

W. H. McFAUL.

VALVES FOR DIRECT ACTING ENGINE.

No. 178,792.

Patented June 13, 1876.

Fig. 1.

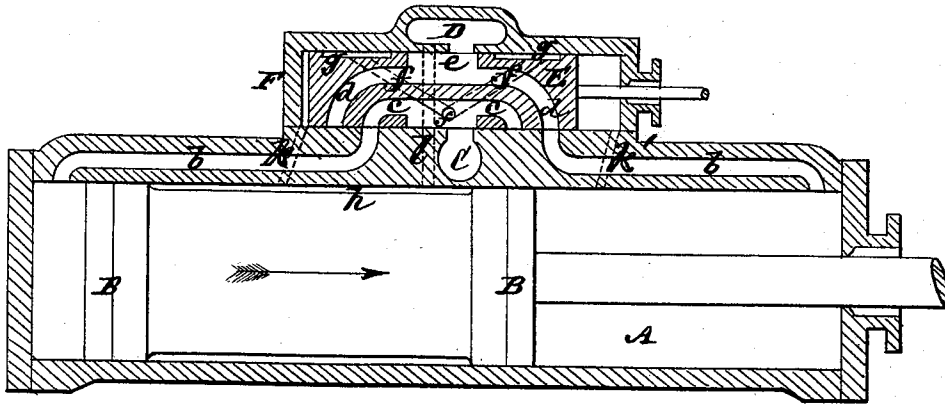


Fig. 2.

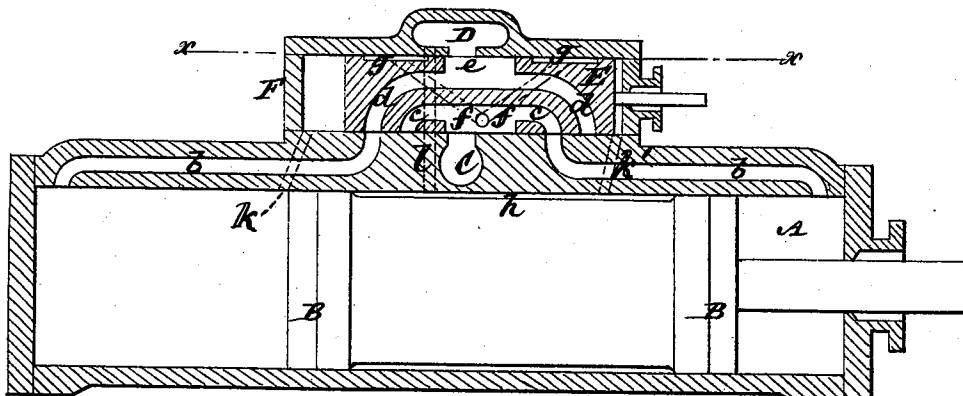


Fig. 4.

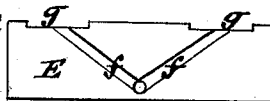


Fig. 3.

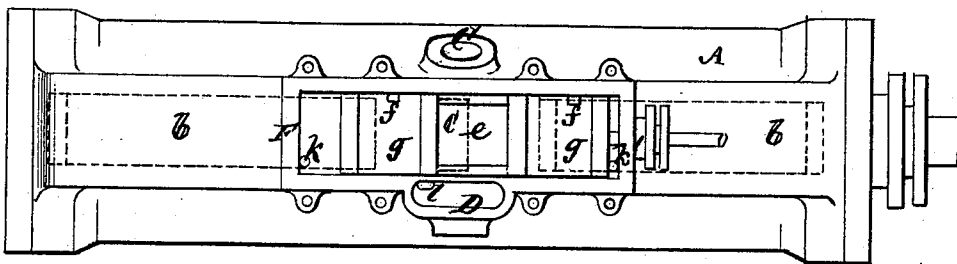
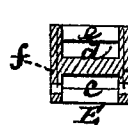


Fig. 5.



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IMPROVEMENT IN VALVES FOR DIRECT-ACTING ENGINES.

Specification forming part of Letters Patent No. **178,792**, dated June 13, 1876; application filed November 18, 1875.

To all whom it may concern:

Be it known that I, WILLIAM H. McFAUL, of the city, county, and State of New York, have invented certain new and useful Improvements in Valves of Direct-Acting Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention more particularly relates to slide-valves of direct-acting engines, using an elongated piston in which there is an exhaust-duct between the heads of the piston, the same operating in concert with passages in the engine-cylinder or valve-case, which passages are alternately put in communication by the motion of the piston with said duct, and with opposite ends of the valve-box, to automatically throw the valve by the exhaust-steam of the engine.

The invention consists in a novel construction of the valve, including its steam and exhaust passages or cavities, and the fixed passages which it controls, or by which it is controlled, whereby a balanced or free and most perfect action is obtained for the valve.

Figures 1 and 2 represent longitudinal sections—which, for the purpose of illustration, will here be termed vertical—of the cylinder with its piston, and valve of a direct-acting engine, constructed in accordance with my invention, said views showing the piston and valve in different working positions. Fig. 3 is a plan or exterior longitudinal view (in a plane at right angles to the previous figures) of the same with the valve-box cover removed. Fig. 4 is a side view of the valve detached; and Fig. 5 a central transverse section thereof.

A is the cylinder of the engine, and B B its piston, which is an elongated one. C is the steam-inlet; D, the main exhaust, and *b b* the main passages leading to opposite ends of the cylinder. E is the valve, which is a slide, one of rectangular construction in its transverse section, and works in close-fitting contact with the top, bottom, and sides of the valve box or case F, thus virtually forming a piston-valve. This valve is what may be termed a hollow, D, one having an inner D-shaped steam cavity or receiving-space *e*,

and an outer inclosed D-shaped exhaust-passage, *d*, interrupted by an outlet, *e*, in the back of the valve, which outlet is in constant communication with the main exhaust-cavity D, which is constructed in the back of the valve box or case F, and always opens to the outlet *e* in the valve. The steam-cavity *c* is in uninterrupted communication by diverging passages *f f*, in either or both sides of the valve, with back cavities *g g*, whereby a counter-acting pressure against the live steam acting on the inner D-shaped cavity *c* is obtained, and a balancing effect or action produced for the valve. The valve E may be reciprocated or worked by mechanical means, as by an eccentric and valve rod, or it may be operated automatically through the direct agency of the steam from the engine-cylinder by the motion of the engine-piston, which is the arrangement that will here be described. Thus the elongated or double-headed piston B B is made with a cavity, *h*, which may be annular or not, and extends from head to head of the piston, or nearly so; otherwise this double-headed piston may be solid. Passages *k k'* connect the opposite ends of the valve-box F with the interior of the cylinder A, and with the cavity *h*, in the piston, alternately during the motion of the piston. Another passage, *l*, establishes uninterrupted communication between the cavity *h* in the piston and the main exhaust.

The operation is as follows: Accordingly as the valve E is thrown to the right or to the left to bring either of its passages *b b* in communication with the steam-cavity *c* of the valve, and the other of said passages with the exhaust-passage *d*, will the piston B B be worked toward the one end or other of the cylinder A, and accordingly as, during such motions of the piston and toward the end of the stroke thereof, either head of the latter uncovers and exposes to the steam in the cylinder either passage *k* or *k'*, while the other of such last-named passages has previously been and continues in communication with the exhaust-cavity *h* of the valve, will the valve E be thrown by the spent steam of the cylinder to the one end or other of the valve-box, and the motion of the piston be reversed as required.

Instead of the cavities and passages *D e d d*, being for exhaust, and *C e e* being for steam, the cavities and passages *D e d d* may be for steam, and *C e e* for exhaust, in which case the passages *f f* must connect with the cavity *d d*, instead of with *e e*.

I claim—

The piston-like slide-valve *E*, constructed with a steam receiving and distributing face-cavity, *e*, and an outer inclosed exhaust-passage *d*, having a back outlet, *e*, in combination

with the counterbalancing back steam-spaces *g*, the connecting steam-passages *f*, the back main exhaust *D*, the face steam-inlet *C*, and the engine-passages *b b*, substantially as shown and described.

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