W. H. DOWNING.

VALVE-GEAR FOR REVERSING.

No. 181,153. Patented Aug. 15, 1876.

Fig. 1

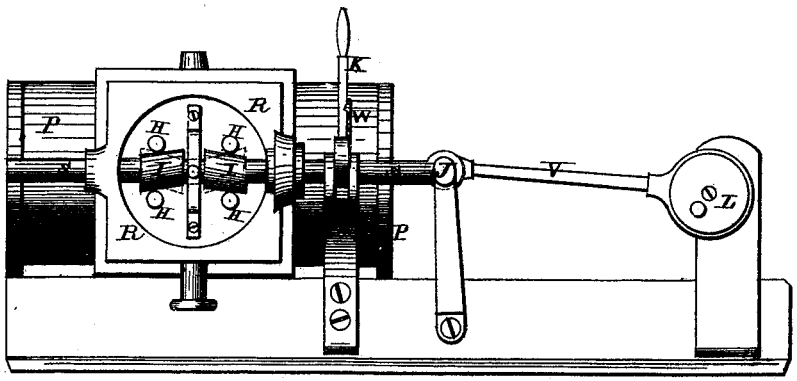


Fig. 3.

Fig. 4.

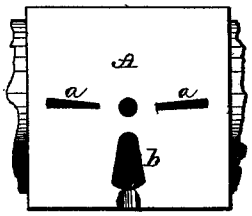
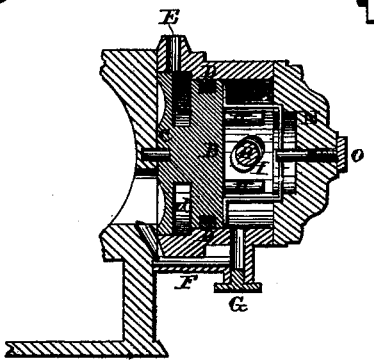


Fig. 2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM H. DOWNING, OF BARNHART'S MILLS, PENNSYLVANIA.

IMPROVEMENT IN VALVE-GEAR FOR REVERSING.

Specification forming part of Letters Patent No. **181,153**, dated August 15, 1876; application filed June 20, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. DOWNING, of Barnhart's Mills, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

The nature of my invention consists in the construction and arrangement of a balanced valve and reverse-gear for steam-engines, as will be hereinafter more fully set forth.

In the annexed drawings, which fully illustrate my invention, P represents the steam-cylinder and R the steam-chest. A is the valve-seat, provided with the steam-inlet ports *a a* and exhaust-port *b*, as shown. The valve consists of two disks, B and C, of unequal diameter, connected in the center so as to form a steam space or chamber, *d*, between them; or the valve may be made in one solid piece, constructed to form the two disks and steam-space. The disk C is the larger one, resting on the seat A, and has steam-ports *e e* through it, and exhaust-passages *f f* on its face side. The smaller disk B has a circumferential groove turned in it to receive metal packing-rings D. When the valve is in its place in the steam-chest R, which is turned of different diameter, to correspond with the size of the two disks, steam enters through the inlet E into the chamber or space *d* between the two disks. If the disks were of the same size, and no steam allowed to pass by either disk, the valve would not be forced either way. But as the disk C has the steam-ports *e e*, this end of the valve would have to be made as much larger as the area of said openings, and the valve would then balance, as there would be no more pressure one way than the other; but when the engine makes a revolution, the exhaust steam passes by the face of the valve at *f*, and out of the exhaust-port *b*. In passing the face of the valve, the exhaust steam will press the valve from its seat, and, hence, the disk C must be made large enough to counteract this pressure by the steam-pressure in the space *d*.

In large engines, or in small engines also, if necessary, the exhaust steam is passed through a passage, F, to the back of the disk B, to counterbalance the exhaust-pressure on the face of the valve; and in that case a valve, G, is used to regulate the pressure on the back of the disk B. From the back of the valve project four pins, H H, as shown, which pins, in a full-sized valve, will be provided with friction-rollers. S is the valve-rod, provided with two eccentric or cam projections, I I, which are formed substantially as shown, and placed between the pins H. The valve-rod S is, by a swivel-joint, J, connected to the eccentric-rod V, operated in the usual manner by the eccentric L. On the valve-rod S is feathered a lever, K, held in a suitable arm or standard, through which the valve-rod passes, and said lever is to be held in a notched or ratchet bar, W. When the lever is set in the center notch, the valve will not move, the cams I I passing freely between the pins H H; but when moved either way from that point, the cams I will operate on the pins H, and rotate the valve sufficiently to uncover the steam-ports *a a*, and thus start the engine either backward or forward, as the cam L may be set.

N is the cap of the steam-chest, in the center of which is a set-screw, O, to keep the valve down on its seat.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination of the valve B C, having pins and rollers H, the cam or eccentric projections I I on the valve-rod S, and the operating-lever K, attached to said rod, all substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of June, 1876.

WILLIAM H. DOWNING.

Witnesses:
O. C. CRANE,
ALEXANDER PETERS.