[72.]

119,088. Patented Sep. 19, 1871.

Bradbury M. Johnson.

Impt. in Direct-acting Engines

Fig. 1.

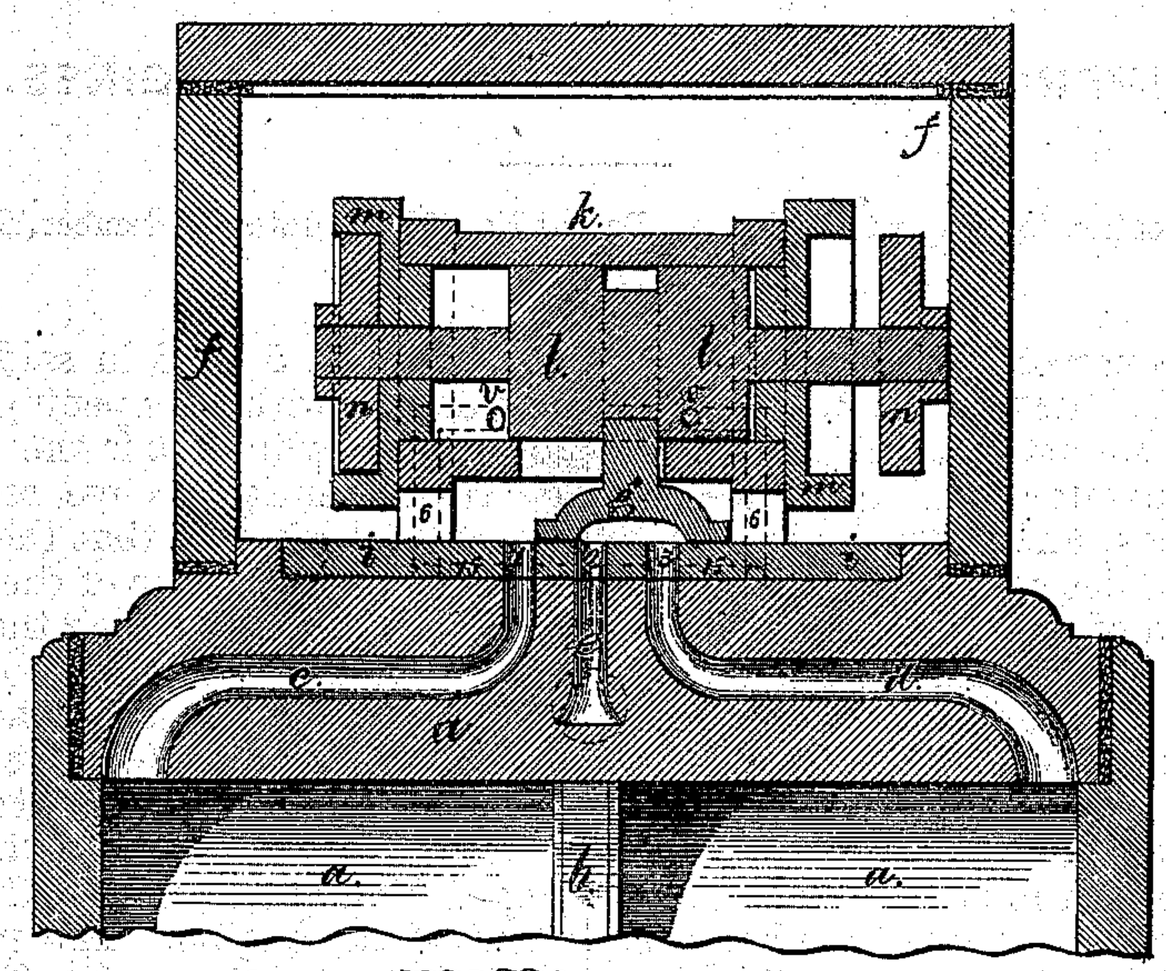


Fig. 2.

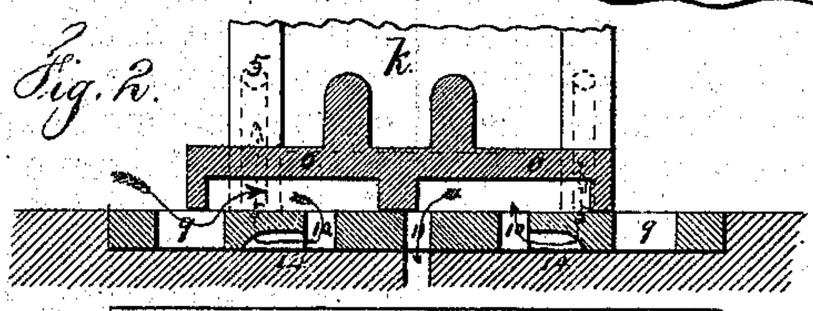


Fig. 3.

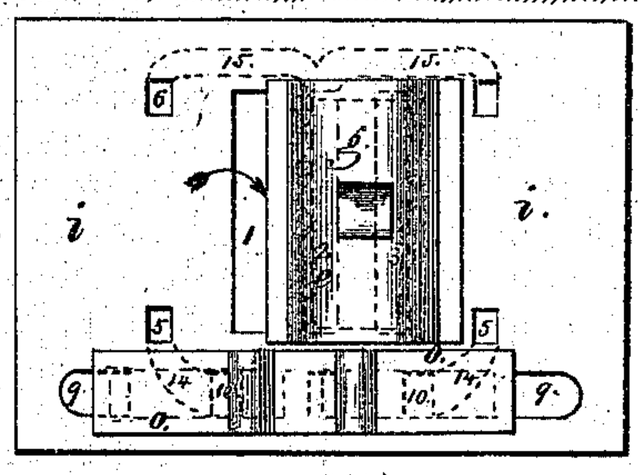
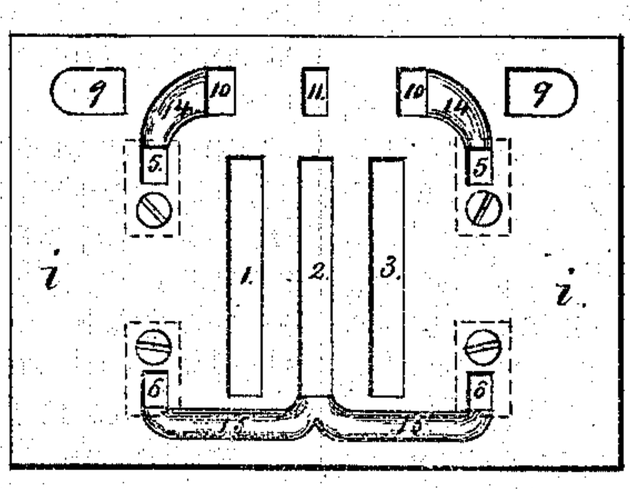


Fig. 4.



Witnesses

Chas. F. Smith

Geo. L. Pinckney

Bradbury M. Johnson

Lemuel W. Serrell

Atty

UNITED STATES PATENT OFFICE.

BRADBURY M. JOHNSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND WILLIAM H. M. PYE, OF SAME PLACE.

IMPROVEMENT IN DIRECT-ACTING ENGINES.

Specification forming part of Letters Patent No. 119,088, dated September 19, 1871.

To all whom it may concern:

Be it known that I, BRADBURY M. JOHNSON, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Direct-Acting Engines; and the following is declared to be a correct description thereof:

In the construction of direct-acting steam-engines a small secondary valve has been employed to admit steam into a cylinder that has moved the main valve; thereby the piston-rod could easily operate through tappets upon the secondary valve, and that in turn control the steam-pressure that gives motion to the main valve. In direct-acting engines of this class there has been difficulty in constructing the passages between the secondary valve-seat and the cylinders, (whose piston moves the valve,) because these passages have had to be cored out and afterward chipped and finished, and were liable to imperfections both in the material and in the workmanship.

My invention consists in a removable valve-seat with the passage-ways of the secondary valve in such removable seat, so that access is freely given the steam-passages for finishing the same before the seat is attached in its place. I also construct the cylinder of the valve in such a manner that the movement will be rapid but almost noiseless, in consequence of the steam exhausting as the movement is completed and the concussion being received by a cushion of steam.

In the drawing, Figure 1 is a vertical section of the valve and its actuating piston and cylinder. Fig. 2 is a vertical section of the secondary valve and the valve-seat. Fig. 3 is a plan of the main and secondary valves and seat, and Fig. 4 is an inverted plan of the removable seat.

The steam-cylinder *a*, piston *b*, ports *c* and *d*, and exhaust-port *e* are of any usual character and size; so also is the steam-chest *f*. The movable valve-seat *i* is provided with openings 1, 2, and 3, corresponding with the ports *c*, *d*, and *e*, and the main valve *g* is of the usual character. The seat *i* is to be faced true, by planing or otherwise, upon both sides, and fitted to the top of the cylinder *a*, and the surfaces may be ground together or rendered steam-tight by a thin layer of paint, and screws are to be used to hold the seat *i* to its place. The cylinder *k* is sustained upon four legs or hollow supports, and is attached to the seat *i* before the latter is secured in place, the openings 5 5 6 6 in said plate or seat *i* corresponding with the openings of the hollow legs; and in the cylinder *k* is the double-piston *l*, with a circumferential groove receiving the stem of the main valve *g*, so that the two move together. The movable heads *m* of the cylinder *k* are made with recesses, into which the cushioning-pistons *n* pass at the extremes of motion, and, by confining steam, act as cushions to prevent concussion. The secondary valve *o* is actuated by a rock-shaft and tappets controlled by the movement of the piston-rod of the engine, and shifting said valves *g* at the extremes of the movement of the engine. The plate *i* has the ports 9 9, 10 10, and 11 in it. These ports 9 and 10 do not connect with any opening in the cylinder *a* where said plate *i* rests upon the same, but the port 11 connects with the exhaust *e*. The ports 10 connect to the ports 5 by the grooves or ways 14, which are to be, by preference, in the plate *i*, but might be in the surface of *a*, upon which it rests; and the ports 6 connect by similar grooves 15 with the exhaust 2.

It will now be understood that the ports in the plate *i* forming the valve-seat are easily cast or otherwise made or finished, and the valves and cylinder connected therewith before the plate *i* is attached to the cylinder *a;* hence these parts can be easily and cheaply made and adjusted.

When the valve *o* is moved a steam-way is opened through 9, as indicated by the arrow, Fig. 2, and the steam passes, by the port 10, grooved way 14, and port 5, into the cylinder *k* to move the piston *l* and main valve *g* to their opposite positions, at the same time the exhaust is opened on the opposite side of the piston 7, through the posts 5, 14, 10, 11, and *e*. As the piston *l* and valve *g* complete their stroke the opening *v* of the port 6 is uncovered, (see Fig. 1,) and the steam pressure is instantly relieved by passing through the ports 6, 15, and 2 to the exhaust *e*. The respective operations performed as aforesaid are the same at both ends of the stroke, and if the valve *o* is given the proper movement it will admit the necessary quantity of steam as the end of the valve passes along over the port 9, and then covers that port to shut off the further inlet of steam, but keeps the exhaust open on the opposite side of the piston *l;* and the uncovering of the port *v* also opening an exhaust, the steam is relieved on both sides

of the piston *l;* hence there will not be any back pressure upon the piston *l* when the steam is admitted to move the same.

I claim as my invention—

1. The removable valve-seat *i*, made with the respective inlet and exhaust-ports, arranged substantially as shown, for the main and secondary valves, and the cylinder that operates the main valve, substantially as set forth.

2. The cylinder *k* in the steam-chests *f*, and piston *l*, in combination with the valves *o* and *g* and ports for the induction and exhaust, the parts being arranged and operating substantially as set forth.

3. The exhaust-ports *v* connected to the main exhaust *e*, and positioned in the cylinder *k* in such a manner as to be uncovered by the piston *l* as it completes its movement, substantially as and for the purposes set forth.

Signed by me this 8th day of June, A. D. 1871.

BRADBURY M. JOHNSON.

Witnesses:

CHAS. H. SMITH,

GEO. T. PINCKNEY.

(72.)