No. 778,664. PATENTED DEC. 27, 1904.

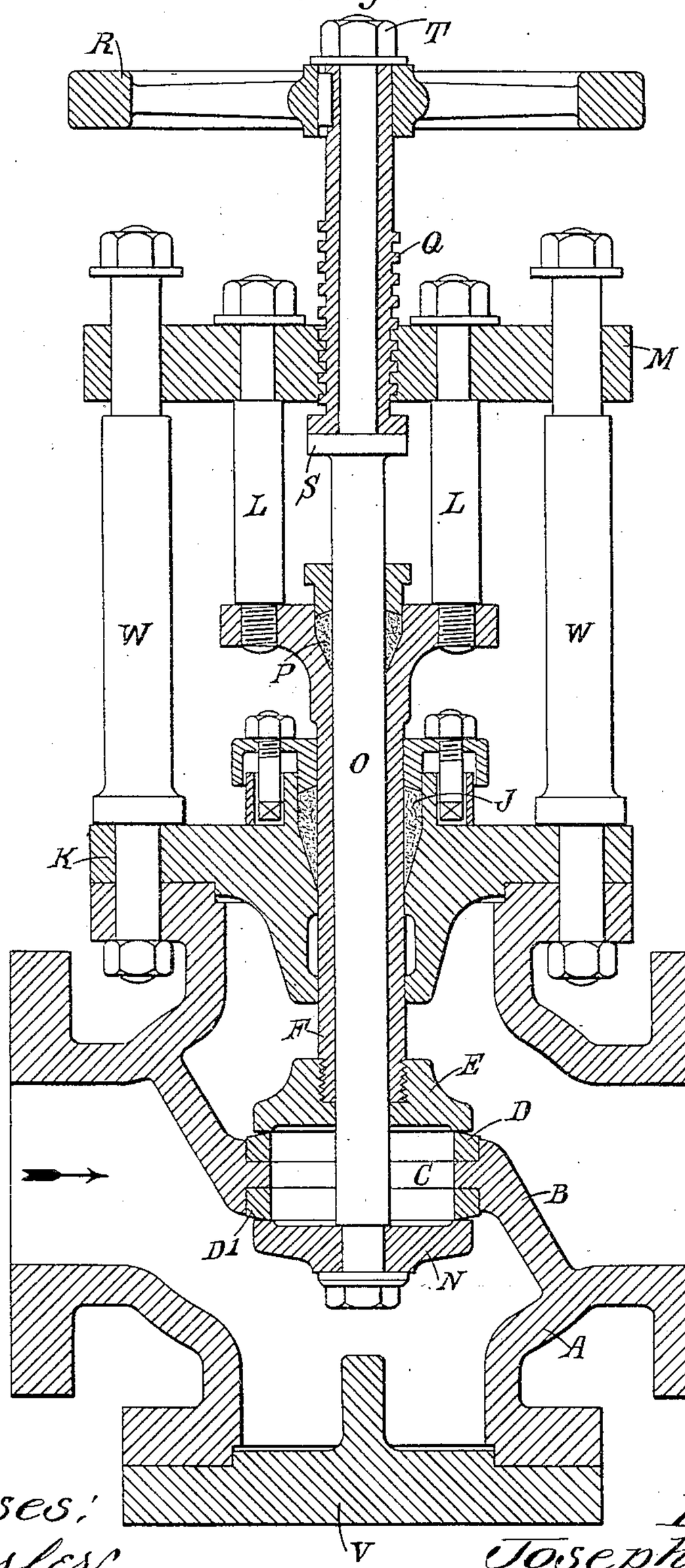
J. HOPKINSON & R. KILBURN.

STOP VALVE.

APPLICATION FILED JULY 25, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



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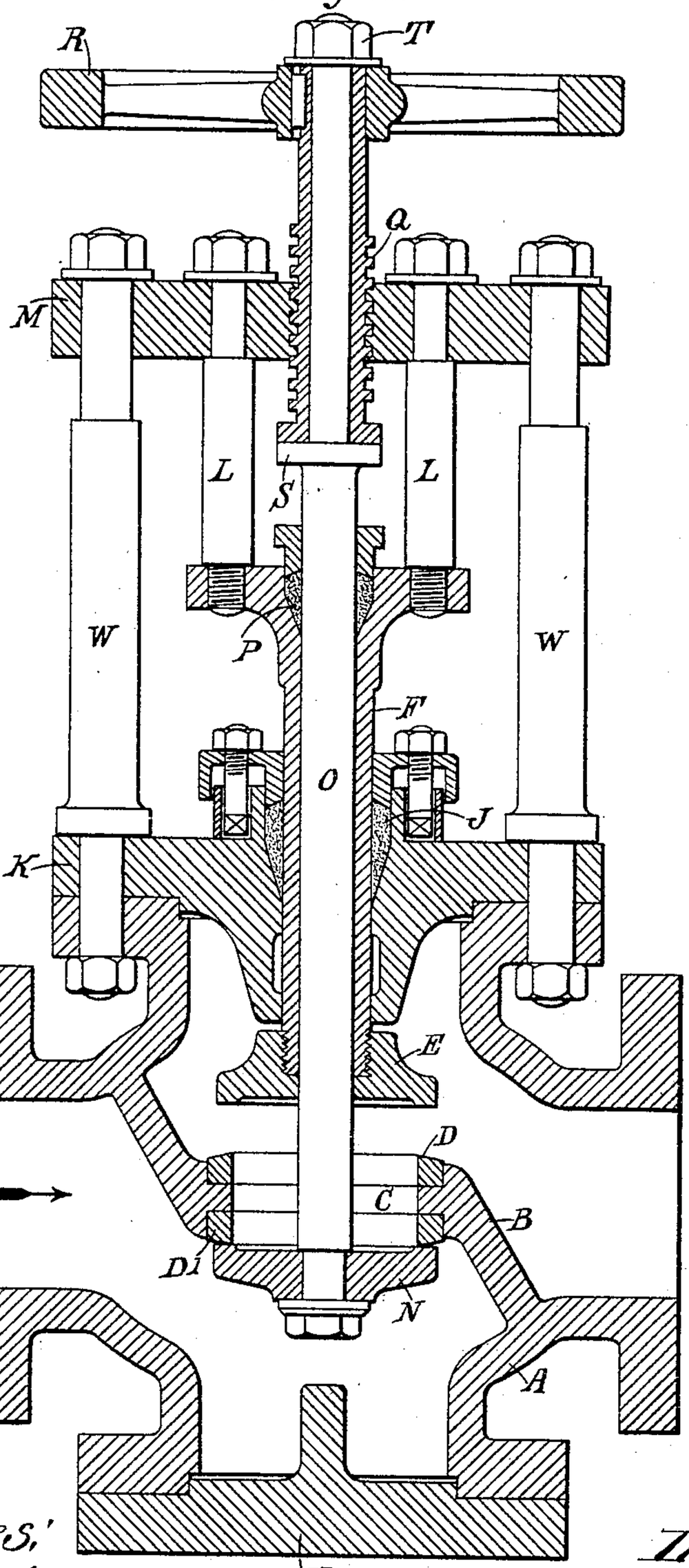
4 SHEETS—SHEET 2.

Fig. 2.



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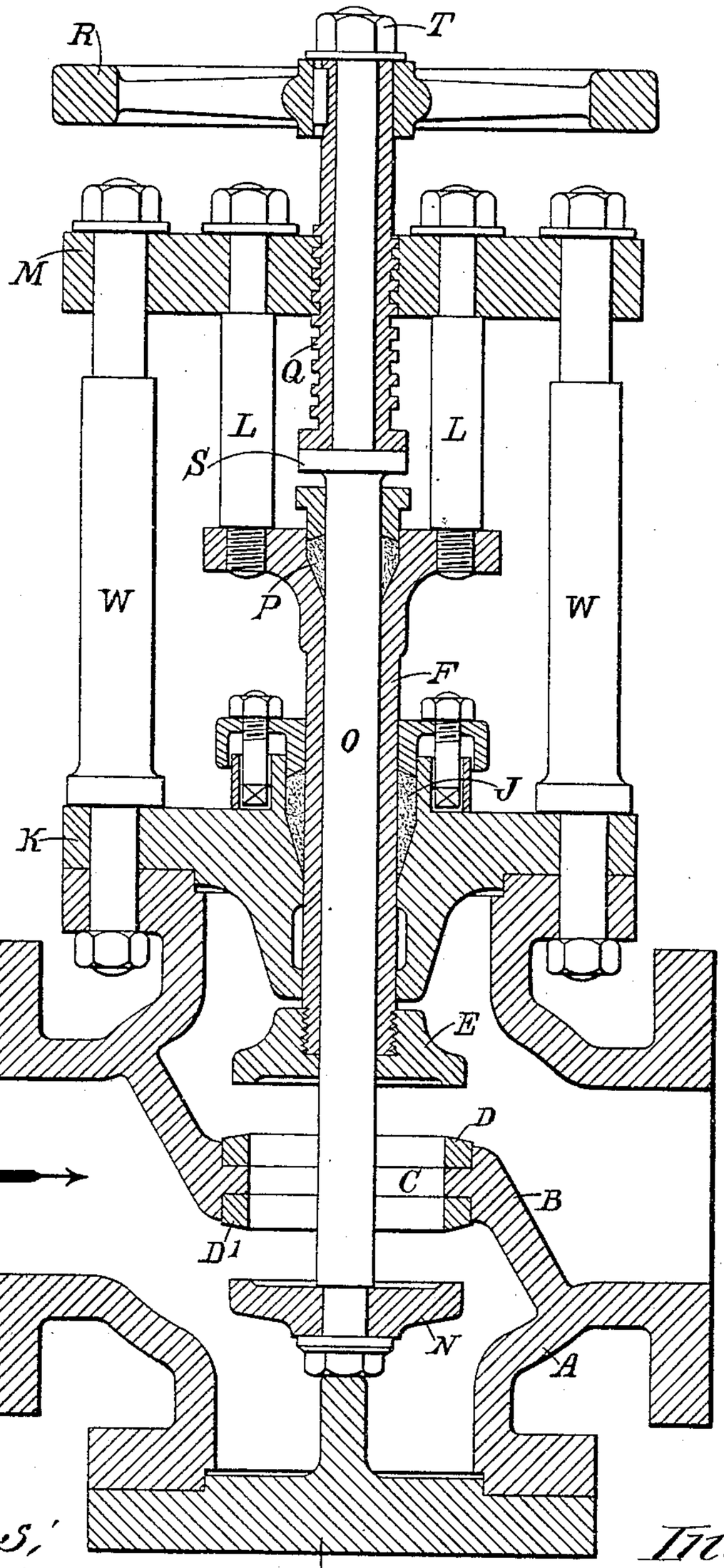
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

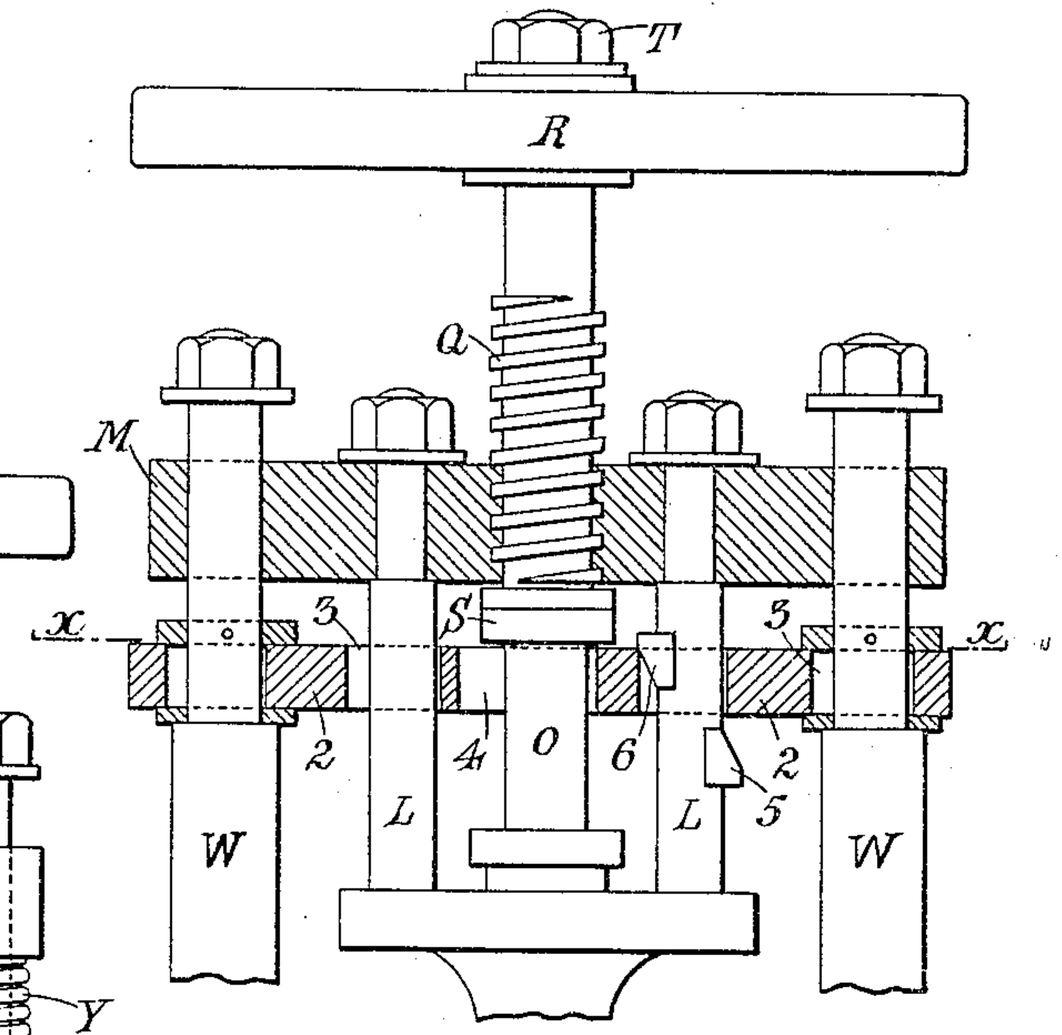


Fig. 4.

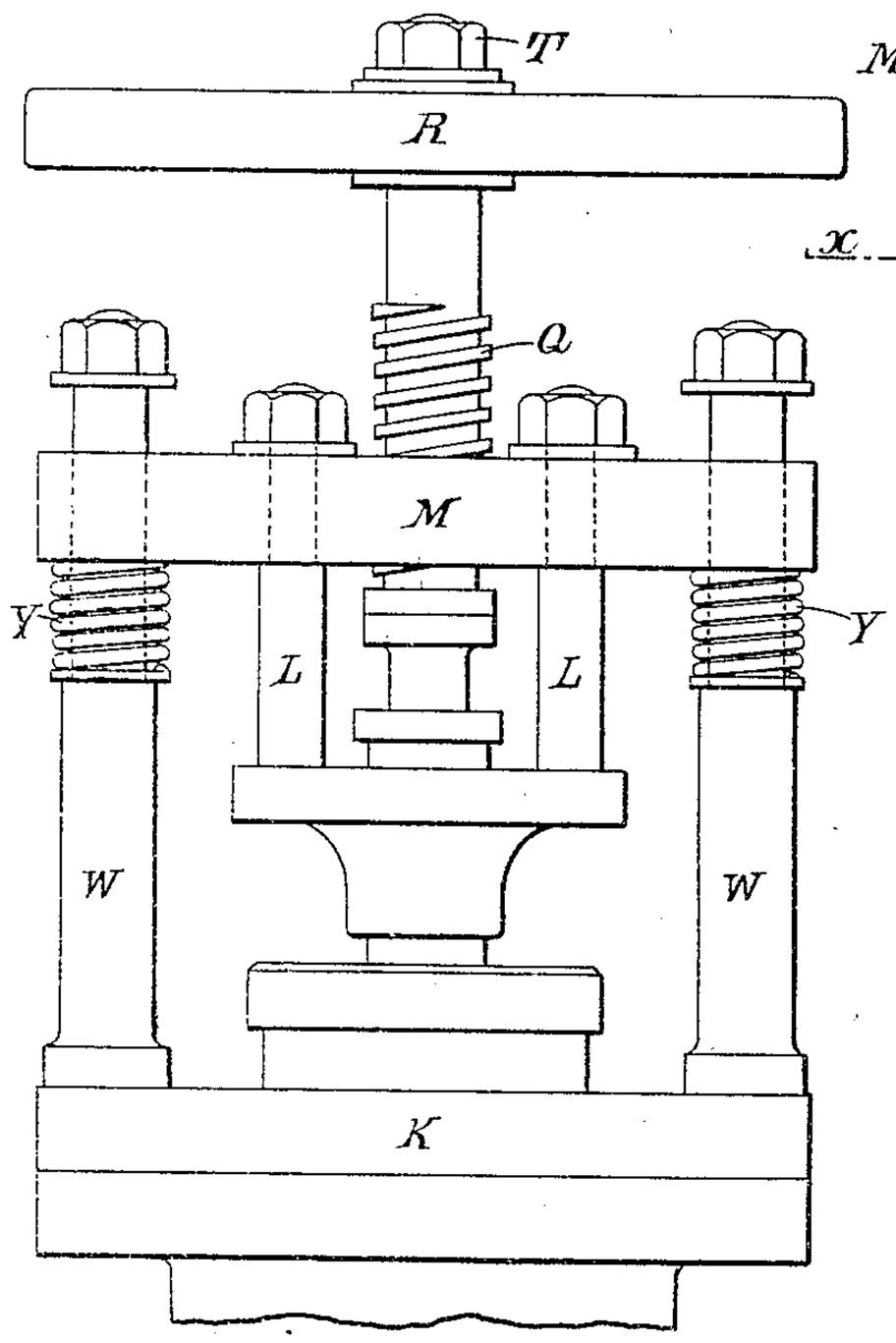
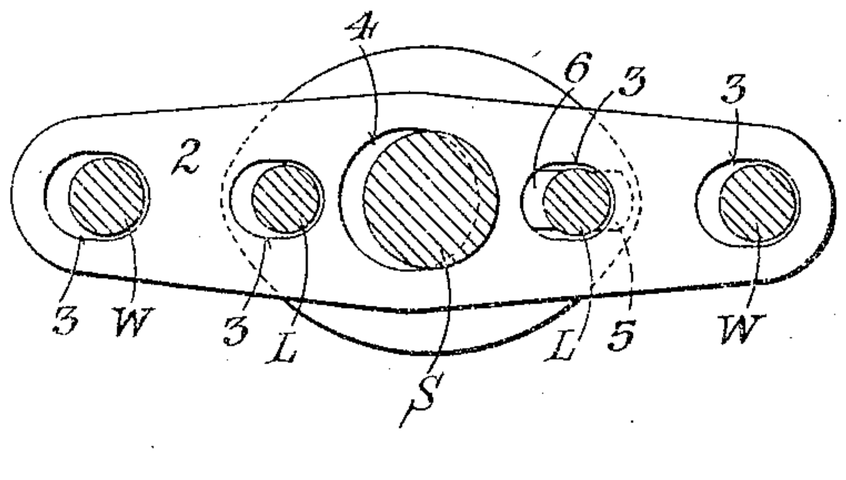


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH HOPKINSON AND RICHARD KILBURN, OF HUDDERSFIELD, ENGLAND, ASSIGNORS TO J. HOPKINSON AND COMPANY, LIMITED, OF HUDDERSFIELD, ENGLAND, A CORPORATION OF GREAT BRITAIN.

STOP-VALVE.

SPECIFICATION forming part of Letters Patent No. 778,664, dated December 27, 1904.

Application filed July 25, 1904. Serial No. 218,141.

To all whom it may concern:

Be it known that we, JOSEPH HOPKINSON and RICHARD KILBURN, both subjects of the King of Great Britain, residing at Huddersfield, England, have invented certain new and useful Improvements in Stop-Valves, of which the following is a specification.

This invention relates to screw-down stop-valves of the mushroom type for steam and other fluids, and has for its object to insure continued fluid tightness of such valves, while avoiding excessive strain on the working parts and on the valve-body and seating floor or partition, such as commonly occurs in valves constructed as heretofore. At the same time scoring action on the face and seat of the main valve is avoided when opening and closing the same. Moreover, the construction of the valve-body is simplified as compared with other stop-valves with double valves and the path of the steam is less circuitous.

The chief feature of our invention is the provision of two valves working in opposite directions and connected by their external actuating mechanism, said valves closing on oppositely-arranged seats in a single floor or partition and nipping said floor or partition between them when closed. In this construction the seating-floor is not subjected to stress in one direction only, due to the action of the closing means, as is the case in other forms of stop-valves. There is only one thoroughfare through the seating-floor, this thoroughfare being controlled by both of the aforesaid valves, one of which serves to prevent the flow of steam when the other or main valve is being opened and closed.

In carrying our invention into practice we employ a bridge capable of a limited movement on its guides, which are attached to the valve-body or to the lid. The main valve is connected, by means of a tubular spindle, to this bridge, and the other valve is furnished with a spindle passing through the tubular spindle aforesaid and through a stuffing-box therein and then through a screw-threaded sleeve, which can turn, but cannot slide longitudinally on the said spindle. The said screw-threaded sleeve engages with corresponding screw-threads in the bridge and serves to open and close the valves when it is rotated.

Referring to the accompanying drawings, Figure 1 is a longitudinal central section of a stop-valve constructed according to our invention and showing both valves closed on their seats. Fig. 2 is a similar view, but showing the main valve raised from its seat while the other valve is still closed; and Fig. 3 is another similar view, but showing both valves open. Fig. 4 is a side view of a portion of a stop-valve, showing springs under the bridge for assisting to lift the latter. Fig. 5 is a view illustrating a modification in which a locking-bar is used for locking the inner spindle; and Fig. 6 is a section on the line $x\,x$, Fig. 5.

Like letters of reference denote corresponding parts in the several figures.

A is the valve body or casing; B, the seating-floor or partition; C, the thoroughfare through said floor; D D′, valve-seats arranged in opposite sides of said floor, and E the main valve. Said valve E is connected to a tubular spindle F, which passes through a stuffing-box J in the lid K and is connected by rods or pillars L L to a bridge M. N is the second or controlling valve, connected to a spindle O, which passes through a stuffing-box P, arranged at the upper end of the tubular spindle F, and through a screw-threaded sleeve Q, which is screwed through the bridge M.

R is a hand-wheel keyed upon the end of the screw-threaded sleeve Q for rotating said sleeve. Endwise movement of the sleeve Q upon the spindle O is prevented by a collar S at one end and a nut T at the other end.

V is a removable lid closing a branch through which the valve N is inserted. The valve E is inserted through the opposite branch, which is closed by the lid K.

W W are pillars attached to the valve-body or lid to form guides for the bridge M, said bridge being capable of a limited movement on said guides, as indicated by the drawings. In Fig. 1 the bridge is shown in its lowermost position and in Figs. 2 and 3 in its raised po-

sition. By turning the hand-wheel R, and thus rotating the screw-threaded sleeve Q when the valves are closed, the bridge M is lifted, as indicated in Fig. 2, until the valve E is raised the full distance from its seat and the bridge comes against the nuts or other stops at the ends of the guides. Further rotation of the hand-wheel R in the same direction then causes the spindle O to descend and move the valve N from its seat, as indicated in Fig. 3, and the thoroughfare through the floor or partition is thus opened. It will be seen that the valve E is raised the full distance from its seat before the valve N begins to open, whereby scoring of the valve E and of the corresponding seat D is prevented. When closing, the valve N first approaches its seat and closes the thoroughfare, and then afterward the valve E closes. By reason of the protection thus afforded to the faces of the valve E and its seating D these parts are maintained in good condition, and leakage is effectually prevented. It will be observed that when the valves are closed on their seats they grip the seating-floor B tightly from opposite sides, and no one-sided stress, due to the action of the closing means, is brought to bear on this floor, such as would tend to distort the floor or cause destructive strains therein or in the valve-casing. It is thus possible to close the valve effectually and to maintain a tight closure without straining the casing or the working parts and without tending to separate the lid from the casing. Moreover, although both valves are rigidly held to their seats by mechanical pressure the valve-spindles are not restrained from endwise movement, even when the valves are closed, but are free to expand and contract without straining the valve-casing or working parts or tending to disturb the lid-joint.

In some cases we provide the outer end of the valve-spindle O with a handle, by which the valve N may be rotated while against its seat, if required.

In the arrangement shown in Fig. 4 springs Y Y are provided on the pillars W W to press against the bridge and assist the lifting of the latter.

In the modification shown in Figs. 5 and 6 we provide a positively-acting locking-bar 2, resting on the pillars W and so constructed with slots 3 that it can be moved to and fro through a limited distance for the purpose of locking and unlocking the central spindle O. When the bar is moved to the right, the screw-threaded sleeve Q can pass through the central opening 4 in the locking-bar; but when the bar occupies the position (shown in Fig. 5) underneath the lower end of the screw-threaded sleeve the latter is prevented from moving downward. The locking-bar can be moved by hand, or it can be operated mechanically by cam-pieces or taper projections 5 6 on the rods L or on one of said rods, and so arranged that when the rods L move up the cam-piece or taper projection 5 pushes the locking-bar to the right, and so unlocks the central spindle, and when the rods L move downward the cam-piece or taper projection 6 pushes the locking-bar to the left, and so relocks the central spindle.

In our improved construction the valves when closed are rigidly held against their seats by mechanical pressure converging to the center, and the stresses to which the body is subjected are those due to the fluid-pressure. In other constructions the forces acting on the valve-body, due to the action of the closing means, tend to distort the said body and produce an unsatisfactory valve. Moreover, in our construction the main valve opens before the controlling-valve, which latter moves in the opposite direction to the main valve, and both valves must be opened by mechanical means before steam can pass through the thoroughfare.

We are aware that valves have been made with a by-pass or supplemental valve in combination with a larger or main valve and operated by one wheel or screw to put the main valve into equilibrium of pressure before it is opened, so that it can be opened easily. In such cases the valves work in the same direction, and if either of them leaks steam can pass to the egress side of the valve. We are also aware that double or superposed valves have been used working in the same direction on independent seats, but not both held closed by mechanical means or arranged to nip the seats between them or in such a way as to leave the spindles freedom to expand and contract.

What we claim is—

1. In a stop-valve, the combination, with a valve-casing, of a partition having a thoroughfare therethrough, a seat-face on each side of said partition, a pair of non-rotatable valves for engaging with the said seat-faces, and means external to said valve-casing for moving said valves toward and away from each other.

2. In a stop-valve, the combination, with a valve-casing, of a partition having a thoroughfare therethrough, a seat-face on each side of said partition, a valve for engaging with each of said seat-faces, concentric spindles to said valves, a screw rotatably mounted on one of said spindles externally to said valve-casing, means for preventing axial movement of said screw relatively to said spindle, means for rotating said screw, a bridge secured to the other spindle externally to said valve-casing, and guides on which said bridge slides.

3. In a stop-valve, the combination, with a valve-casing, of a partition having a thoroughfare therethrough, a seat-face on each side of said partition, a valve for engaging with each of said seat-faces, concentric spindles to said valves, a screw rotatably mounted on one of

said spindles externally to said valve-casing, means for preventing axial movement of said screw relatively to said spindle, means for rotating said screw, a bridge secured to the other spindle externally to said valve-casing, guides on which the said bridge slides and stops on the guides for limiting the travel of the bridge.

4. In a stop-valve, the combination, with a valve-casing, of a partition having a thoroughfare therethrough, a seat-face on each side of said partition, a valve for engaging with each of said seat-faces, concentric spindles to said valves, a screw rotatably mounted on one of said spindles externally to said valve-casing, means for preventing axial movement of said screw relatively to said spindle, means for rotating said screw, a bridge secured to the other spindle externally to said valve-casing, guides on which said bridge slides, and springs pressing said bridge in one direction.

5. In a stop-valve, the combination, with a valve-casing, of a partition having a thoroughfare therethrough, a seat-face on each side of said partition, a valve for engaging with each of said seat-faces, concentric spindles to said valves, a screw rotatably mounted on one of said spindles externally to said valve-casing, means for preventing axial movement of said screw relatively to said spindle, means for rotating said screw, a bridge secured to the other spindle externally to said valve-casing, guides on which said bridge slides, a locking-bar for coacting with one of said spindles, guides for said locking-bar, and cams fixed to one of said spindles for moving said locking-bar.

6. In a stop-valve, the combination, with a valve-casing, of a partition having a thoroughfare therethrough, a seat-face on each side of said partition, a valve for engaging with each of said seat-faces, concentric spindles to said valves, a screw rotatably mounted on one of said spindles externally to said valve-casing, means for preventing axial movement of said screw relatively to said spindle, means for rotating said screw, a bridge secured to the other spindle externally to said valve-casing, guides on which said bridge slides, springs pressing said nut in one direction, a locking-bar for coacting with one of said spindles, guides for said locking-bar, and cams fixed to one of said spindles for moving said locking-bar.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOSEPH HOPKINSON.
RICHARD KILBURN.

In presence of—
THOMAS H. HIRST,
JOHN R. SNALAM.