4 Sheets--Sheet 1.

J. NORTH.
Steam Pump.

No. 162,409. Patented April 20, 1875.

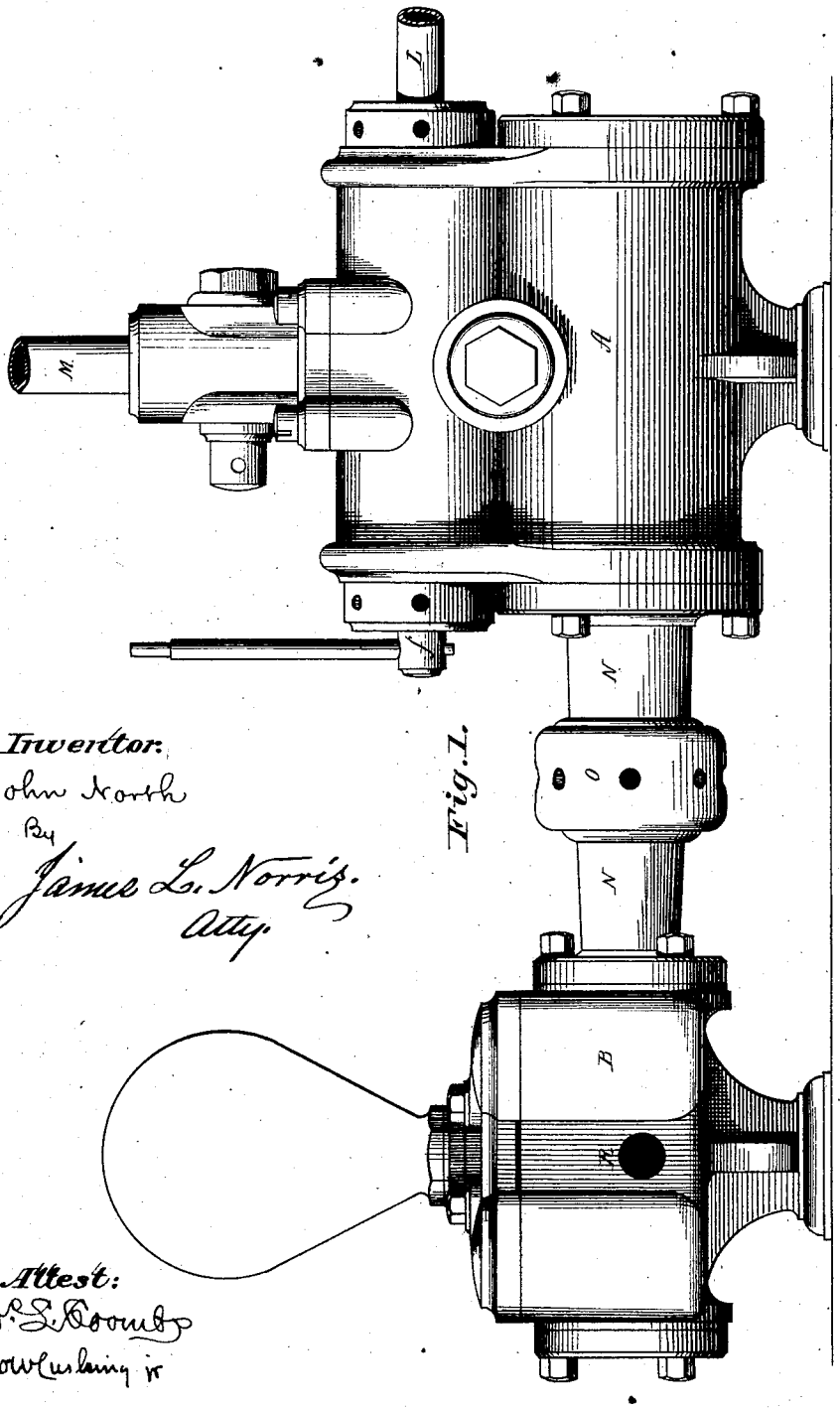

Fig. 1.

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Steam Pump.

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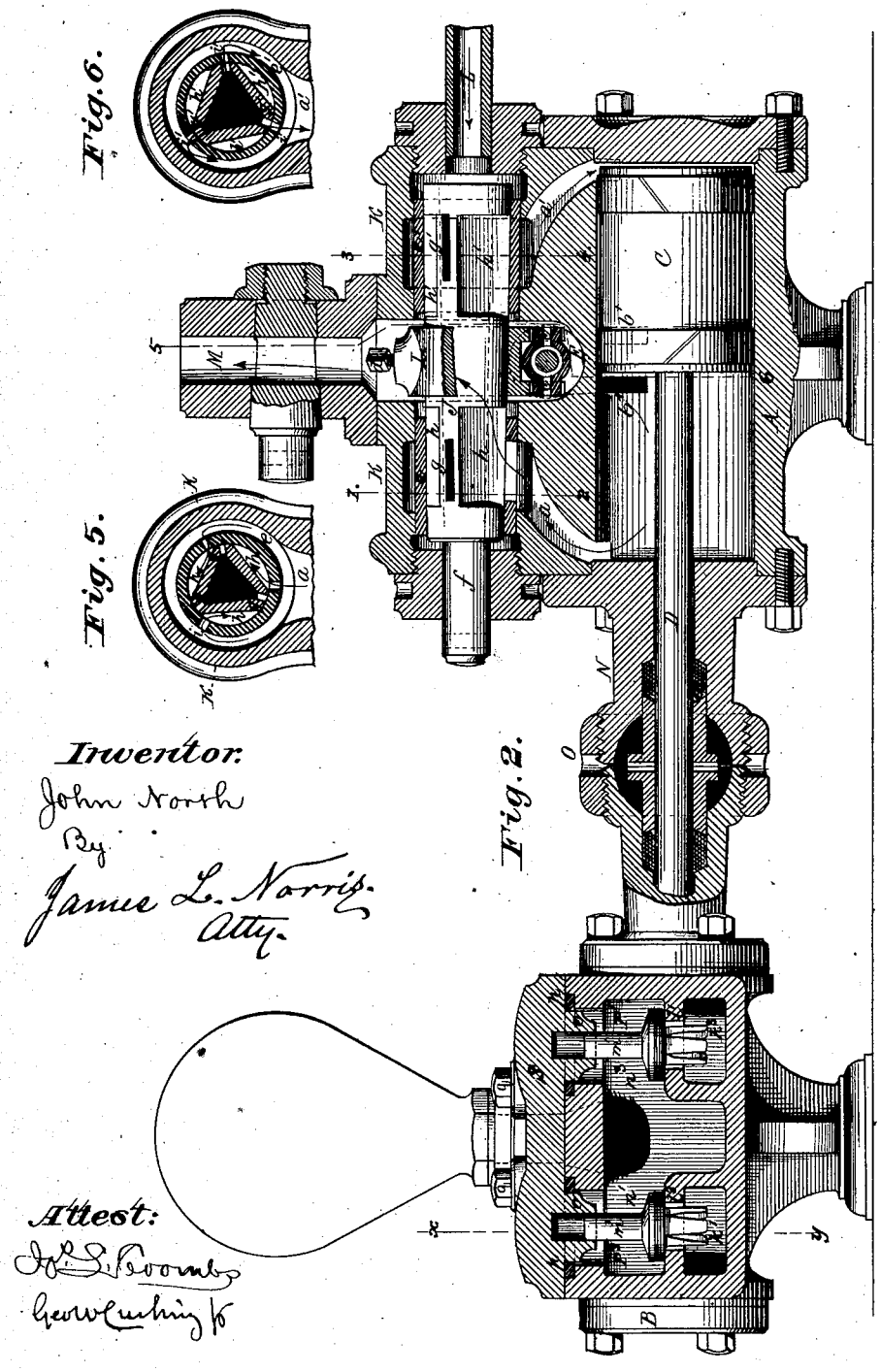

Fig. 6.

Fig. 5.

Fig. 2.

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Fig. 4.

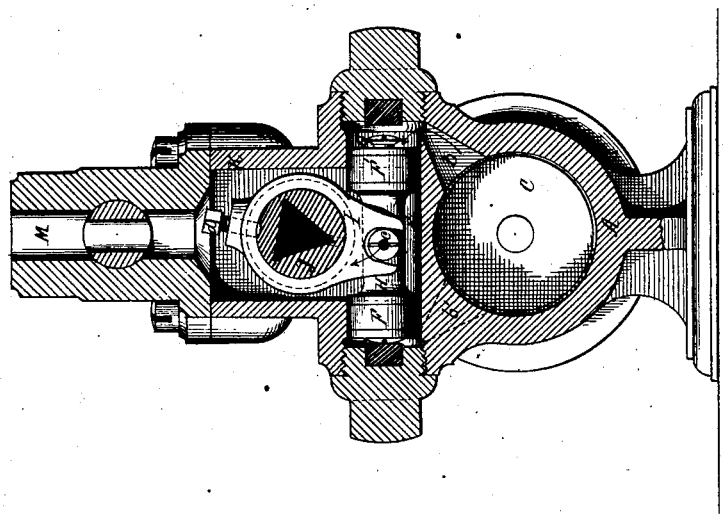
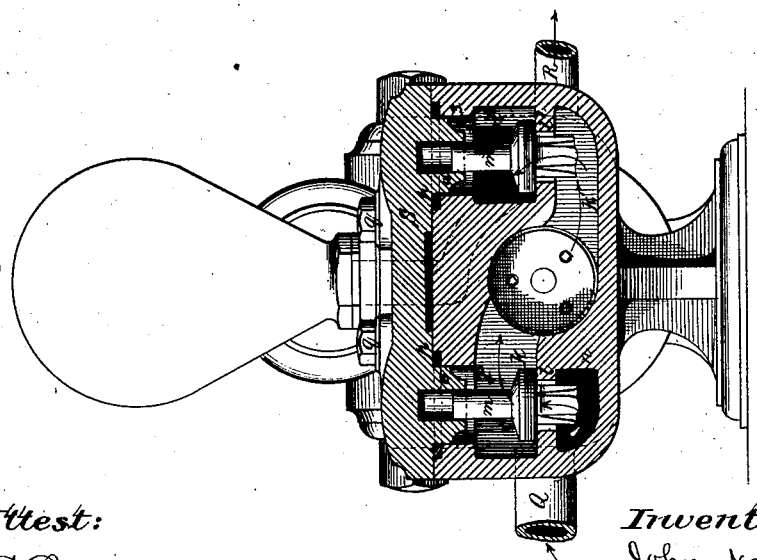


Fig. 3.



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Steam Pump.

No 162,409. Patented April 20, 1875.

Fig. 11.

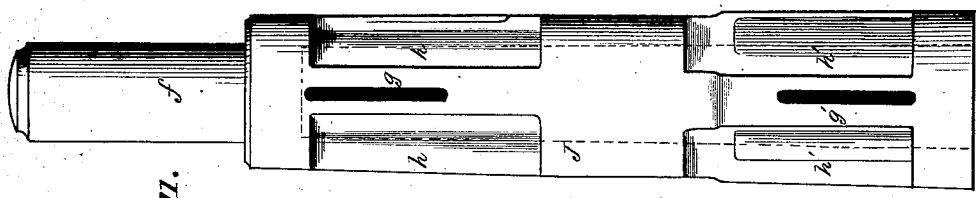


Fig. 8.

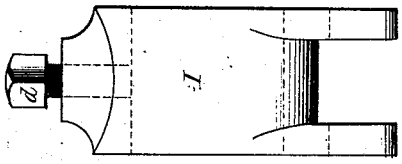


Fig. 10.

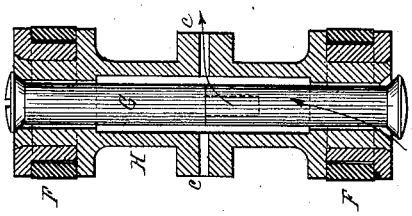


Fig. 7.

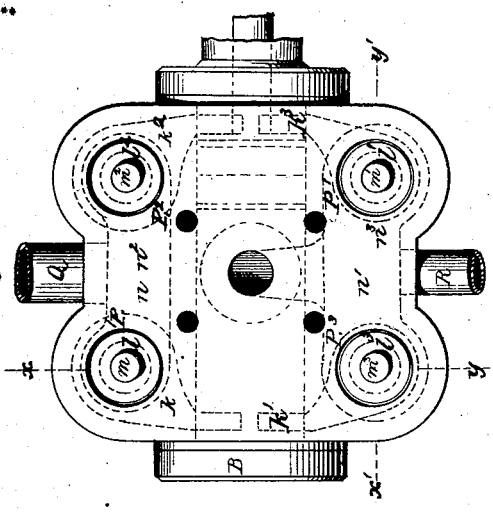
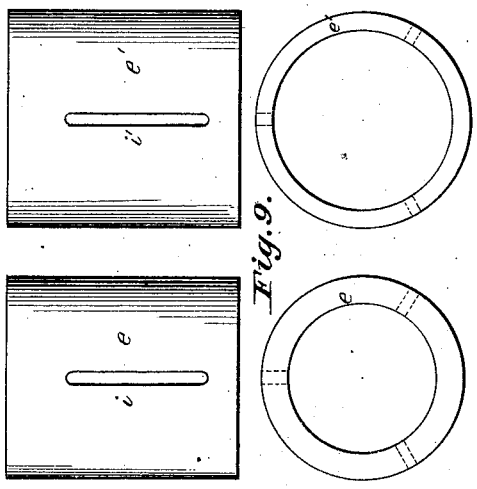


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN NORTH, OF SOUTHINGTON, CONNECTICUT.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. **162,409**, dated April 20, 1875; application filed February 27, 1875.

To all whom it may concern:

Be it known that I, JOHN NORTH, of Southington, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Steam-Pumps, of which the following is a specification:

This invention consists in the combination of an oscillating steam-valve with a steam-moved piston-valve extending transversely to the steam-valve, and fitted into an auxiliary cylinder, the ends of which communicate with the main cylinder. The oscillating steam-valve works in glands fitted into the steam-chest, and it is provided with a stem which extends through one end of the steam-chest, so that, by applying to this stem a suitable lever or starting-bar, the steam-valve can be moved by hand for the purpose of starting the pumping-engine. The steam-cylinder and the pump-cylinder are secured together by a tubular connection, which is made in sections, each section containing a gland and stuffing-box, so that when said sections are drawn together, either by a nut or by flanges and bolts, a steam-tight joint is formed on the piston-rod which extends through said tubular connection.

The double-acting pump-cylinder has two induction and two eduction ports located each side or nearly on line with the center of the pump-cylinder, and all of said ports have separate passages one from the other, and the valve of each pump and its seat are likewise independent of each other, so that the pump can be worked single or double acting.

In the drawings, Figure 1 represents a side elevation. Fig. 2 is a longitudinal vertical section. Fig. 3 is a transverse section of the pumping-cylinder in the plane *x y*, Fig. 2. Fig. 4 is a similar section of the steam-cylinder in the plane 5 6, Fig. 2. Fig. 5 is a transverse section of the main steam-valve in the plane 1 2, Fig. 2. Fig. 6 is a similar section of the same in the plane 3 4, Fig. 2. Fig. 7 is a plan of the pump-cylinder, the bonnet of the valve-chamber having been removed. Figs. 8, 9, 10, and 11 are details, which will be referred to as the description progresses.

Similar letters indicate corresponding parts in all of the figures.

In the drawings, the letter A designates the steam-cylinder, and B is the pump-cylinder of my steam-pump. In the steam-cylinder is fitted the piston C, which connects by a rod, D, with the plunger of the pump-cylinder. The steam-piston C extends throughout one-half the bore of the steam-cylinder, or nearly so, and said cylinder is provided with four ports, *a a' b b'*, Figs. 2 and 4, the ports *a a'* being situated near the ends of the cylinder and serving as the regular steam and exhaust ports, while the ports *b b'* are situated near the middle of the cylinder, and communicate with the opposite ends of the auxiliary cylinder E, best seen in Fig. 4 of the drawing. In this cylinder is fitted a double piston, F F', a detached section of which is shown in Fig. 10. This piston is fitted loosely on a rod, G, and its two heads are connected by a tube, H, which is provided in the middle with hollow nipples *c c*. On these nipples is placed a yoke, I, a detached view of which is shown in Fig. 8. The tubular body of this yoke embraces the cylindrical central part of the steam-valve J, being fastened to the same by a set-screw, *d*. The steam-valve, a detached view of which is shown in Fig. 11, is made in the form of a tapering plug, which works in glands *e e'*, that are fitted into the steam-chest K, as shown in Fig. 2. Said steam-chest is supplied with steam through a pipe, L, and the steam-exhausts through the pipe M. The steam-valve is hollow nearly throughout its entire length, and from its solid small end extends a pin, *f*, through a stuffing-box in one end of the steam-chest, so that by applying a lever or starting-bar to this pin the steam-valve can be turned and the pump can be started. Those portions of the steam-valve which work in the glands *e e'* are provided with ports *g g'*, which communicate with the internal bore or channel of the valve, and through this channel with the steam-pipe L. In said portions are formed recesses *h h'*, by cutting away parts of the plug, and these recesses communicate with the exhaust-pipe M. The glands *e e'* are provided with ports *i i'*, the ports *i* in the gland *e* being in communication with the port *a* of the cylinder, (see Fig. 5,) while the ports *i'* in the gland *e'* communicate with the port *a'* of the cylinder. (See Fig. 6.) If the steam-valve is turned to the position shown in Figs. 2, 5, and

6, the steam passes into the steam-cylinder through the ports g', i', and a', and it exhausts through the ports a and spaces h, as indicated by the arrows.

The motion of the steam-valve takes place as follows: When the steam-piston, as the same moves in the direction of the arrow marked on it in Fig. 2, clears the port b, steam enters the auxiliary cylinder E, and throws the piston F F′ to the position shown in Fig. 4, and by this motion the steam-valve is turned to the position shown in Figs. 2, 5, and 6. The steam from the auxiliary cylinder exhausts through the hollow part of the piston F F′ and through the nipples c c, as indicated by the arrows in Fig. 10. The motion of the steam-valve takes place before the steam-piston has reached the end of its stroke, so that the said piston is cushioned and prevented from slamming against the cylinder-head. When the steam-piston on its return stroke clears the port b' (Fig. 2) the steam-valve is changed, and by these means steam is admitted into the steam-cylinder alternately at one end and then at the other end, and a uniform reciprocating motion is imparted to the steam-piston.

The cylinders A and B are secured together by a tubular connection, N, which is made in sections, one section being fastened to the head of the cylinder A, and the other to the head of the cylinder B, while the two sections are fastened together either by a coupling-nut, O, with a right and left hand thread, as shown in Fig. 2, or by bolts and flanges. The piston-rod D enters through the tubular connection N, and in the interior of this connection are formed stuffing-boxes, the glands of which are forced in when the coupling-nut O is tightened up, so that a steam-tight joint is formed round the piston-rod, and at the same time the two cylinders are firmly united.

The pump-cylinder B is provided with four ports, k, k^1, k^2, and k^3, each of which communicates with a separate valve-chamber P P^1 P^2 P^3, and in these valve-chambers are formed the seats l l^1 l^2 l^3 for the valves m m^1 m^2 m^3. The ports k and k^2 are situated above the valve-seats l l^2, while the ports k^1 k^3 are situated below the valve-seats l^1 l^3, and the valve-chamber P P^2 communicates with the supply-pipe Q through channels n n^2, while the valve-chamber P^1 P^3 communicates through channels n^1 n^3 with the delivery-pipe R.

The two induction and the two eduction ports of the double-acting pump-cylinder are located each side or nearly on line with the center of the pump-cylinder, and each of said ports have separate passages, one from the other, as clearly illustrated in the accompanying drawings.

If the pump is in operation, and the plunger moves in the direction of the arrow shown in Fig. 7, the pump draws water through the valve m, and it delivers water through the valve m^1, and when the plunger moves in the opposite direction to said arrow the pump draws water through the valve m^2, and it delivers water through the valve m^3.

The valves and valve-seats are entirely independent from each other, and if either of the valves, from some cause, becomes inoperative, the pump continues to act. For instance, if the valve m should become inoperative the pump will draw water through the valve m^2, and deliver water through the valve m^3, but on its return stroke the pump will not act. In other words, if all the valves are in good working order the pump is double-acting, but if one of the valves becomes inoperative the pump is simple-acting; but in no case my pump will fail to act entirely unless two of the valves become inoperative at the same time. The bonnet S, which serves to close the several valve-chambers in the pump-cylinder, is provided with four projections, o, which are bored out to form the guides for the valve-stems, and which fit into corresponding cavities leading down into the valve-chambers. Round each of these projections is placed a gasket, p, and, if the bonnet is screwed down by the screw q, the joints round the projections o are rendered tight. By removing the bonnet free access can be had to all the valves.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of an oscillating steam-valve with a steam-moved piston-valve, extending transversely to the steam-valve and fitted into an auxiliary cylinder, the ends of which communicate with the main cylinder, substantially as shown and described.

2. The combination, with a steam-moved piston-valve, of an oscillating valve which may work in glands, provided with a stem extending through the steam-chest to allow of the oscillating valve being turned within its seat by means of a wrench or other device.

3. The combination of a tubular connection with the steam-cylinder and pump-cylinder of a direct-acting steam-pump, said connection being made in sections which are drawn together, and when drawn together form a tight joint on the piston-rod, substantially as and for the purpose described.

4. The double-acting pump-cylinder having two induction and two eduction ports located each side, and nearly on line with the center of the pump-cylinder, all said ports having separate passages, one from the other, substantially as set forth.

In testimony that I claim the foregoing, I have hereunto set my hand.

JOHN NORTH.

Witness:

JAMES L. NORRIS,

GEO. W. CUSHING, Jr.