

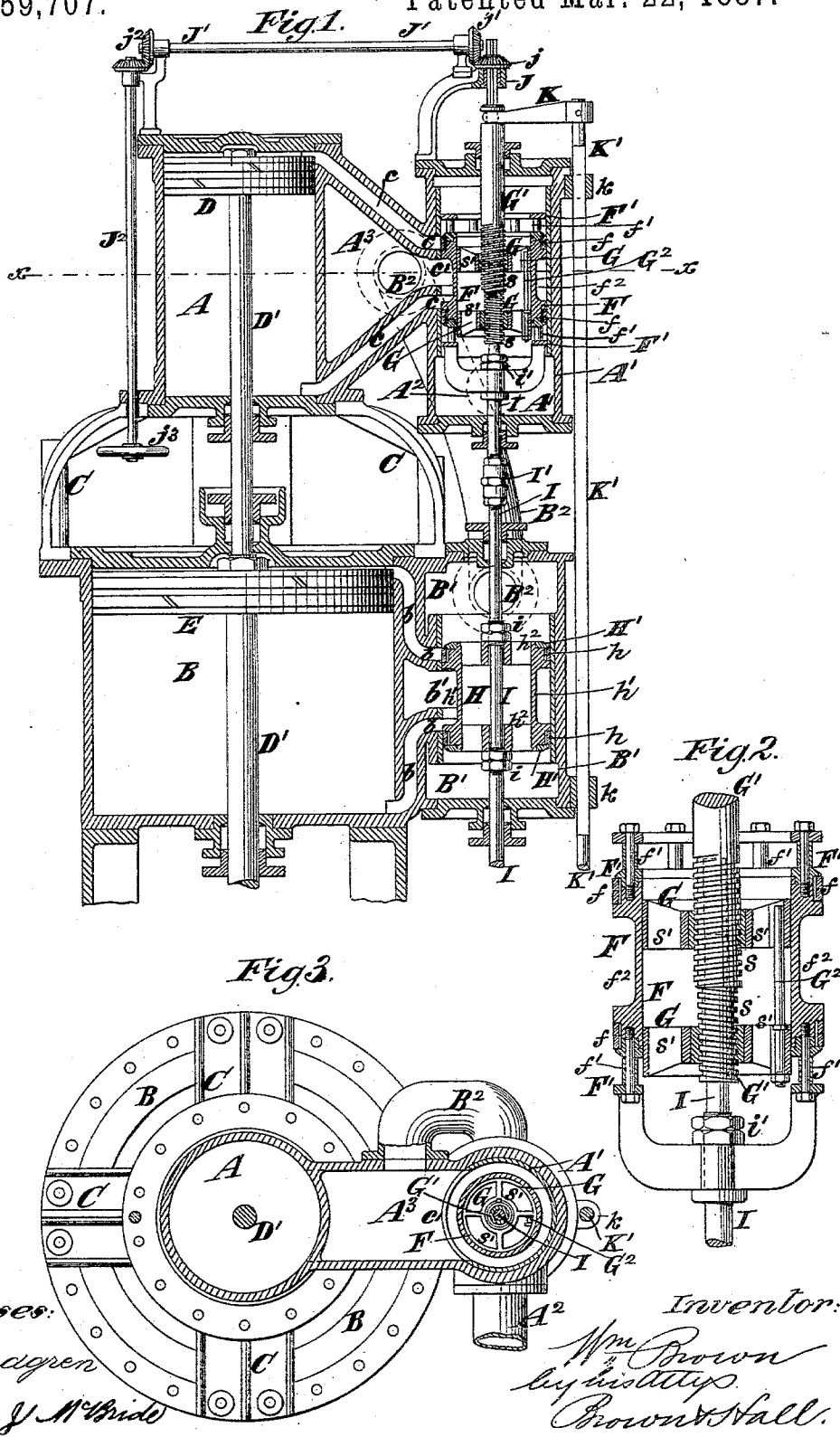
(No Model.)

W. BROWN.

VALVE FOR STEAM ENGINES.

No. 359,707.

Patented Mar. 22, 1887.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM BROWN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO HIMSELF
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VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 359,707, dated March 22, 1887.

Application filed August 16, 1886. Serial No. 211,022. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BROWN, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Valves for Steam-Engines, of which the following is a specification.

My invention relates to engines having piston-valves which are hollow, or have extending from end to end a straight cylindric bore, in which operates a reciprocating cut-off valve composed of two piston-heads adjustable toward and from each other by a rod having reversed screw-threads; and the invention consists in novel combinations of parts, herein-
after described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of the cylinders, valve-chests, and valves of a compound engine embodying my invention, and in which the two cylinders are arranged in line with the high-pressure or smaller cylinder above the low-pressure or larger cylinder. Fig. 2 is a vertical section, upon a larger scale, of the main piston-valve and cut-off valve for the high-pressure cylinder; and Fig. 3 is a horizontal section upon the plane of the dotted line $x x$, Fig. 1.

Similar letters of reference designate corresponding parts in the several figures.

A B designate the high and low pressure cylinders, which are here represented as arranged one above another, and supported one from the other by a support, C, such as is shown and described in my United States Letters Patent No. 341,549, dated May 11, 1886. To the two cylinders A B are fitted pistons D E, which are secured upon a common piston-rod, D'.

A' B' designate the two valve-chests of the engine, one for each cylinder A B, and which, as here represented, are formed in the same integral castings with the cylinders, and are arranged with their axes approximately parallel with or extending in the same direction as the axes of the cylinders. The valve-chests A' B' are cylindric in their horizontal section, and steam may be supplied to the valve-chest A' of the high-pressure cylinder through a pipe or opening, A², communicating with the side thereof, and the steam ex-

hausted from the high-pressure cylinder may pass by a pipe, B², to the side of the valve-chest B' of the low-pressure cylinder.

The high-pressure cylinder is provided with ports c , which serve alternately for the passage of steam from the valve-chest A' to the cylinder A and the exhaust of steam from the cylinder A and through the exhaust-port c' to the main exhaust-cavity A³. From this main exhaust-cavity leads the pipe B², whereby steam exhausted from the high-pressure cylinder is delivered to the valve-chest B' of the low-pressure cylinder.

F designates the main piston-valve, which is fitted to the cylindric valve-chest A', and controls the admission of steam to the main cylinder A. It may be provided with suitable ring-packing, f , at opposite ends, which packing may be held in place by ring-shaped followers F', and in these followers are formed cut-off ports or passages f' . The main valve F also has an annular groove or portion of reduced diameter, f'' , which, when the valve is working in the valve chest, forms an annular belt or passage around it, and this annular belt or passage f'' serves to control the communication of the ports c alternately with the exhaust-ports c' .

The low-pressure cylinder is provided with ports or passages b , which serve alternately for the passage of steam from the valve-chest B' to the cylinder B and the exhaust of steam from said cylinder to the main exhaust port or cavity b' , from which the steam passes to the condenser. In the valve-chest B' is arranged a hollow piston-valve, H, substantially like the valve F, before described, which may be provided with suitable ring-packing, h , held in position by follower-rings H'. This valve H also has a portion of reduced diameter, h' , forming an annular belt or passage surrounding the valve and serving to control the alternate communication of the supply-ports b with the exhaust-port b' .

I designates the main-valve rod, which works through suitable stuffing-boxes in the heads of the two valve-chests A' B', and which is centrally connected with both the main valves F and H. As here represented, the main valve H has bridges h^2 extending across it,

in which the valve-rod I has a bearing, and is secured in proper position on the rod by nuts *i*, applied to the rod above and below said valve H. The upper end of the stem I is connected by nuts *i'* with a bridge or yoke formed upon the ring-shaped follower F' at the lower end of the main valve F, as best shown in Fig. 2. The portions of the rod which are connected respectively with the valves H and F are preferably connected by a screw-threaded coupling-nut, I', arranged between the valve-chests A' B', and whereby provision is afforded for properly fixing the length of rod between the two valves F and H.

The main valve has a cylindric bore open from end to end, and from which the cut-off ports or openings *f'* lead to the exterior of the valve, and within such cylindric bore of the main valve F is fitted a cut-off valve composed of two piston-heads, G, which are secured upon a rod, G', having right and left hand screw-threads *s*, which fit suitable nuts provided in the two piston-heads G, constituting the cut-off valve. The two piston-heads G may be connected by a rod, G², as best shown in Fig. 2, so that they are prevented from turning one relatively to the other, and when the valve-rod G' is turned the piston-heads will be advanced toward each other or moved from each other in order to vary the point of cut-off in a well-understood manner. When the stem G' is turned in a direction to move the piston-heads away from each other, the cut-off valve will be lengthened, and the steam will be cut off from the cylinder A earlier in the stroke of the piston D. On the contrary, when the valve-rod G' is turned in the direction to bring the piston-heads nearer together, the cut-off valve will be shortened, and steam will be admitted to the cylinder A during a greater portion of each stroke. The piston-heads constituting the cut-off valve are provided with openings *s'* through them, as best shown in Fig. 2, in order to enable steam to flow freely from one end to the other of the valve-chest A'.

For the purpose of turning the valve-rod G' to vary the point of cut-off, I have represented the upper end of the rod G' as provided with a gear-wheel, *j*, which is supported in a bearing, J, and through which the upper end portion of the valve-rod G' may slide, said rod being provided with a groove-and-feather connection with the gear-wheel *j*. With the wheel *j* engages a wheel, *j'*, on a cross-shaft, J', and this cross-shaft may be turned through bevel-wheels *j''* by means of an upright shaft, J², which may be provided at the lower end with

a hand-wheel, *j*³. When the hand-wheel *j*³ is turned, motion is communicated through the gearing described to the valve-rod G', and it may thus be turned in one or other direction, as may be desired.

The valve-rod G' is operated from an arm, K, upon an upright bar or rod, K', which may be reciprocated vertically in suitable bearings, *k*, upon the valve-chests A' B'. The valve-rod I and the rod K', from which the valve-rod G' is operated, may be worked by eccentrics in the usual way common to marine engines, and which I have not shown, as they form no part of my invention. The valve-rod I may be operated by means of two eccentrics and the ordinary link-motion for reversing, and the rod K' and valve-rod G' may be operated by a single eccentric.

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

1. The combination, with an engine-cylinder and the cylindric valve-chest A', constructed with supply and exhaust ports, of the main piston-valve F, having a cylindric bore extending from end to end, and in which are cut-off ports, the cut-off valve composed of the piston-heads G G, having openings in them and fitting the bore of the main valve, and the valve-rods I and G', working through opposite ends of the chest and connected one with the main valve F and the other with the piston-heads G G for reciprocating the said valves, substantially as herein described.

2. The combination, with the cylinder and cylindric valve-chest of a steam-engine, of a hollow piston-valve having a cylindric bore extending from end to end and provided at the ends with the followers F', having formed in them cut-off ports *f'*, and the cut-off valve consisting of piston-heads G, working within the bore of the main-valve, substantially as herein described.

3. The combination, with the cylinder and cylindric valve-chest of a steam-engine, of a hollow piston-valve, F, having a cylindric bore, and the rod I, for working it, extending through one end of the chest, the cut-off valve consisting of piston-heads fitting the bore of the main valve, and the rod G', for operating the cut-off valve, provided with right and left hand screw-threads, to which the piston-heads are fitted, and working through the opposite end of the chest and receiving within it the valve-rod I, substantially as herein described.

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Witnesses:

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