W. H. Howland,

Rotary Valve.

No. 92,052. Patented June 29 1869.

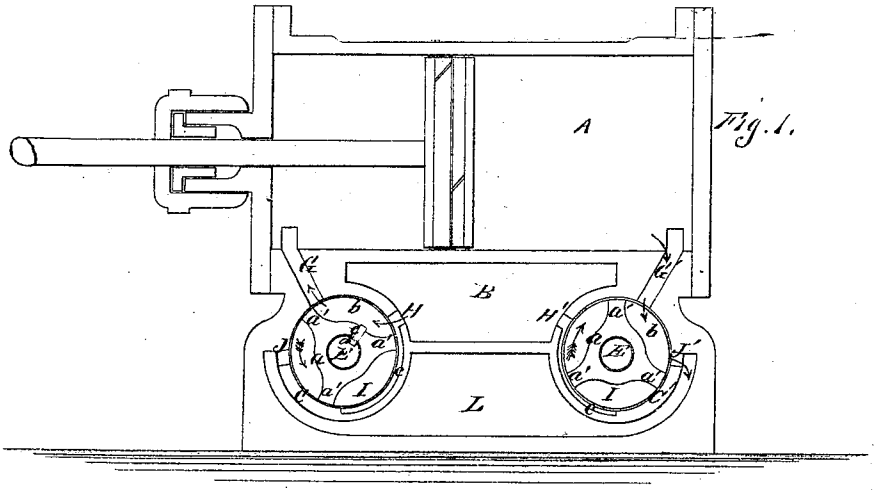


Fig. 1.

Witnesses,
Geo. H. Strong.
N. Staniforth

Fig. 2.

Inventor,
Wm. H. Howland
By Dewey & Co
His Attys

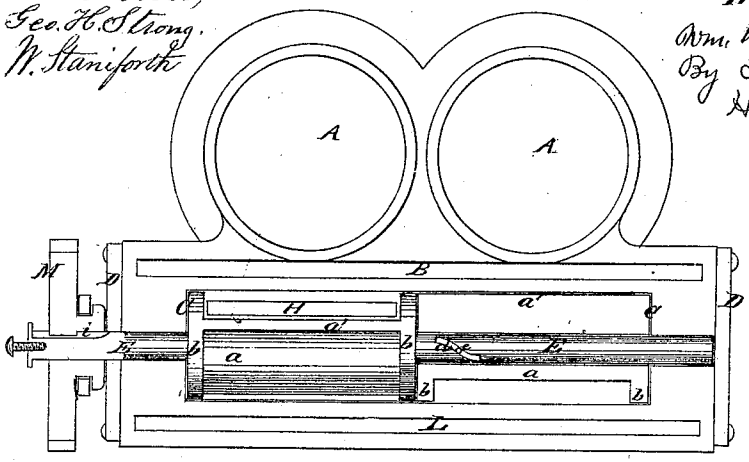
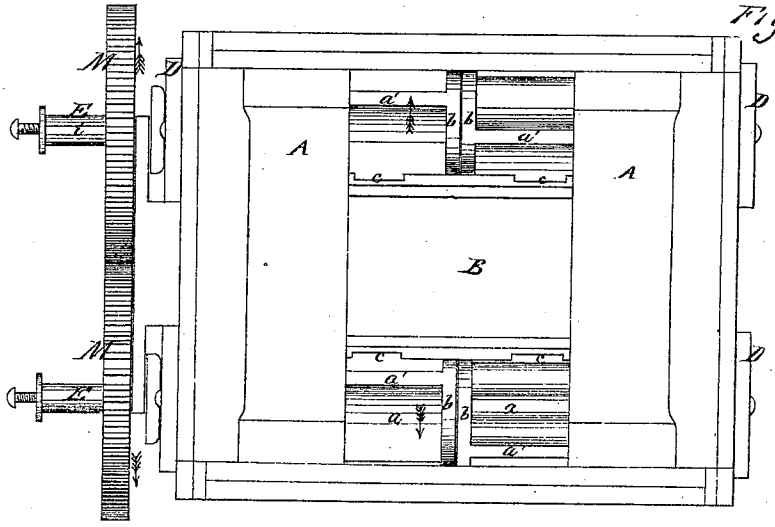


Fig. 3.



N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

United States Patent Office.

WILLIAM H. HOWLAND, OF SAN FRANCISCO, CALIFORNIA.

Letters Patent No. 92,052, *dated June* 29, 1869.

IMPROVEMENT IN STEAM-ENGINE VALVES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WILLIAM H. HOWLAND, of the city and county of San Francisco, State of California, have invented an Improvement in Steam-Engines; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains, to make and use my said invention or improvement without further invention or experiment.

The object of my invention is to provide an improved construction for steam-engines, and more especially referring to devices for alternately supplying and exhausting the steam from either end of the cylinders.

In my improved engine, one or two cylinders may be used, or four may be employed, in which case two cylinders may connect with each of the two cranks, the shaft being midway between the pairs of cylinders.

The valves may be so arranged that the cylinders shall take steam from but one end, or, as in the single-cylinder engine, from each end, and may be placed on the top, at the side, or in any position most convenient.

As illustrated by my present specification and drawings, the engine consists of two cylinders lying horizontally, side by side, and intended to operate on cranks, placed at right angles to each other on the same shaft.

The valves are situated beneath the cylinders, and rotate in cylindrical chambers.

The cylinders and valve-chambers are all cast together, the chambers extending entirely across at each end of the cylinders, so that one valve-spindle, or shaft will operate the valves for both cylinders at either end.

The valves are long, and consist of a number of arms, with open spaces between them, and a disk, or flange at each end, to keep the steam from escaping.

The steam-chest is situated directly beneath the central portion of the cylinders, between the valve-chambers, and the steam passes to the cylinders through the upper part of the chambers, and is exhausted into a space beneath the steam-chest, through passages on the opposite side of the chambers from the induction-ports, these passages being all so situated as to be nearly in a straight line when opened, thus allowing the steam to pass freely, and without a tendency to choke.

Passages are also formed, so that the steam is admitted behind the valves, thus balancing them.

The valve-spindles, or shafts, are turned by gearing from the outside, rotating the valves always in one direction, whether the engine turns forward or backward.

By a peculiar device, the engine may be reversed, by simply withdrawing the valve-spindles a short distance in the direction of their length, this changing the lead of the valves instantly, without changing the direction of their motion.

Referring to the accompanying drawings for a more complete explanation of my invention—

Figure 1 is a side sectional view of one of the cylinders, showing a cross-section of the valves and chambers.

Figure 2 is a cross-section of the cylinders, with longitudinal section of valve-chamber.

Figure 3 is a plan, with part of the cylinders removed.

Similar letters of reference, in each of the figures, indicate like parts.

A A are the cylinders of an engine, of which the present drawings show two, cast side by side, and having a space, B, directly beneath, which forms the steam-chest, and also serves as a steam-jacket for the cylinders.

The valve-chambers C C′ are situated beneath each end of the cylinders, extending entirely across, under both cylinders, and are closed by covers, D D, at each end.

The valves *a* consist of three or more arms, *a′ a′ a′*, which may have soft packing-metal in their periphery, and which extend across beneath each end of each cylinder.

At the ends of the arms are disks, or flanges *b b*, which fit against the ends of the valve-chambers, at each end, and make them steam-tight.

The spindles, or shafts E E, to which the valves are fastened, and by which they receive motion, extend entirely across beneath each end of the cylinders, as shown in fig. 2, each shaft carrying the two valves at one end.

G and G′ are the steam-ports, entering the cylinder, shown at fig. 1;

H and H′, the passages from the steam-chest; and

J and J′ are the exhaust-ports, which lead to a chamber, L, beneath the steam-chest, from whence the exhausted steam may escape to the open air, or it may be subjected to condensation, thus giving increased power to the engine.

c c are small passages, opening from the steam-chest directly into the valve-chambers, and passing around to the back of the valve, when the steam fills the whole of the space I, between the arms *a*, thus making a perfectly-balanced valve.

The valves receive their motion, through the shafts E, by means of gears M M, which are turned from the engine-shaft.

In order to reverse the engine, it is necessary to change the lead of the valves, which is effected by means of a pin, *e*, which is fastened to the valve, and enters the oblique slot *d*, in the shaft E, fig. 2.

The shafts are slotted at *i*, and feathers, in the

gears M M, cause them to rotate, but allow them to be withdrawn, as shown at fig. 3, which causes the oblique slot *d* to move the valve, by means of the pin *e*, and thus change its lead, so that the engine will be reversed.

Having thus described my invention,

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

1. The valve-chambers C C′, having the passages G, H, and J, together with rotating valves *a*, with their arms *a′*, when constructed substantially as herein described.

2. The reversing-mechanism, consisting of the movable shafts E, with the oblique slots *d*, and the pins *e*, substantially as herein described.

3. The construction and arrangement of the valves *a* and passages *c c*, substantially as described.

In witness whereof, I have hereunto set my hand and seal.

WILLIAM H. HOWLAND. [L. S.]

Witnesses:

JOHN LEE BOONE,

WILLIAM STANIFORTH.