



# UNITED STATES PATENT OFFICE.

JOHN HOLLY, OF ROUSEVILLE, PA., ASSIGNOR OF THREE-FOURTHS HIS RIGHT TO JAMES H. DANN AND J. D. GAGE, OF SAME PLACE.

## IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 131,545, dated September 24, 1872.

*To all whom it may concern:*

Be it known that I, JOHN HOLLY, of Rouseville, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification:

### *Nature of the Invention.*

This invention relates to certain improvements in steam-engines; and consists of a combination of parts too fully hereinafter described to need a preliminary statement.

### *General Description.*

In the drawing, Figure 1 is an elevation of a cylinder with the steam-chest cover and valve-gear removed. Fig. 2 is a cross-section of the steam-chest and cylinder, showing the cut-off disk, &c. Fig. 3 is a view showing the manner of expanding the cylinder or packing rings; Figs. 4 and 6, views showing the two sides of the cut-off disk; and Fig. 5 a cross-section of the same, showing the exhaust ports or recesses.

A represents the frame; B, the cylinder; and C, the steam-chest. The latter is made in the form shown, and is provided with a circular exhaust-port,  $a$ , in the center, and four peculiarly-shaped steam-ports,  $b^1 b^2 b^3 b^4$ , in the valve-seat, as shown in Fig. 1, partly in dotted lines, opening into the cylinder in the usual manner. D represents the cut-off or reversing valve, which is merely a flat metal disk having two steam-ports,  $c^1 c^2$ , which set over the seat of the steam-chest in such a manner that two of the ports,  $b^2 b^3$ , shown in dotted lines in Fig. 1, will be closed up, while ports  $b^1 b^4$  will come opposite the ports  $c^1 c^2$  in disk D, and so be open. The upper edge of this disk D is supplied with a number of gear-teeth,  $d d$ , which engage with corresponding teeth on a rod,  $e$ , which runs across through the top of the steam-chest C, and which is operated by a lever, E. It will be seen that by moving the rod  $e$  back and forth the disk D will be partially turned so as to reverse the position of the ports  $c^1 c^2$  and  $b^1 b^4$ . Immediately outside of this disk D is another similar disk, F, (see Figs. 4, 5, and 6,) which is the oscillating valve,

and which is provided with three steam-ports,  $f^1 f^2 f^3$ , which are cut entirely through the disk, and three exhaust-ports,  $g^1 g^2 g^3$ , which are only partially cut through the disk, as shown at  $g^3$  in Fig. 5, and which connect at the center above the exhaust-port  $a^1$  in the disk D, and through the valve-seat. (See Fig. 4.) On the back of disk F is a lug, G, (Figs. 2 and 5, which is provided with a slot,  $h$ , into which a small feather on the valve-stem H (see Fig. 2) sits, and upon which the eccentric arm I is secured which operates this valve. It will be readily seen that when the eccentric of the engine oscillates the valve F, when the eccentric is as far ahead as it will go, steam-port  $f^1$  will be above port  $c^2$  and  $b^4$ , while exhaust-port  $g^2$  will be above steam-ports  $c^1$  and  $b^1$ , so that the steam will enter the back end of the cylinder first, and thus cause the engine to move ahead until the eccentric reacts upon the valve F and reverses the position of the ports, causing port  $f^1$  to cut off the steam from port  $b^4$  and bring exhaust-port  $g^3$  over port  $b^4$ , thus allowing the steam in the back end of the cylinder to escape while the steam is let into the opposite end of the cylinder, and so the action goes on, which is, in this respect, precisely like the common slide-valve.

To reverse the engine the lever E is simply pushed in, and, moving disk D, turns the ports  $c^1 c^2$  until they are opposite ports  $b^2$  and  $b^3$ , which will bring steam-port  $f^3$  and exhaust-port  $g^1$  into play, thus causing the valve F to act in the opposite direction. This is an important feature of novelty in my invention, as by these simple means I make the engine reversible by the use of only one eccentric, and thereby do away with the "link-gear," &c., and combine in one device a reversing-gear and "starting-bar." The valve being flat and oscillating works only on the surface it covers, and thus does away with the troublesome "wearing hollow" common to sliding and rolling valves; and, being circular, it can be "ground in the lathe," which is a great advantage in saving of time, &c. This valve is applicable to all kinds of engines.

Having thus described my invention, what I claim is—

1. The oscillating disk-valve F, formed with the ports  $f^1 f^2 f^3$  and  $g^1 g^2 g^3$ , as described and arranged within the steam-chest C, and connected with the valve-stem H, all constructed and arranged as herein specified.

2. The disk D, formed with the ports  $c^1 c^2$  upon its side and teeth  $d$  upon its periphery, in combination with the lever E, rack  $e$ , steam-chest C, and steam-openings  $b^1 b^2 b^3 b^4$ , all con-

structed and arranged substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN HOLLY.

Witnesses:

J. R. DRAKE,

C. N. WOODWARD.