

C. J. McCALLUM.
Rotary-Valve for Steam-Engines.

No. 219,750.

Patented Sept. 16, 1879.

Fig. 1.

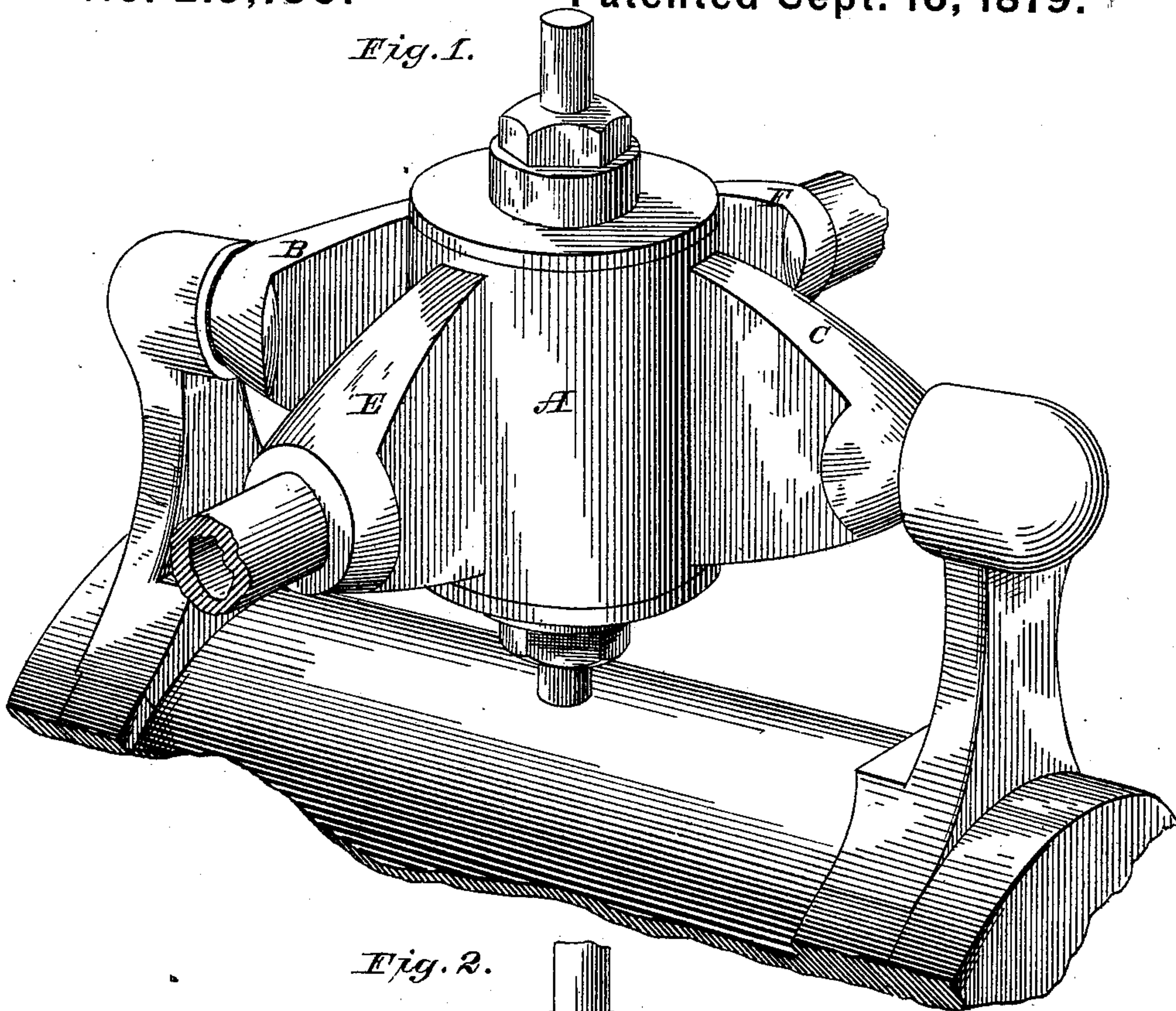
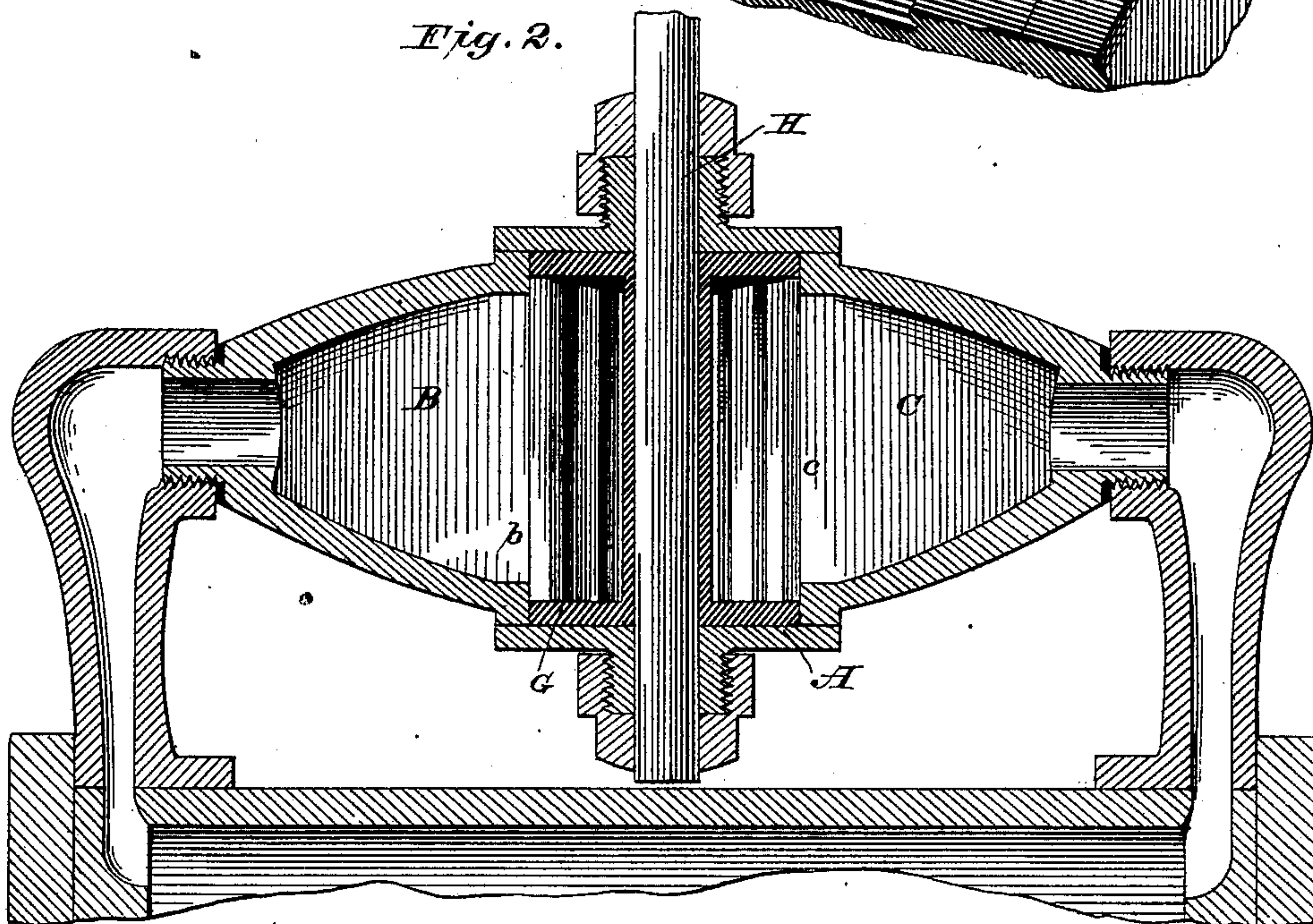


Fig. 2.



Attest:
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UNITED STATES PATENT OFFICE.

CHARLES J. McCALLUM, OF WARREN, MAINE.

IMPROVEMENT IN ROTARY VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **219,750**, dated September 16, 1879; application filed August 15, 1879.

To all whom it may concern:

Be it known that I, CHARLES J. McCALLUM, of Warren, county of Knox, State of Maine, have invented an Improvement in Rotary Valves for Steam-Engines, of which the following is a specification.

My invention relates to rotary valves for steam-engines of that class in which the valves are made hollow, with slots or openings in the shell of the valves to form ports for the ingress and egress of the steam.

The object of the invention is to gain simplicity in construction with capability of working the steam expansively, and especially to provide such a construction that the steam may be admitted in successive instalments during the stroke.

The details of my invention are herein fully explained, and the extent of said invention indicated in the claims.

In the drawings hereunto attached and forming part of this specification, Figure 1 is a perspective view of my improvement with the valves in position; Fig. 2, a transverse vertical section centrally through the valve-seat and valve, and through the connections with the cylinder. Fig. 3 is a central transverse section across the axis of the valve, showing the cylinder-connections in part and the supply and exhaust pipes, also in part. Fig. 4 is a perspective view of the valve removed from its seat.

In Figs. 1, 2, and 3, A represents the valve-seat, and B C the connections with the cylinder, said connections opening into the valve-seat through slots *b c*. Also connected to the valve-seat at right angles to the pipes B C are the supply and exhaust pipes, marked E and F, respectively, the pipes E and F having openings into the valve-seat, marked respectively, *e* and *f*.

The interior surface of the valve-seat A is turned smooth and true, and preferably slightly conical to obtain a close fit and compensate for wear, and the valve is fitted accurately thereto. The valve is represented in Fig. 4, and is marked G in this and the other figures. It is in form frusto-conical, (slightly tapering,) is made hollow, and closed at the ends. A central partition, *g*, extending axially from side to side throughout the entire length of the valve, divides it into two equal chambers.

These chambers are provided with openings or ports *m m' m'' o o' o'' p p' p'' q q' q''*, all in length and width corresponding exactly to the ports *b c* and *e f*.

The axis of the valve is shown at H. It extends through the heads of the valve and through stuffing-boxes in the heads of the valve seat or chest, and is connected to suitable gearing in order to impart proper rotary motion to the valve. This motion is so regulated that the valve shall make one-quarter revolution during one stroke of the piston, and there being three slots in one-quarter of the circumference of the valve, as *m m' m''*, there will be three successive instalments or impulses of the steam during each stroke of the piston. The arrangement of the parts and their operation may be understood by reference to Fig. 3.

The valve being in the position there shown in full lines, the piston will be understood as at the beginning of its stroke, and, moving to the left, steam is admitted through the supply-pipe E and through the port *q''*, and passes to the cylinder through the port *p''* or pipe *c*. The supply of steam is, however, cut off for an instant, in the forward movement of the valve, by the bar or cut-off 11. This, like all the others, is made a little wider than the opening, in order to give full opportunity to allow the steam to work expansively. While the port *q''* is open, however, the other end of the cylinder is exhausting through the pipe B, openings in port *m''*, and by port *o''*, through exhaust-pipe F. At the next step the live steam is admitted at *q'* and the exhaust escapes at *o'*, and at the third and last in this stroke the steam is admitted through *q* and exhausted through *o*. At this instant the edge 12 of the partition *g* will be passing the steam-port *e*, when live steam will be cut off, the other end 6 of partition *g* will pass the exhaust-port *f*, and allow that end of the cylinder to which the pipe *c* is attached to exhaust through the proper openings. The partition *g* all the while separates the live steam from the dead, the edges 6 and 12 acting in their turn to cut off the steam from either end of the cylinder in the same manner as the bars 1 and 2, &c., all being of the same width.

It will be observed that this construction of

the valve supplies the steam to the cylinder in quick instalments or impulses and then allows it to work expansively.

In the arrangement shown, the steam is admitted at the beginning of the stroke, again at half-stroke, when it has the greatest leverage, and again a little before the piston reaches the center, which carries it past the center.

It is obvious that the number of ports may be increased and the steam admitted in smaller and more frequent instalments, but obviously a less number than that shown cannot be used, when the steam is to be admitted by instalments. I contemplate also connecting the valve to the driving-shaft by means of a star-wheel, interposed in suitable position, in order to give an intermittent or step-by-step movement to the valve, such movement being so regulated as to admit the steam successively through the ports and, by means of the bars 1, 2, 3, &c., to cut off the steam and allow it to work expansively, as heretofore explained.

The shell of the valve-chest may be inclosed in another casing, the supply-pipe terminating in the said outer shell and supplying said intervening space with steam.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

In a rotary valve constructed to make one-fourth revolution to each stroke, the combination of the shell, slotted with ports and interposed bars, to give successive instalments of steam during each stroke, and of the transverse partition *g*, with the valve-seat and ports therein, as and for the purposes shown.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES J. McCALLUM.

Witnesses:

F. L. MIDDLETON,
W. C. MARTIN.