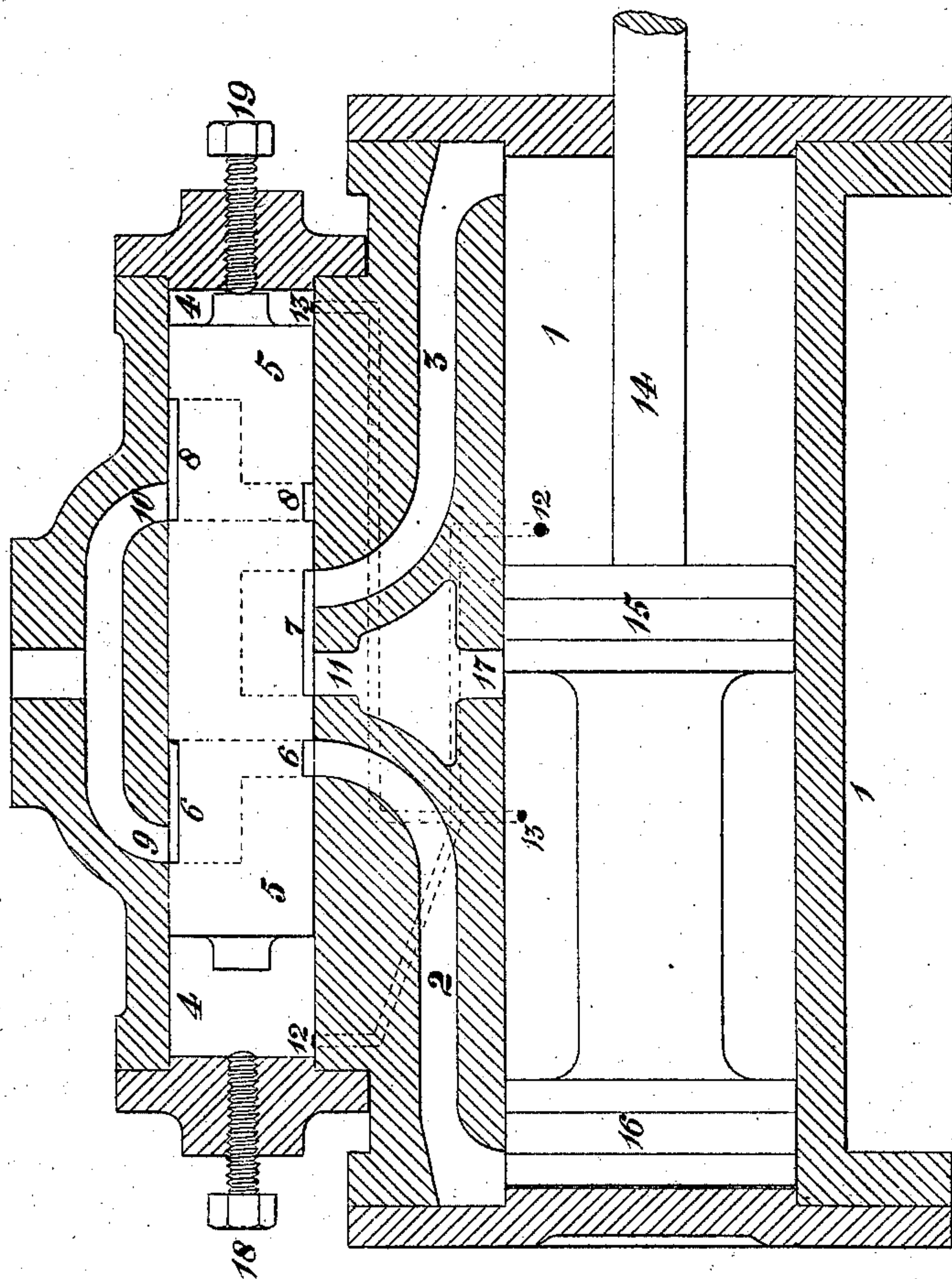


J. CLARKSON.
Direct Acting Engines.

No. 150,397.

Patented May 5, 1874.



Witnesses
Edmund Hunt
John Gentling

Inventor
John Clarkson

UNITED STATES PATENT OFFICE.

JOHN CLARKSON, OF GLASGOW, SCOTLAND.

IMPROVEMENT IN DIRECT-ACTING ENGINES.

Specification forming part of Letters Patent No. **150,397**, dated May 5, 1874; application filed March 6, 1874.

To all whom it may concern:

Be it known that I, JOHN CLARKSON, of Glasgow, in Scotland, have invented certain Improvements in Direct-Acting Steam-Engines, of which the following is a specification:

My invention relates to improved and simplified arrangements for distributing steam alternately to the opposite ends of a cylinder, such arrangements being more specially designed to apply to cylinders which are directly combined with pumps, so as to form what are known as direct-acting steam-pumps.

The accompanying drawing is a longitudinal section of a steam-engine cylinder embodying my improved arrangements.

The steam-cylinder 1 is made with the usual passages 2 3, but the valve-chamber 4 is cylindrical, the valve-piece 5 being also cylindrical and having formed in it three cavities or passages, 6 7 8. The valve-piece 5 is fitted to work steam-tight within the valve-chamber 4, or as nearly steam-tight as may be without excessive friction. The steam enters the valve-chamber 4 by two inlets, 9 10, and the exhaust takes place from it by one outlet, 11. The middle cavity 7 in the valve-piece 5 is for putting the exhaust-port 11 in communication alternately with the cylinder-passages 2 3. The other two cavities, 6 8, in the valve-piece 5 are made through it, and form passages to lead the steam alternately to the cylinder-passages 2 3. Two additional passages, 12 13, (principally indicated by dotted lines, and which are of small size,) are made between the interior of the cylinder 1 and the valve-chamber 4, their ports in the latter being at the opposite ends. The cylinder piston-rod 14 has fast on it a pair of pistons, 15 16, together equivalent to a single piston of extra length, as the steam only acts on the outer side of each. These pistons 15 16 and the ports in the cylinder of the small passages 12 13 are arranged in relation to each other so that those ports are alternately uncovered to the acting steam in each end of the cylinder, as the pistons nearly reach the opposite end. Thus, in the drawing, the pistons

15 16 are supposed to have just reached the inner end of their stroke, and the steam, having had access by the small passage 12 to the corresponding end of the valve-chamber 4, is supposed to have forced the valve-piece 5 toward the other end, so as to admit steam for the return stroke of the pistons 15 16. The middle of the interior of the cylinder 1 communicates, by a port, 17, with the exhaust-passage 11, and consequently, when one end of the valve-chamber 4 is accessible to the steam, the other end of that chamber is in communication, through its passage—13, for example—through the middle of the cylinder, and through the port 17, with the exhaust-passage 11. With these arrangements, as the pistons 15 16 approach either end of their stroke, they admit steam, by one of the small passages 12 13, to move the valve-piece 5, so as to reverse the action of the steam and motion of the pistons. The pistons 15 16 are prevented from knocking against the ends of the cylinder 1 by regulating the extent of movement of the valve-piece 5, so as to uncover less or more of the ports 2 3 to the admission of steam; and this regulation is effected by means of stop-pins 18 19, screwed in through the covers of the valve-chamber 4. The valve-piece 5 is itself prevented from knocking violently against the stop-pins 18 19 by suitably proportioning the small passages 12 13; or screw-pins may be entered into these passages from the outside, at any convenient part, to regulate the flow of steam by them, by more or less obstructing the passages.

I am aware of the patent granted to C. A. Conde, July 16, 1872, which I hereby disclaim.

I claim—

The combination of the valve-piece 5 with the small additional passages 12 13, duplex piston 15 16, and port 17, arranged and working in the manner and for the purposes herein set forth.

JOHN CLARKSON.

Witnesses:

EDMUND HUNT,
JOHN JENKINS.