

O. H. GRONBERG.
Balanced Slide-Valves.

No. 144,090.

Patented Oct. 28, 1873.

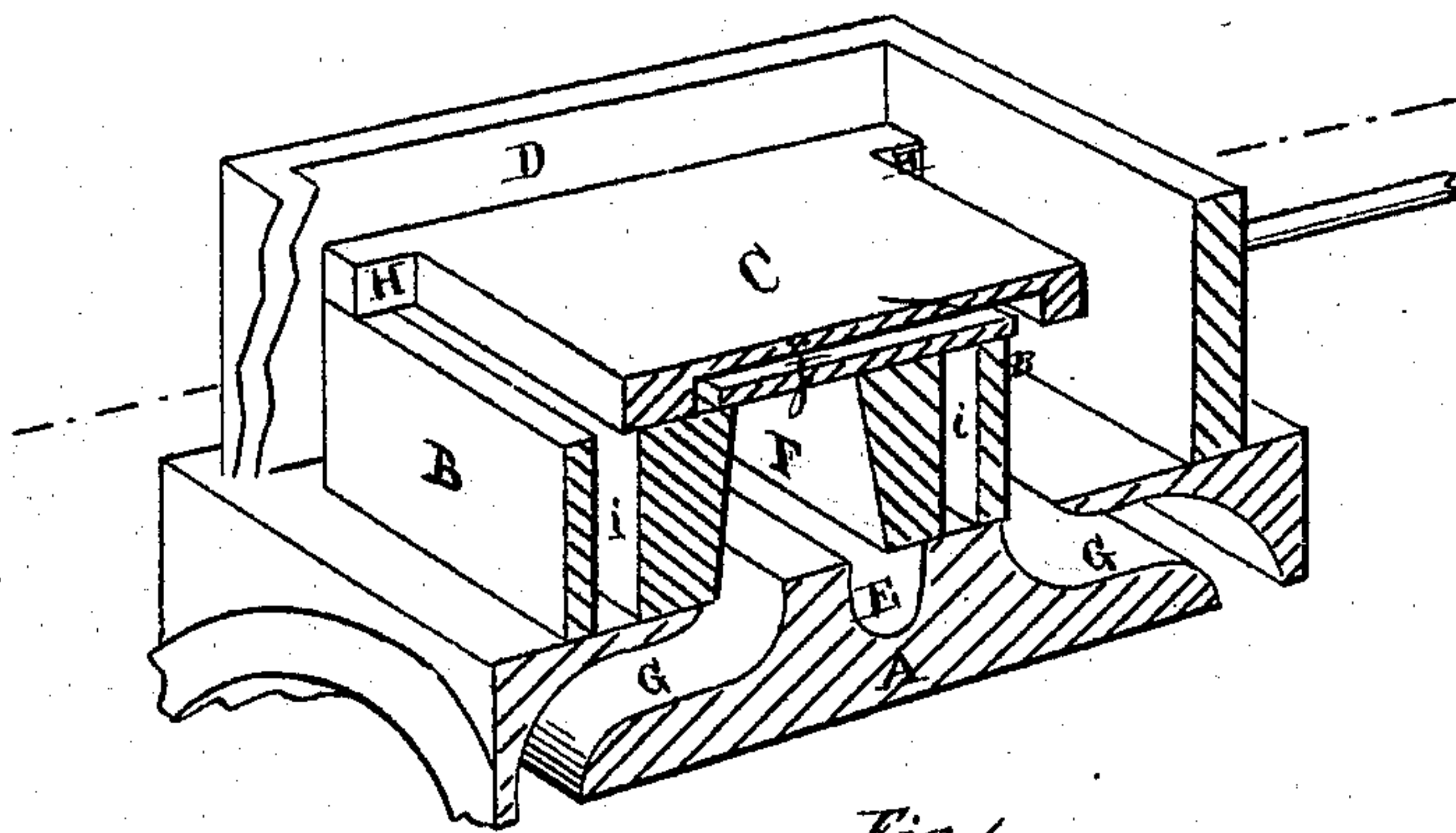


Fig. 1.

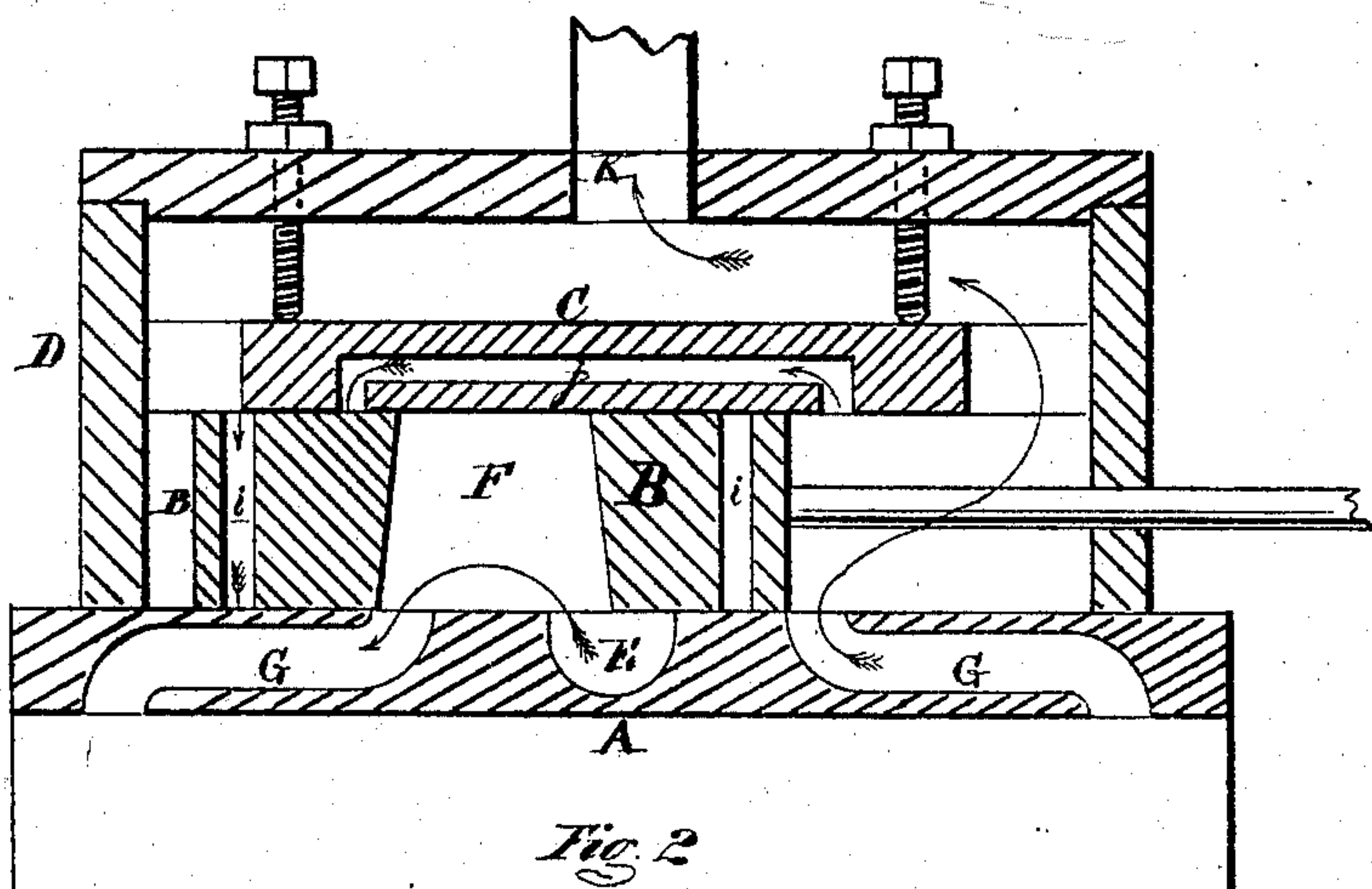


Fig. 2.

ATTEST:

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OTTO H. GRONBERG, OF FERRYSBURG, MICHIGAN.

IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. **144,090**, dated October 28, 1873; application filed July 15, 1873.

To all whom it may concern:

Be it known that I, OTTO H. GRONBERG, of Ferrysburg, in the county of Ottawa and State of Michigan, have invented certain Improvements in Balanced Slide-Valves, of which the following is a specification:

The nature of my invention relates to an improvement in steam-engines, whereby the slide-valve is balanced in its reciprocation between two seats, and the piston is cushioned by steam from the opposite end of the cylinder, thereby saving the volume of steam required to fill the side pipes and clearance at each stroke of the piston; and to this end it consists in the peculiar construction of the valve, and an upper seat, in the form of an adjustable plate, in the steam-chest. The plate is channeled, and the valve slides between it and the seat proper. Steam is admitted to the valve through what has been heretofore used as the exhaust-port, and is exhausted through the steam-chest, the valve traveling in the same direction as the piston.

Figure 1 is a sectional perspective view of a steam-chest fitted with my improved balance-valve. Fig. 2 is a longitudinal vertical section of the same, including portions of the side pipes.

Like letters refer to like parts in the several figures.

In the drawing, A represents a portion of a cylinder, in which are molded the side pipes G G and an intermediate port, E, the surfaces about the ports forming a seat for the slide-valve B, in the center of which is a transverse opening, F, extending nearly from side to side, and at each end is a narrow port, *i*. The valve is a rectangular flat block of metal, faced true on the upper and lower surfaces, and is moved by a stem and eccentric rod, whose eccentric is set to throw the valve in the same direction as the piston is moving. C is a plate resting upon the back of the valve, against which it is kept steam-tight by set-screws tapped through the cover of the steam-chest D. The plate has a longitudinal channel, *j*, opening from the lower face, and extending longitudinally, as seen in Fig. 2. At each end of the plate is an exhaust-opening, H, into the upper part of the steam-chest, into which is tapped the eduction-pipe K.

The valve-block being moved to the extreme right of the chest, steam entering at the port E passes through the chamber F of

the valve into the right-hand side pipe G, and thence into the cylinder, propelling the piston to the left, the valve moving in the same direction until the right passage G is closed, when the stroke of the piston is completed by the expansion of the steam contained in the cylinder. Traveling farther, the valve brings its small ports *i i* over the ports G G, when a small portion of the steam contained in the right end of the cylinder passes through the channel *i j i* into the left-hand end in time to fill the left side pipe and cushion the advancing piston just before it completes its stroke. Moving a little farther, the valve discloses the right port G, to exhaust the steam from the right end of the cylinder through the passage H into the eduction-pipe K, immediately after which the valve-chamber F includes the left side pipe G with the port E, thus reversing the motion of the piston; the operation of the valve during the return stroke being the reverse of that just described, saving at each stroke the volume of live steam heretofore required to fill the side pipes and clearance.

By means of the set-screws the plate can be adjusted to the back of the valve so that no leakage of steam can occur between them; and as there is no steam-pressure upon the back of the valve, the latter is practically balanced.

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

1. The valve B provided with the openings F *i i*, and the plate C provided with the channel *j* and ports H H, constructed and arranged in the steam-chest D with relation to the induction E, side pipes G G, and eduction K, substantially as and for the purpose set forth.

2. The valve B, working under the plate C, and provided with the cavity or opening F, for conveying steam from the induction E to the ports G G alternately, substantially in the manner described.

3. The arrangement of the openings *i i* in the valve B, with relation to the channel *j* in the plate C, for cushioning the exhaust side of the piston with steam from the other side thereof as it approaches the end of each stroke, substantially as described.

OTTO H. GRONBERG.

Witnesses:

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H. P. HUNTER.