W. M. Henderson,

Steam Slide Valve.

No. 51,314. Patented Dec. 5, 1865.

Fig. 1.

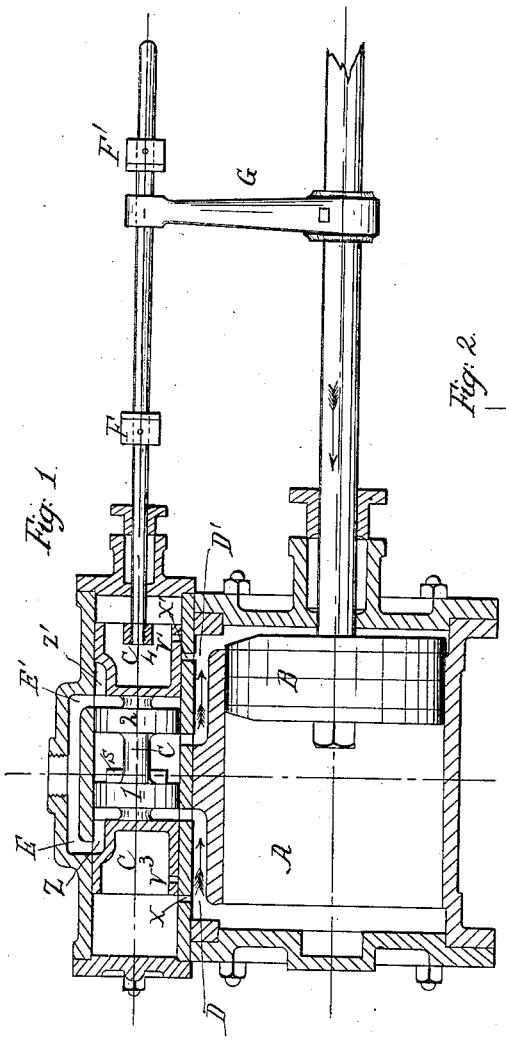
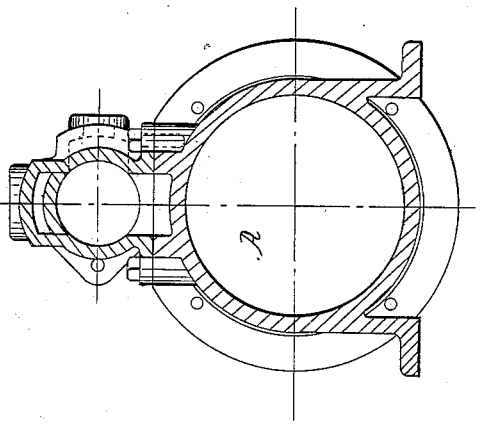


Fig. 2.



Witnesses:
Geo. A. Pope.
Chas. M. Betts

Inventor,
William M. Henderson

UNITED STATES PATENT OFFICE.

WILLIAM M. HENDERSON, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **51,314**, dated December 5, 1865.

To all whom it may concern:

Be it known that I, WILLIAM M. HENDERSON, of Baltimore city, and State of Maryland, have invented certain Improvements in the Mode of Constructing and Operating Direct-Action Independent Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Figure 1 represents a longitudinal section through the engine, showing the steam-cylinder, the steam-valve, the arrangement of ports and passages, &c., and means for operating the valve; Fig. 2, a transverse section of the same.

The object of this improvement is to simplify the construction and operation of direct-action independent steam-engines, or that class where a reciprocating movement of the piston is maintained without the intervention of a rotating shaft and fly-wheel.

The improvements consist in the arrangement of the steam valve and passages and mode of operation, as will hereinafter be more fully described.

A is a steam-cylinder; B, the piston, the rod of which passes through a stuffing-box in the front head, as shown. To the other end of this rod may be attached any mechanism requiring a reciprocating motion, as a pump, blowing-cylinder, or reciprocating saw, &c.

C is a piston-valve, accurately turned to work within a cylindrical steam-chest bored to suit.

D D′ are the main steam-ports. These are usually cored in the cylinder-casting. Sometimes they are made in a separate casting and bolted, by means of flanges, to short connections cast on each end of the cylinder. In this case these ports are not cored at all, as the pattern leaves their form, while the roof is made by the bottom of the steam-chest when bolted to the steam-cylinder. The joint being planed and screwed together with red lead, it will be readily seen this is a great improvement over the method of coring, as when cores are used for forming the passages in the cylinder the passages cannot be perfectly inspected, the inner surfaces not being exposed to view, and, besides, the steam-chest sits closer to the cylinder and does not require so long a leverage to operate the valve. It will at the same time be observed there is still only one joint to make, which is made on a line with the top of the steam-ports instead of outside them, as generally the case.

The piston-valve has two solid disks, 1 2, which play over the steam-ports D D′, and two trunks, 3 4, cast in one piece, through which latter holes V V′ are drilled, playing over holes X X′, drilled through the bottom of the steam-chest. Upon the accuracy of position of these holes depend the entire success of the operation of the valve. Nothing could be more simple to mark off and cut through than these short direct passages, as the eye and hand of the workman are brought to bear on the very spot, nothing being hid in lengthy tortuous passages, as is the case in the uncertainty of cored holes. A portion of each trunk is cut away, as shown at *z z′*, communicating with E E′, the exhaust-ports.

S is where the steam enters the chest.

G is an arm keyed on the middle of the piston-rod for reversing the valve.

The operation of the valve is as follows: It will be seen by inspection of the drawings that the steam-piston is making the stroke to the left, the steam entering by the port D′ and exhausting by the ports D and E. As it approaches the end of its stroke the arm G will come in contact with the collar F and the valve will be carried by it also to the left. First, the valve C will close the ports D D′, then V′ will be brought over X′, when a part of the steam impelling the piston will pass through this passage to the right of the valve and throw it over the ports. Steam-pressure not being at this time on the other end of the valve this passage will be closed again by the travel of the valve before the outer edge of disk 2 opens a communication between port D′ and the exhaust E′. Otherwise the steam would escape before it had fulfilled its duty. This will not take place until the extreme edge of the valve passes X′, when the steam will exhaust through this passage into port D′ and out of exhaust-port E′, and the valve will consequently come to a state of rest. Steam will now be admitted to the other side of piston B by the port D, and the stroke to the right will be made, and when the piston approaches the other end of the steam-cylinder the arm G will come in contact with collar F′ and carry the valve with it, the hole V and the edge of the valve operating over the port X in a similar manner, as before described, which, being al-

ternately repeated, will cause an automatic reciprocating motion to the engine.

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

1. The arrangement of the valve C with the steam and exhaust ports and passages, as herein set forth.

2. The arrangement of the passages V V′ in the valve with the passages X X in the valve-seat when operating substantially as and for the purposes herein described.

WILLIAM M. HENDERSON.

Witnesses:
GEO. A. POPE,
CHAS. M. BETTS.