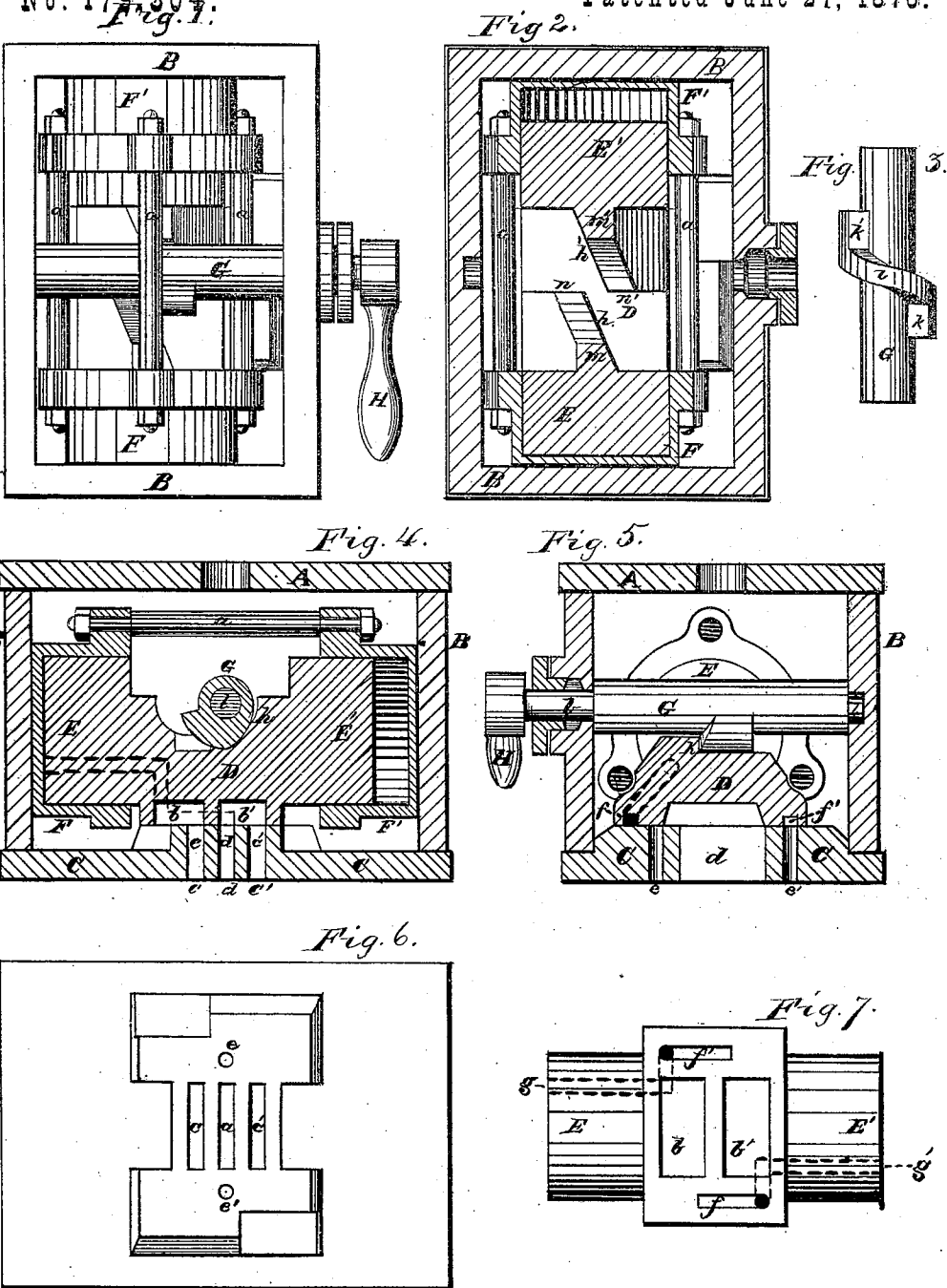


J. HARE.

VALVES FOR DIRECT ACTING ENGINES.

No. 172,304.

Patented June 27, 1876.



Witnesses
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IMPROVEMENT IN VALVES FOR DIRECT-ACTING ENGINES.

Specification forming part of Letters Patent No. 179,304, dated June 27, 1876; application filed February 17, 1876.

To all whom it may concern:

Be it known that I, JAMES HARE, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Valves of Direct-Acting Engines for operating pumps and other purposes; and the following is a full, clear, and exact description of the same.

This invention relates to valves of the description referred to in Letters Patent Nos. 161,610 and 166,002, issued to me on April 6, and July 27, 1875, for the purpose of regulating the admission of steam to and its escape from the ports of the pump or machine.

This invention consists in the combination, with a valve having its face formed with suitable openings for admitting and discharging steam to and from the cylinders, and capable of two motions at right angles to each other, and also having its ends formed as pistons or cylinders, of suitably-arranged cylinders or pistons adapted to work with said ends, and a peculiarly-formed cam, which serves to partially effect the double motion of the valve, the balance of said motion being effected by said pistons or cylinders.

In the accompanying drawing, Figure 1 represents a top view of a steam-chest fitted with my improvement, the cover being removed. Fig. 2 is a horizontal section through the axes of the supplemental cylinders. Fig. 3 is the cam employed to give the double motion to the valve. Fig. 4 is a vertical longitudinal section through the axes of the supplemental cylinders. Fig. 5 is a transverse section through the center of the valve. Fig. 6 is a plan of the valve-seat; and Fig. 7 is a view of the under side of the valve, showing the passages formed therein for supplying and exhausting steam to and from the main and supplemental cylinders.

Similar letters have reference to corresponding parts.

B represents the steam-chest, of which A is the cover, and which sets, in the usual manner, upon the cylinder, of which C is a portion. Upon the cylinder is a raised valve-seat, having the steam-ports *c c'* communicating with the ends of the main cylinder, and also the exhaust-port *d*, and with it the two small ports *e e'*, for exhausting the supplemental cylinders.

D is a valve, having its ends E E' formed as pistons working into suitable cylinders; or the ends may be formed as cylinders and work over stationary pistons. In the face of the valve, Fig. 7, are formed the ports *b b'*, for acting on the main cylinder, and *f f'* for acting on the supplemental cylinders and ports communicating with the ports *g g'*. On the back of the valve are lugs *m m'*, which are acted upon by the spiral cam *i* coming in contact with the faces *h h'*, and so serving to give the valve its lateral motion. At the ends of the spiral are cogs *k k'*, which, when the spiral has reached the extremity of its motion, act upon the faces *n n'*, carrying the valve longitudinally until in a position to be acted upon by the supplemental cylinders. E E' are the supplemental cylinders, united by bolts *a a*. These cylinders are capable of moving freely in the steam-chest B in every direction except longitudinally. In case the valve or parts attached should need attention, the valve and attached cylinders may be lifted out of the chest for examination or repairs—an advantage of great importance.

The cam *i k k'* is formed on a sleeve, G, which slips over and is fastened upon a shaft, *l*, which is operated from the outside of the chest by the lever H—another form of my invention in which the valve is cylindrical; and the supplemental cylinders, being concentric with it, receive no motion during the lateral travel of the valve, being held in position by suitable lugs in the chest. In all other respects it resembles the form described.

The operation is as follows: The steam-chest being connected with the boiler, steam passes freely through the valve-port *b*, Fig. 4, and cylinder-port *c*, pushing the piston from left to right in the cylinder. As it moves the piston carries with it the lever H, which is suitably connected to it, and this, in turn, produces the partial revolution of the cam *i k k'*, thereby moving the valve laterally until the piston has nearly completed its stroke. Then the supplemental port *f* communicates with the exhaust-port *e*, and at the same moment the tooth *k* comes in contact with the face *n*, and carries the valve longitudinally until the port *f*, sliding off the valve-seat, allows the steam which fills the steam-chest to enter the

supplemental cylinder F through the passage *g*, the steam thereby completing the throw of the valve. A like action takes place during the opposite throw of the valve.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Substantially as hereinbefore set forth, the cam formed by a portion of a spiral, terminated at either end by a tooth, *k k'*, said teeth to act in combination with the spiral, and give a motion at right angles to that produced by it.

2. The combination, substantially as here-

inbefore set forth, of the above-described cam with a suitably-formed valve, having projections *h h'* on the back, to engage with the acting surfaces of the cam, which serves to give the said valve its transverse motion, and its longitudinal motion, so far as may be necessary.

Witness my hand this 9th day of February, A. D. 1876.

JAMES HARE.

Witnesses:

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ALFRED BLAISDELL.