(No Model.)

2 Sheets—Sheet 1.

E. G. SHORTT.

STEAM ENGINE.

No. 389,768. Patented Sept. 18, 1888.

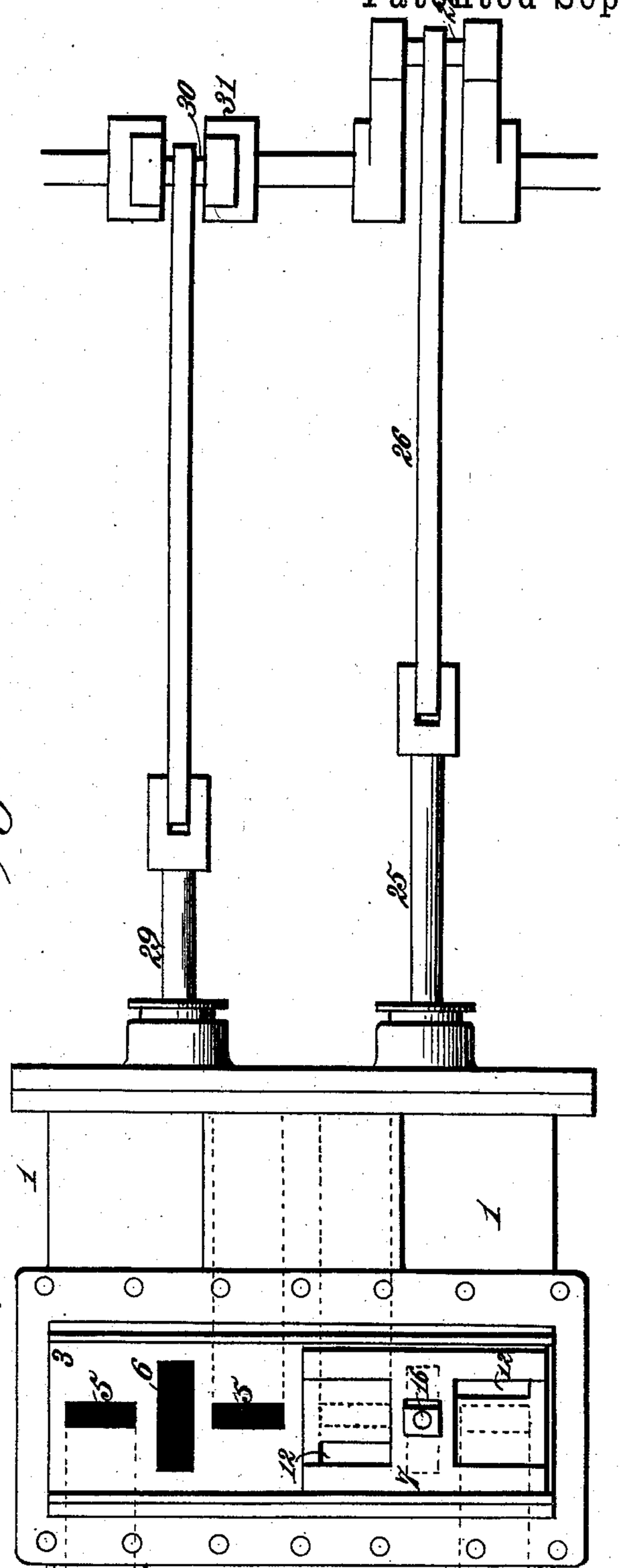

Fig. 1.

Witnesses.
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

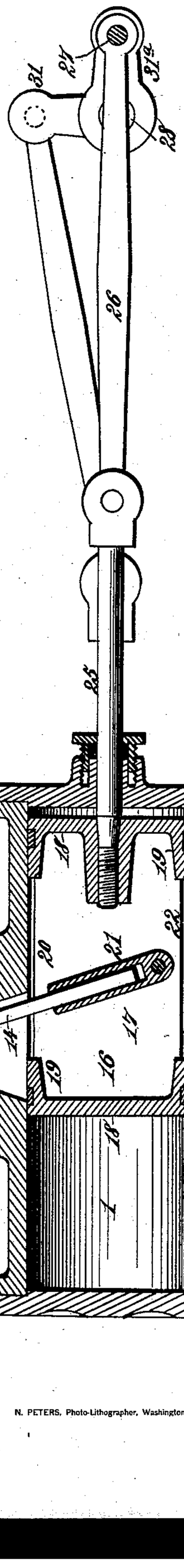


Fig. 3.

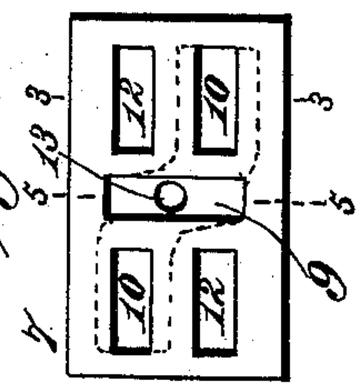
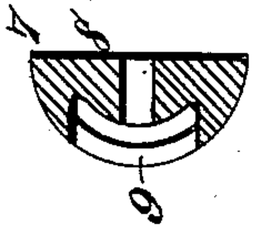


Fig. 4.

Fig. 5.



Witnesses.
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UNITED STATES PATENT OFFICE.

EDWARD G. SHORTT, OF CARTHAGE, ASSIGNOR OF ONE-HALF TO CHARLES G. EMERY, OF BROOKLYN, NEW YORK.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 389,768, dated September 18, 1888.

Application filed December 15, 1887. Serial No. 258,012. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. SHORTT, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

My present invention relates to steam-engines of that class in which a duplex mechanism is employed acting upon the same shaft. It is my purpose to provide a novel and simple valve mechanism operated by the piston and directly connected thereto; and to this end the invention consists in the several novel features of construction and new combinations of parts hereinafter fully set forth, and specifically pointed out and defined in the claims.

In the accompanying drawings, Figure 1 is a plan view of the engine, the bonnet of the steam-chest being removed and the valves taken from their seats. Fig. 2 is a vertical central section taken longitudinally through one of the cylinders. Fig. 3 is a face elevation of one of the valves. Fig. 4 is a transverse section of Fig. 3 in the line 3 3. Fig. 5 is a similar section in the line 5 5.

In the said drawings, the reference-numeral 1 designates the cylinders, arranged side by side and supported upon any suitable supports, 2. Upon the central portions of their upper cylindrical walls, which are considerably thickened for the purpose, I form the valve-seats 3, each consisting of a concave and substantially semicircular channel arranged transversely to the axis of the cylinder. In each valve-seat is formed a single port, 5, upon each side of a central opening, 6, the latter cut through the valve-seat into the cylinder and lying transversely to the former. One of the said steam-ports 5 communicates with one end and the other with the other end of the cylinders, and said ports serve alternately as live-steam and as exhaust ports.

The valves 7 consist each of a substantially semi-cylindrical body of metal, having a central solid portion, 8, with a semi cylindrical cavity upon each side thereof. Directly over the solid portion 8 an exhaust-opening, 9, is formed in the seating-face of the valve, and upon each side thereof and alternating with each other in position are exhaust-ports 10, their inner ends having communication with the inner ends of said central opening, as shown in Figs. 3 and 5. In the same longitudinal line with each exhaust-port, but on the opposite side of the central transverse opening, 9, are formed live-steam ports 12, cut directly through the body of the valve.

In the center of the exhaust-opening 9, and in the radial line of the valve-block, is cut an aperture, 13, in which the end of a valve-stem, 14, is mounted and fastened with a nut, 15, the body of the stem being carried through the opening 6 in the valve-seat.

Within each cylinder 1 is a piston, 16, inclosing a cylindrical space, 17, and having upon each head 18 a wide flange, 19, properly packed in the cylinder 1. In the wall of each piston is formed an opening, 20, corresponding in position with the opening 6 in the valve-seat, and through the same the stem of the valve is inserted within the interior of the piston, where it telescopes, as the piston reciprocates, in a coupling, 21, pivotally attached at one end within said piston and centrally with relation to its ends. Upon the side of the piston opposite the opening 20 is formed a second opening, 22, and in the wall of the cylinder 1 is formed a central exhaust-opening, 23, a suitable exhaust-pipe, 24, being common to both cylinders.

The piston-rod 25 of one cylinder is connected in the usual manner to one end of a pitman, 26, the other end thereof being on the crank-pin 27 of the power-shaft 28. The other piston-rod, 29, is in like manner connected to a crank-pin, 30, carried by a crank-arm, 31, set at an angle of ninety degrees with the other crank-arm, 31ª. In this manner each piston is at most effective point at the moment when the other is at the end of its stroke and the crank of the latter is at its dead-points.

The steam-ports at the point where they enter the cylinder are not shown in the drawings, being of the usual construction. The flanges 19 of the pistons are of such width that the opening 22 is greater than the stroke of the piston, whereby the exhaust-port 23 is always open, as shown in Fig. 2.

What I claim is—

1. In a steam-engine, the combination, with a cylinder having a centrally-arranged valve-

seat provided with two ports in the same transverse line and a steam-port leading therefrom to each end of the cylinder, of a valve having two steam and two exhaust ports, alternating one with another, the exhaust-ports having communication with a central opening, and a valve-stem passing through said opening and connected to the piston, substantially as described.

2. In a steam-engine, the combination, with a cylinder having a steam-chest and provided with live-steam and exhaust ports, of a valve seated within said chest, a piston reciprocating within the cylinder, and a valve-stem passing from said valve through an opening therein and in the valve-seat, and having a sliding connection with the piston, substantially as described.

3. In a steam engine, the combination, with a cylinder having a central exhaust-opening, of a piston moving therein and having an exhaust-passage between its ends, a valve having exhaust-ports cut in but not through its body and communicating with a central common exhaust-opening, and a valve-stem connected to said piston, substantially as described.

4. In a steam-engine, the combination, with a cylinder having a central exhaust and provided with steam-ports which enter the cylinder at the ends, of a piston having an exhaust-passage through its body and provided with flanges on its heads, and a valve having steam-ports cut through its body, and exhaust-ports cut into but not through and communicating with a common exhaust-passage cut centrally in the seating-face of said valve, substantially as described.

5. In a steam-engine, a valve consisting of a substantially semi-cylindrical body having steam-ports cut through on opposite alternate ends and exhaust-ports similarly arranged and cut into but not through the body and communicating with a central exhaust-passage formed transversely and communicating with the inner ends of the alternately-arranged exhaust-ports, substantially as described.

6. In a steam-engine, a valve consisting of the substantially semi-cylindrical body 7, having live-steam and exhaust ports formed alternately upon opposite sides of a central transverse exhaust-opening, 9, having communication at its ends with the ends of the exhaust-port and provided with a valve-stem, 14, substantially as described.

7. In a pumping-engine, the combination, with duplex steam-cylinders having a central exhaust-opening and provided with a concave valve-seat extending centrally in front of each cylinder, of semi-cylindrical valves having two exhaust and two live-steam ports arranged upon opposite alternate portions of the transverse center of the valve, and a central exhaust-opening having communication with both the exhaust-ports, substantially as described.

8. The combination, with the cylinders having a centrally-arranged transverse double valve-seat concave in cross-section and provided with a central line of ports, with transverse openings through the seat between each pair of ports, of semi-cylindrical valves moving independently on the double seat, each valve having exhaust-ports arranged alternately upon opposite sides of a central transverse exhaust-opening and communicating with the latter, and also having alternating steam-ports upon opposite sides of the central exhaust, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD G. SHORTT.

Witnesses:
A. G. PECK,
A. A. COLLINS.