

UNITED STATES PATENT OFFICE.

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STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 567,805, dated September 15, 1896.

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To all whom it may concern:

Be it known that I, WILLIAM B. BROWN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Double-Acting Steam-Engines, of which the following is a specification.

My invention relates to an improved double-action reciprocating engine.

The invention includes certain novel features of construction and combination of parts which are hereinafter described and claimed.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a top view or plan of the engine. Fig. 2 is a side view of the cylinder. Figs. 3 and 4 are horizontal sections of the cylinder and steam-chest, each figure showing the piston and the valves in different positions. Fig. 5 is an end view of the cylinder and steam-chest, the heads of which are removed. Fig. 6 is a view of the two piston-valves of the steam-chest on a larger scale. Fig. 7 is a vertical section showing the valves and passages from the steam-chest to the cylinder.

The letter C designates the steam-cylinder; *b*, the piston in the cylinder; *b'*, the piston-rod.

The steam-chest I has at its center on top a steam-supply pipe *h*, and at each end on the bottom exhaust-pipe *i*. A double piston-valve *j j'* reciprocates in the steam-chest and is moved by a valve-rod *j²*, which projects through the end of the chest. This valve-rod may be operated by an eccentric on the main shaft or otherwise.

The double piston-valve has two pistons, each of which is provided with a sleeve *l l'*. These sleeves point toward each other, one being enough larger in diameter than the other to allow the smaller one to insert itself into the larger one telescope fashion. (See Fig. 6.) Both pistons are fitted on the valve-rod *j²* by a screw-thread *l²*, by which means they may be adjusted relative to each other and also relative to the diagonal ports *m*, between the steam-chest and cylinder. The steam supplied by pipe *h* always enters between the two pistons *j j'*. The sleeves on the two pistons serve to keep the latter from

wabbling. The position of the double piston-valve seen in Fig. 4 is that which it has at the extreme limit of its stroke to the left. The position of the piston *b* in the cylinder seen in Fig. 3 is at mid-stroke. This piston moves either way toward the ends from the position shown to cover the diagonal ports *m*, but in moving toward the ends does not uncover the port nearest the end toward which it is moving. Thus provision is made for a steam-cushion at each end of the cylinder to stop the movement of the piston.

When the piston *b* is at its extreme limit of stroke at either end, the diagonal port *m* near that end will be covered by the piston, as shown in Fig. 4, and under these conditions it is necessary to have a supplemental induction-valve to allow steam to enter the cylinder at that end and start the piston *b* back. Therefore I provide a branch passage *n*, connecting with each diagonal port *m*, a supplemental valve *n'* to close the branch passage, and a spring to press on the valve and keep it normally seated. This passage *n* adjacent the spring at either side is widened (see Fig. 7) and branches into the cylinder, (see Fig. 5,) so that when the said valve *n'* is unseated a clear passage leads from the port *m* into the cylinder. Now when the piston *b* is at its extreme limit at one end and the double piston-valve is in proper position to let the steam into the diagonal port *m* at the same end, at such instant the pressure of steam in the chest and port *m*, acting on the puppet-valve *n'*, will unseat it, (see Fig. 4,) and thereupon steam will pass into the cylinder and start the piston *b* toward the other end of the cylinder. As soon as the piston *b* moves far enough to uncover the diagonal port *m* steam will then pass through said port more freely into the cylinder and give further impulse to the piston.

The supplemental induction-valve *n'*, when it is open, will allow the steam free entrance to the cylinder, but acts as a check-valve and will not allow any return or escape of steam. A by-passage *o* is in the wall of the valve-chest and communicates between the diagonal port *m* and the end of the branch passage *n* which opens into the cylinder. This by-passage *o* extends around or at one side of the supplemental induction-valve *n'* and serves as an auxiliary exhaust. A valve *o'* governs

the by-passage, and the screw-stem o^2 of this valve projects through the top of the valve-chest. By means of this valve o' the size of the opening from the port m to the by-passage may be varied and thereby regulate the degree of compression of the steam-cushion as the piston is completing its stroke. When the stroke has been completed and it is time for the piston to start back, the supplemental induction-valve n' will open freely to admit steam to the cylinder while the port m is still covered by the piston b .

This engine may be used with any kind of mechanism for converting the reciprocating motion into a revolving motion.

Having thus described my invention, I claim—

1. In an engine the combination of a cylinder; a valve-chest having two ports communicating with the cylinder; two piston-valves, j, j' , in said chest each provided with a sleeve one of which is larger than the other and one inserted into the other telescope fashion; and a rod connecting the two pistons, said rod

being screw-threaded in order to vary the adjustment of the pistons thereon relative to each other and also relative to the said two ports.

2. The combination of a double-acting cylinder and piston; a chest having two ports communicating with the cylinder at some distance from its ends; valves in the chest to govern these ports; a supplemental induction-valve to admit fluid from each of said ports to the end of the cylinder; a by-passage, o , at one side of the induction-valve and at each end of the said chest and communicating between each of the said ports and the induction-valve passage where the latter opens into the cylinder; and a regulating-valve, o' , to govern the size of opening to said by-passage.

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

WILLIAM B. BROWN.

Witnesses:

CHARLES B. MANN, Jr.,
C. CALVERT HINES.