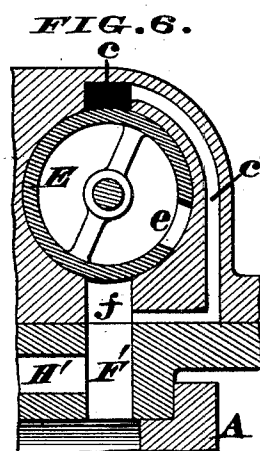
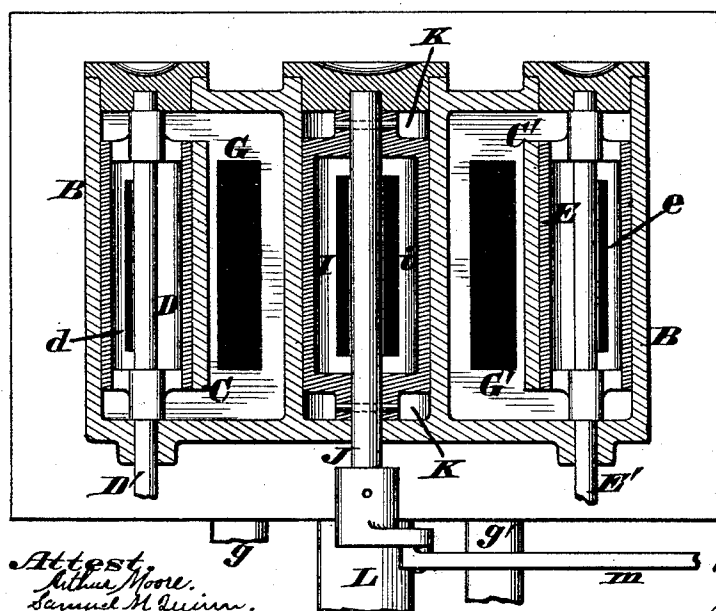
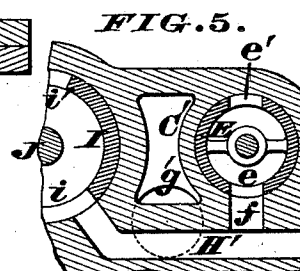
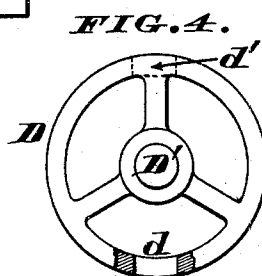
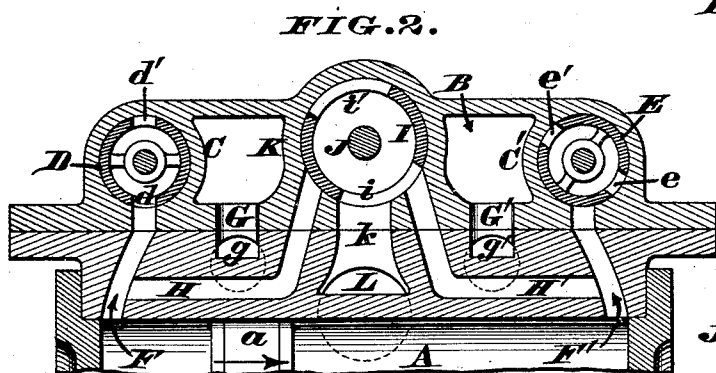
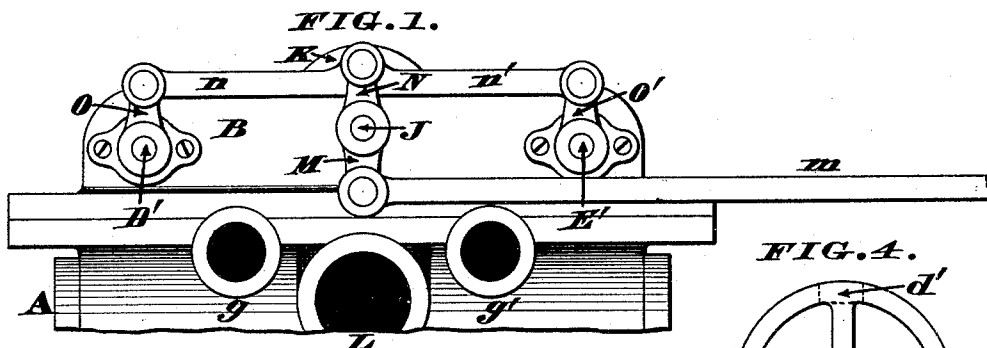


(No Model.)

A. F. DEVEREUX.
VALVE FOR STEAM ENGINES.

No. 460,200.

Patented Sept. 29, 1891.



Attest. 9
Arthur Moore.
Samuel M. Quinn.

Inventor.
Arthur F. Devrient.
By James H. Layman.
Atty.

UNITED STATES PATENT OFFICE.

ARTHUR F. DEVEREUX, OF CINCINNATI, OHIO.

VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 460,200, dated September 29, 1891.

Application filed January 27, 1891. Serial No. 379,260. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR F. DEVEREUX, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Valves for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the annexed drawings, which form part of this specification.

My invention comprises a novel construction and arrangement of counterbalanced valves for locomotives and steam-engines generally, the details of said valves and their mode of operation being hereinafter more fully described.

In the annexed drawings, Figure 1 is a side elevation of the upper part of a steam-cylinder provided with my improved valve mechanism. Fig. 2 is a vertical section of said cylinder. Fig. 3 is a horizontal section of the steam-chest, taken in the plane of the valve-spindles. Fig. 4 is an enlarged end elevation, partly in section, of one of the inlet-valves. Figs. 5 and 6 are sections of two modifications of my invention.

A represents the upper part of a steam-cylinder; *a*, a portion of the piston of the same; and B is the steam-chest, having a pair of cylindrical casings or shells C C', within which are fitted reciprocating rotary inlet-valves D E, that consist of hollow open-ended cylinders mounted, respectively, upon shafts or spindles D' E' and provided with ports *d e*, arranged to control the inlet-ports F F' of the aforesaid steam-cylinder A. These ports take the shape of longitudinal slots, as more clearly seen in Fig. 3, and are supplemented by other slots *d' e'* on the opposite sides of the valves. Furthermore, these slots *d' e'* are practically of the same length and width as the ports *d e*, thereby removing sufficient area from said valves to counterbalance them and enable them to be operated with the least exertion of power.

G G' are passages in the bottom of the steam-chest to allow steam to enter from branch pipes *g g'* and then flow into the open-ended inlet-valves, the branches *g g'* being connected to a main pipe having a suitable throttle-valve or governor.

H H' are exhaust-passages communicating with the inlet-ports F F', the inner ends of said passages being controlled by the exhaust-valve I. This valve consists of a hollow cylinder, closed at each end and mounted upon an axial shaft or spindle J, journaled within a special chamber K of the steam-chest, the valve being provided with a port *i* on one side and a counterbalancing-slot *i'* on the opposite side. Chamber K has no communication whatever with the steam-chest B, but has a passage *k*, leading to the escape-pipe L. Spindle J of the exhaust-valve has a pendent lever M, whose free end is jointed to a rod *m*, the latter being connected, either directly or indirectly, with the engine-eccentric, or with a "link-motion," or with independent cut-off mechanism, so as to allow a greater or less throw of the various valves. Furthermore, said spindle has an upwardly-projecting lever N, from which a pair of connecting-rods *n n'* lead to levers O O' of the spindles D' E'. From the above description it is apparent that the motion imparted by the eccentric-rod *m* to the lever M causes a simultaneous rocking of the three spindles D' E' J and a corresponding oscillation of the valves D E I within their respective casings and chambers. When these valves are in the position seen in Fig. 2, steam first enters through the branch pipe *g*, ascends the passage G, fills the left end of chest B, and thus has free access to the open-ended casing C and to the hollow valve D, fitted therein. Steam enters freely at the ends of this valve, escapes through its ports *d* into the inlet-passage F of the cylinder, and drives the piston *a* in the direction of the arrow, the waste steam contained in said cylinder being now expelled through the channels F' H', communicating ports *i k*, and pipe L; but when the piston completes its stroke this position of the valve is exactly reversed, the waste steam being then discharged through the other channels F H and ports *i k*. As steam is freely admitted to the slots *d', e'*, and *i*, and as the areas of the latter are about equal to the areas of the ports *d, e*, and *i*, it is evident that the valves are relieved from all back-pressure, and on this account they can be operated without diminishing the power of the engine.

In the modification of my invention seen

in Fig. 5 the inlet-valve E is placed comparatively near the exhaust-valve I, and the port *e* of the former communicates with a short channel *f*, leading into the discharge-passage H'; but in another modification (represented in Fig. 6) the inlet-valve E is counterbalanced by a steam-cavity *c* in the casing C', which cavity is of the same length and width as the valve-port *e*, and is supplied with steam by a passage *c'*, leading into the channel *f*.

I claim as my invention—

In a steam-engine, the reciprocating rotary outlet-valve I, fitted within a chamber K and provided with a counterbalancing-slot *i'* and a diametrically-opposite port *i*, that alternately opens communication between the ex-

haust-passages H H' and escape-port L, in combination with a pair of reciprocating rotary inlet-valves D E, fitted within the casings C C' and provided, respectively, with counterbalancing-slots *d' e'* and diametrically-opposite ports *d e*, that control the inlet-passages F F', said valves D *d d'* E *e e'* I *i i'* being operated by spindles D' E' J, having external actuating devices, substantially as herein described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR F. DEVEREUX.

Witnesses:

JAMES H. LAYMAN,
SAMUEL M. QUINN.