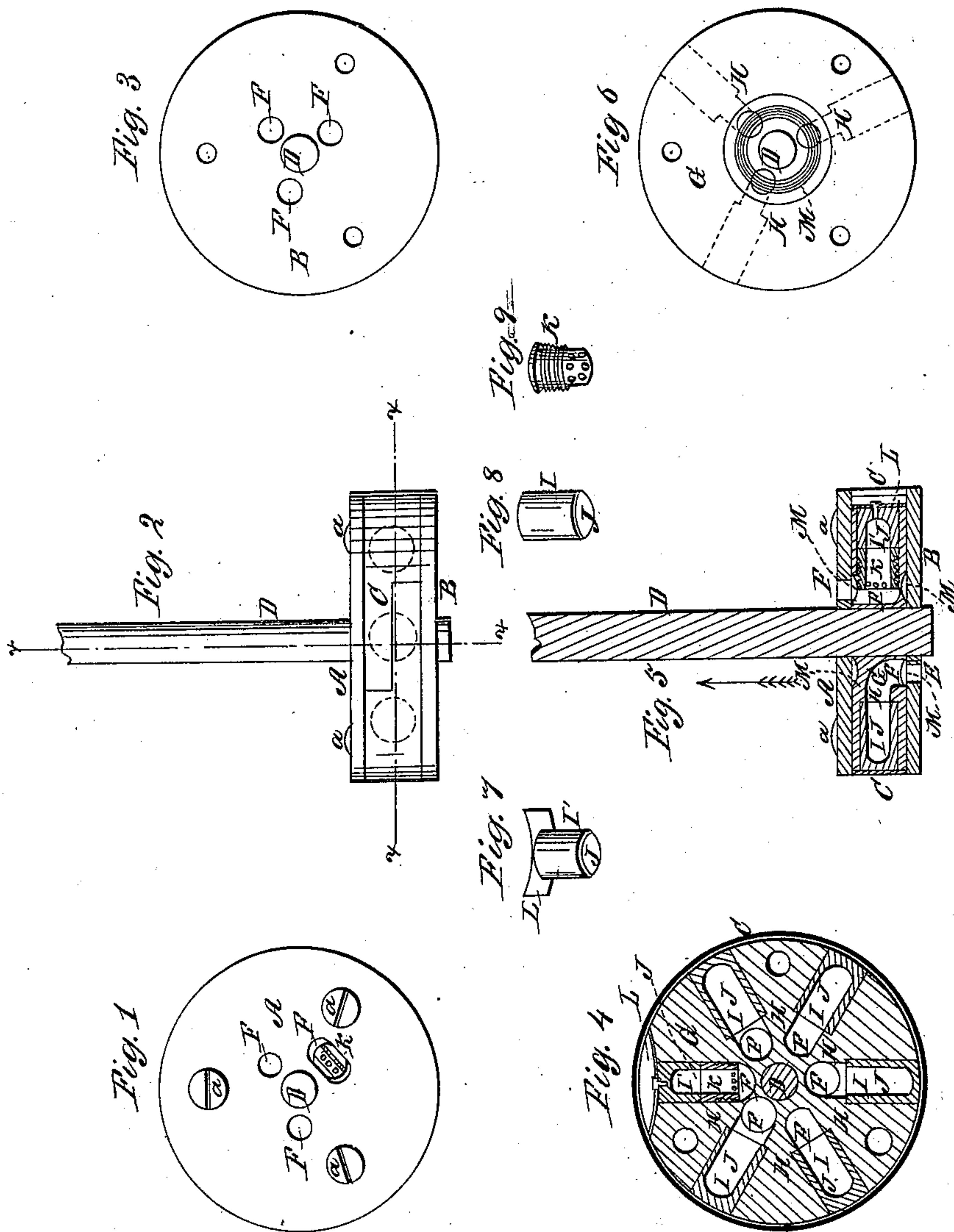


Furniss & Hovey,
Steam-Engine Piston.
No. 40,559. Patented Nov. 10, 1863.



Witnesses;
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F. H. FURNISS AND JACOB HOVEY, OF CLEVELAND, OHIO.

IMPROVEMENT IN PISTONS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 40,559, dated November 10, 1863.

To all whom it may concern:

Be it known that we, F. H. FURNISS and J. HOVEY, of Cleveland, county of Cuyahoga, and State of Ohio, have invented a certain Improved Steam-Engine Piston; and we do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side or face view of the piston. Fig. 2 is an end view. Fig. 3 represents the opposite side from Fig. 1. Fig. 4 is a section in the direction of the line xx in Fig. 2. Fig. 5 is a section in the direction of the line $x'x'$ in Fig. 2. Figs. 7, 8, and 9 are detached sections, which will be referred to in description.

Like letters denote like parts in the drawings.

The nature of our improvement relates to a piston so constructed and arranged that the packing-rings when in the cylinder will be extended so as to fit the bore of the cylinder steam-tight by the action of the steam admitted into the cylinder for the purpose of working the engine, and also in the employment of certain devices for adjusting the packing to the bore of the cylinder, as the nature of the case may require.

A and B, Figs. 1, 2, and 3, are the followers on each side of the piston, and secured together by the screws a .

The spring-packing C may be constructed in the ordinary manner.

D is the piston-rod.

The piston, Figs. 4, 5, and 6, is constructed with openings E and F, which in number may be more or less, as the nature of the case may require. The openings herein described are three on each side, which pass into the middle or center of the piston G, then turn at right angles out through the periphery of the piston, as seen in Figs. 4, 5, and 6. The openings from the periphery are enlarged, forming chambers and a shoulder or valve-seat at the junction of the small openings, as indicated at H. This large part of the openings receives the thimble-valves I, which rest, respectively, upon the seat H. The openings are alike on each side, and which communicate with the valves in the chambers. There are also openings in the followers, which are in direct line with the openings in the piston, as seen in Fig. 5. The chambers and valves ra-

diate from the side openings, E and F, which alternate with each other, as indicated in Fig. 5. Where there is an opening on one side it is blank on the other, though in some cases it may be desirable to have the openings opposite each other, with a partition between.

The valves are operated by means of the steam passing in at the side openings, which forces out the valves, so as to act on the under side of the packing C, causing it to expand, thereby perfectly fitting the bore of the cylinder, thus preventing the passage of steam between the cylinder and packing as the piston reciprocates. When the piston is in action, the steam will only pass in at the openings on one side at a time. If moving in the direction of the arrow in Fig. 5, the steam passes in at the openings E, forcing out the valves I', and when moving in a reverse direction the steam enters in the openings F and operates the valves in the manner and for the same purpose as before mentioned. There being an equal number of valves acting upon the packing at all times when in motion, it follows that in this way the packing is expanded alike as the piston is moved in either direction. When the piston is receiving steam upon one side, and should it by any means force a passage through the valve-chambers, or otherwise enter and occupy the space between the packing and the periphery of the piston, the steam will not affect the valves receiving the action steam, while the valves on the exhaust side will be pressed down upon their respective valve-seats, thus effectually cutting off all passage of steam through the piston. This arrangement allows the valves to be of any suitable form.

Figs. 7 and 8 represent the valves herein described, which are of a cylindrical form, with a cup or chamber, J, in the center. The hollow male screw K is screwed into a female screw cut in the base of the chamber-openings, as seen at K, Fig. 4. The top of this male screw forms an adjustable valve-seat for the valve I', Figs. 4, 5, and 7, to the top of which is the spring L, connected by any suitable means. The circumference of the piston is curved out to receive the spring L, as seen in Fig. 4. By this arrangement the valves may be rendered adjustable, so as to be moved to or from the spring-packing, as may be required, and the said packing may rest upon a series of springs

connected with each valve in the piston similar to that indicated in Figs. 4 and 7.

By means of the hollow screw K, Fig. 7, the valves may be raised or lowered, so as to set out or in the spring-packing, as required. All the valves may be thus arranged in place of the single thimble or cup valve I, Fig. 8, which in itself is substantially the same as the valve I', only the latter is not as long by reason of the screw K taking up a portion of the lower part of the valve-chamber or opening. The steam enters the openings E or F, as the case may be, and passes through the hollow screw K and acts upon the valve I' the same as the other valves. On each side of the piston is a circular groove, M. This groove forms a direct connection with the openings in the piston and followers, and which allows the steam to pass around the grooves from one opening in the follower to the other, and al-

lowing a free passage of the steam to the openings in the piston as admitted through the follower-openings.

What we claim as our improvement, and desire to secure by Letters Patent, is—

1. The openings E and F and valves I, in combination with the piston, as and for the purpose set forth.

2. The hollow screw K, forming an adjustable valve-seat, in combination with the valve I' and piston, for the purpose described.

3. The grooves M, in combination with the openings and piston, as and for the purpose specified.

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Witnesses:

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