S. B. McCray,

Governor Valve.

No. 21,433. Patented Sep. 7, 1858.

Fig 3.

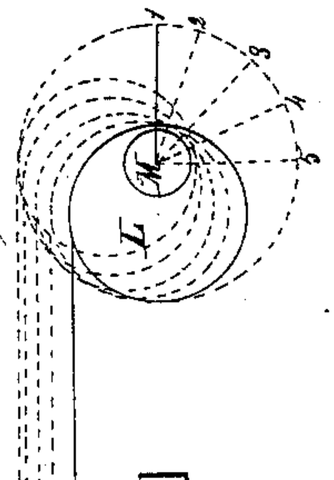


Fig 2.

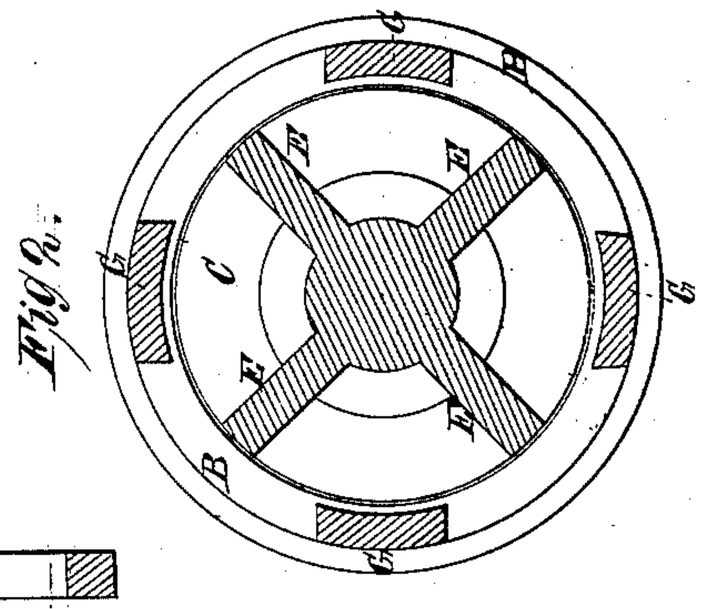
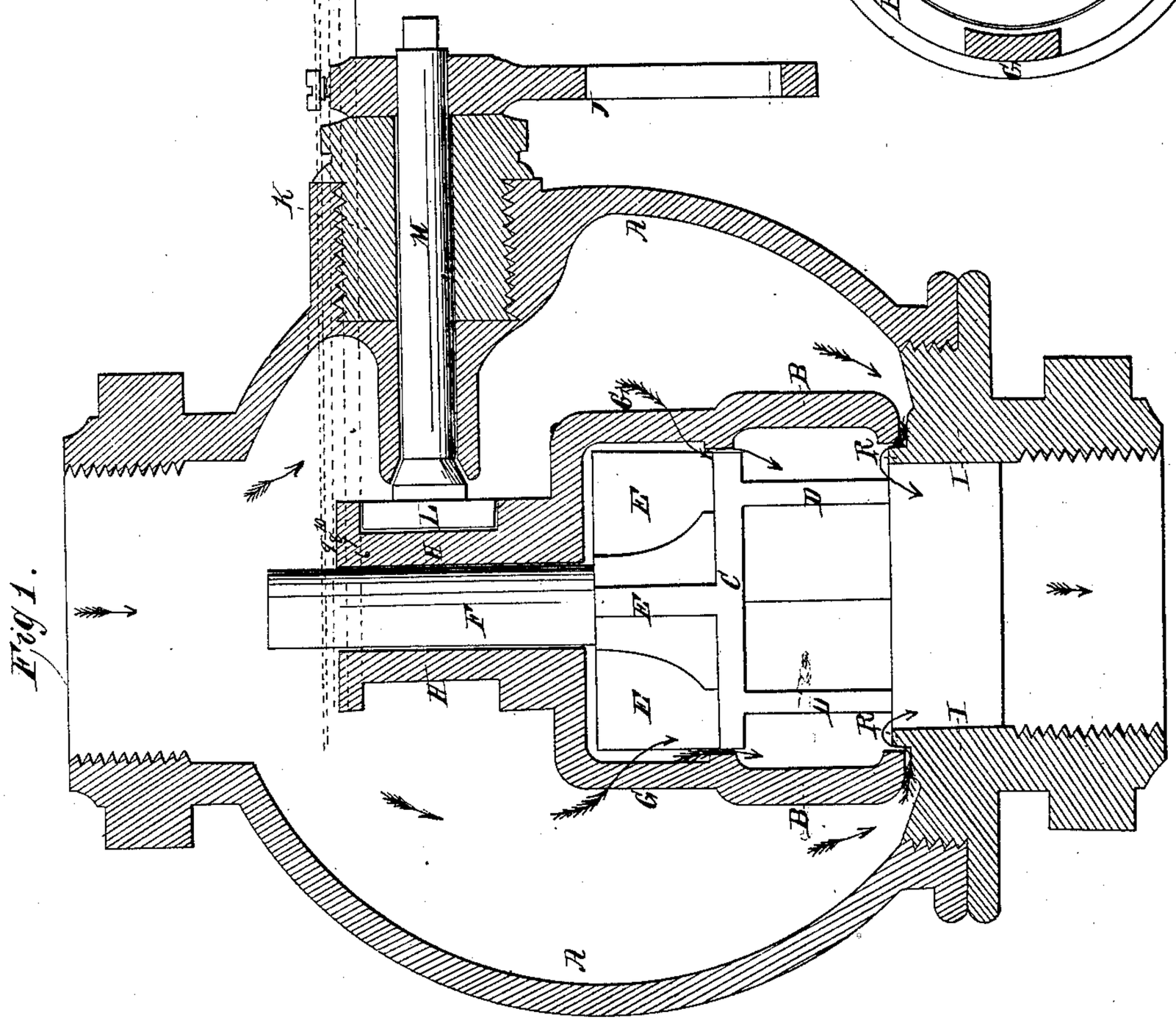


Fig 1.



UNITED STATES PATENT OFFICE.

STUART B. McCRAY, OF GRAND RAPIDS, MICHIGAN.

IMPROVED GOVERNOR-VALVE FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **21,433,** dated September 7, 1858.

To all whom it may concern:

Be it known that I, STUART B. McCRAY, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and useful Improvement in Governor-Valves; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical central section of a governor-valve constructed with my improvements. Fig. 2 is a horizontal section of the same. Fig. 3 is a diagram illustrating the principle of operation of my improvement.

Similar letters of reference in each of the several figures indicate corresponding parts.

In the combination of a piston-valve with a common ball-governor, my invention consists, first, in having a hollow cylindrical valve constructed and arranged to work in suspension over a vertical horizontally-partitioned winged piston in such a manner that it does not come in contact with any horizontal surface nor has any point of binding contact against said vertical piston, this arrangement avoiding the loss of power experienced in working the governor, or what is termed "equilibrium," valve, which has two horizontal seats of different areas additional to the vertical cylindrical piston which I use, said loss of power resulting from the valve not being balanced when resting upon its seats and shut, the perfect balancing with ordinary valves being impracticable from the fact of its being necessary to have the upper seat of greater area than the lower seat, this difference in the areas of the seats being resorted to on account of its being beneficial, and, in fact, necessary, to employ the steam for keeping the valve to its seat.

My invention consists, secondly, in the suspending and working of the hollow cylindrical valve by means of an eccentric or other analogous device when said eccentric is so arranged on the shaft of the slotted rocking link of the governor that its longest radius is at right angles, or nearly so, with the valve-stem when the valve is closed and its shortest radius parallel with the slotted rocking link of the governor. Thus suspending the valve enables me to operate it, although the governor-balls descend with a regular and uniform motion, with a quick speed when the governor-balls first begin to drop, and with a gradually-decreasing speed as the balls continue their descent. I am also enabled to operate the valve with a gradually-increasing speed as the governor-balls rise. Thus having the valve open to a greater extent with the same length of movement of the eccentric at the commencement of the falling of the balls than it does in a like length of movement of the eccentric in the continued descent of the balls, is essential, in order to meet with nearly a full head of steam the check given to the engine by the application of weight or labor thereto.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I construct the exterior parts of my governor of cast-iron or any other suitable material in two parts, as shown at A A and I I in the accompanying drawings, by screwing the two parts together or by fastening with bolts and flanges. The steam-pipe connecting the engine with the boiler is to screw into the top and bottom of the governor, as represented in Fig. 1, or attached by flanges and bolts. The interior of I I is bored out to receive the lower ends of the wings D D D, which are fitted tight into I I and the shoulders on D D D, resting on a ring or projection R R upon the upper side of I I, supporting the winged disk C. (Shown in Fig. 2.) The ring R R and the wings D D D and E E E and disk C are all turned the same diameter.

B B is the winged hollow cylindrical valve, and H H a hollow spool-shaped stem connected to the same by arms G G. The cylinder B is fitted to move loosely up and down over the periphery of the wings D E, disk C, and ring R R, it being suspended by the arms G G and spool H on an eccentric L, the spool being arranged to move up and down over the stem F when operated upon by the eccentric L of the rocking shaft M, which carries the slotted link J. By depressing the links J the eccentric will raise the cylinder B B and cause two steam-openings to be made at the same time, one above the ring R R and one above the disk C. The eccentric L and stem M, I form of one piece of metal. The stem M is made to turn freely within the stuffing-box K, the stem M forming a conical joint at the in-

ner end of the stuffing-box K, the two being ground together, forming a steam-joint, thereby requiring no packing.

From the foregoing description it will be evident that the valve B never rests down upon part I and that it has no seat at top, it being held in suspension by the eccentric L, which is controlled by the governor, whose combination by the eccentric with the valve is such that it never causes the valve to descend lower than is represented in the drawings, Fig. 1. Thus suspending the valve avoids loss of power, as set forth in the statement of the nature of the invention, and also insures an insinuation of sufficient steam into the valve to keep up a perfect lubrication of the same, and thus avoid friction in case of expansion of the metals of the piston and valve. It will also be seen by referring to diagram Fig. 3 that when the eccentric performs its first movement from 1 to 2 by reason of the falling of the governor-balls the valve will be raised a distance corresponding to the distance between 6 and 7, and that when the eccentric has continued its movement a like distance from 2 to 3 by reason of a continued falling of the balls the valve will be raised only just about half the distance it moved at the start, as indicated by the blue line 8. Thus the speed of the valve in opening gradually decreases, as indicated by the red and yellow lines 9 and 10 until it has completed the extent of its movement. The operating of the valve in closing is just the reverse of that in opening, it having a slow speed at the first rising of the balls and a gradually-increasing speed until it is completely shut. It should be noticed that no evil consequences can result from a quick closing of the valve, as it has no seats to slam against.

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

1. Having a hollow cylindrical valve B constructed and arranged to work in suspension over a vertical piston D D, so that it does not come in contact with any horizontal surface, nor has any point of binding contact against said vertical piston D, substantially as and for the purposes set forth.

2. The suspending and working of a hollow cylindrical valve B by means of an eccentric or other analogous device L when said eccentric is so arranged on the shaft of the slotted rocking link that its longest radius is at right angles, or nearly so, with the valve-stem H when the valve is closed, and its shortest radius parallel, or nearly so, with the link J of the governor, substantially as and for the purposes set forth.

STUART B. McCRAY.

Witnesses:
G. YORKE ATLEE,
EDM. F. BROWN.