excepting through the central outlet 3. The ports 9 9' are arranged at such an angle relatively to the port 8 that the valve 4 may be adjusted so that it will simultaneously close the ports 8 and 9 9', thus preventing any escape through the cylinder-cock. The valve 4 is adjusted as last described after the engine has been running so long that the condensation in the cylinders is reduced to the minimum, so that the wa-

ter will be carried off by the exhaust-steam. The cock is adjusted to operate, as shown in Fig. 2, when the engine is first started, and is adjusted, as shown in Fig. 3, when the engine is to stand idle without steam for a considerable period.

I claim—

1. The improved cylinder-cock having the inlet-passages $f f'$, the cylindrical chamber 2, communicating with said passages and extending continuously between them, the outlet-passage 3, extending from the center of said chamber, the ports 6 6' in the chamber at opposite sides of the outlet-passage, the rigidly-connected cylindrical valves $d d'$, closely fitting and movable in the chamber 2 and having an opening between them adapted to connect either of said ports with the outlet-passage, the other valve at the same time closing the other port, and the passages 7 7', formed in the casing outside of the chamber 2 and communicating with the inlet-passages $f f'$ and with the ports 6 6', as set forth.

2. The improved cylinder-cock having the chamber 2, the inlet-passages f and f' at the ends of said chamber, the outlet-passage 3, extending from the center of said chamber, the ports 6 6' in the chamber at opposite sides of the outlet-passage, the rigidly-connected valves $d d'$, movable in the chamber 2 and having an opening between them adapted to connect either of said ports with the outlet-passage, the other valve at the same time closing the other port, and the passages 7 7', communicating with the inlet-passages $f f'$ and with the ports 6 6', said passages 7 7' being extended into the outlet branch of the casing of the cock, and the rotary valve 4 in said branch having a transverse port 8, adapted to coincide with the outlet-passage 3 when the valve is in one position and with the ports 9 9', adapted to coincide with the passages 7 7' when the valve is in another position, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of January, A. D. 1890.

FRED B. HOW.

Witnesses:

C. F. BROWN,
W. C. RAMSAY.