H. R. Worthington,

Steam Pump.

No. 13,370. Patented July 31, 1855.

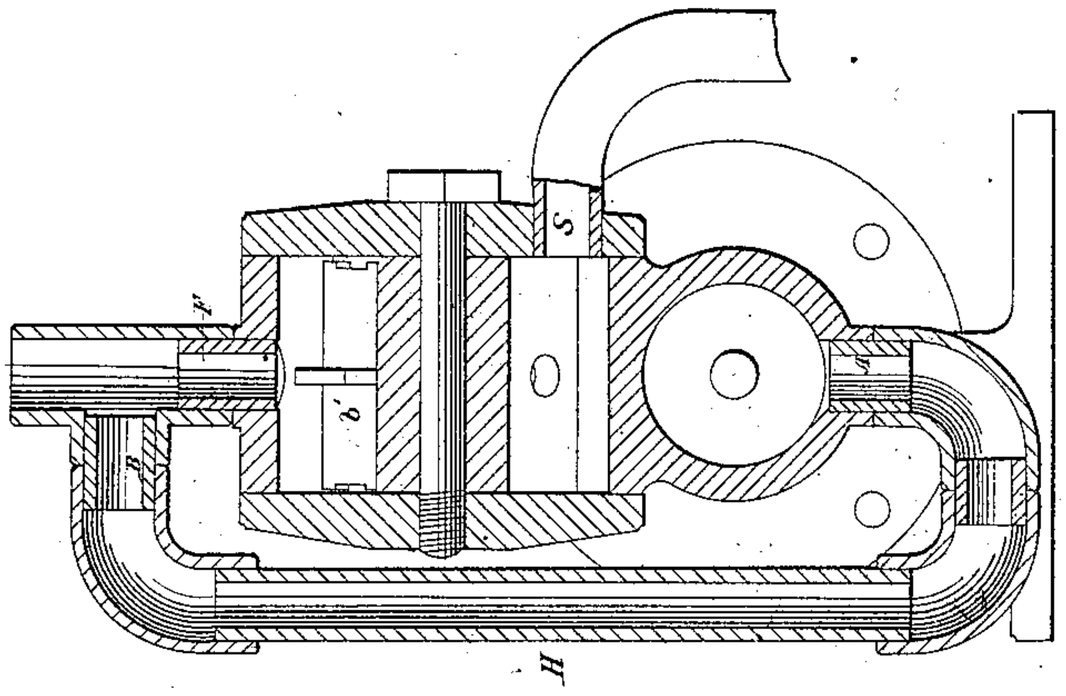

Fig. 2.

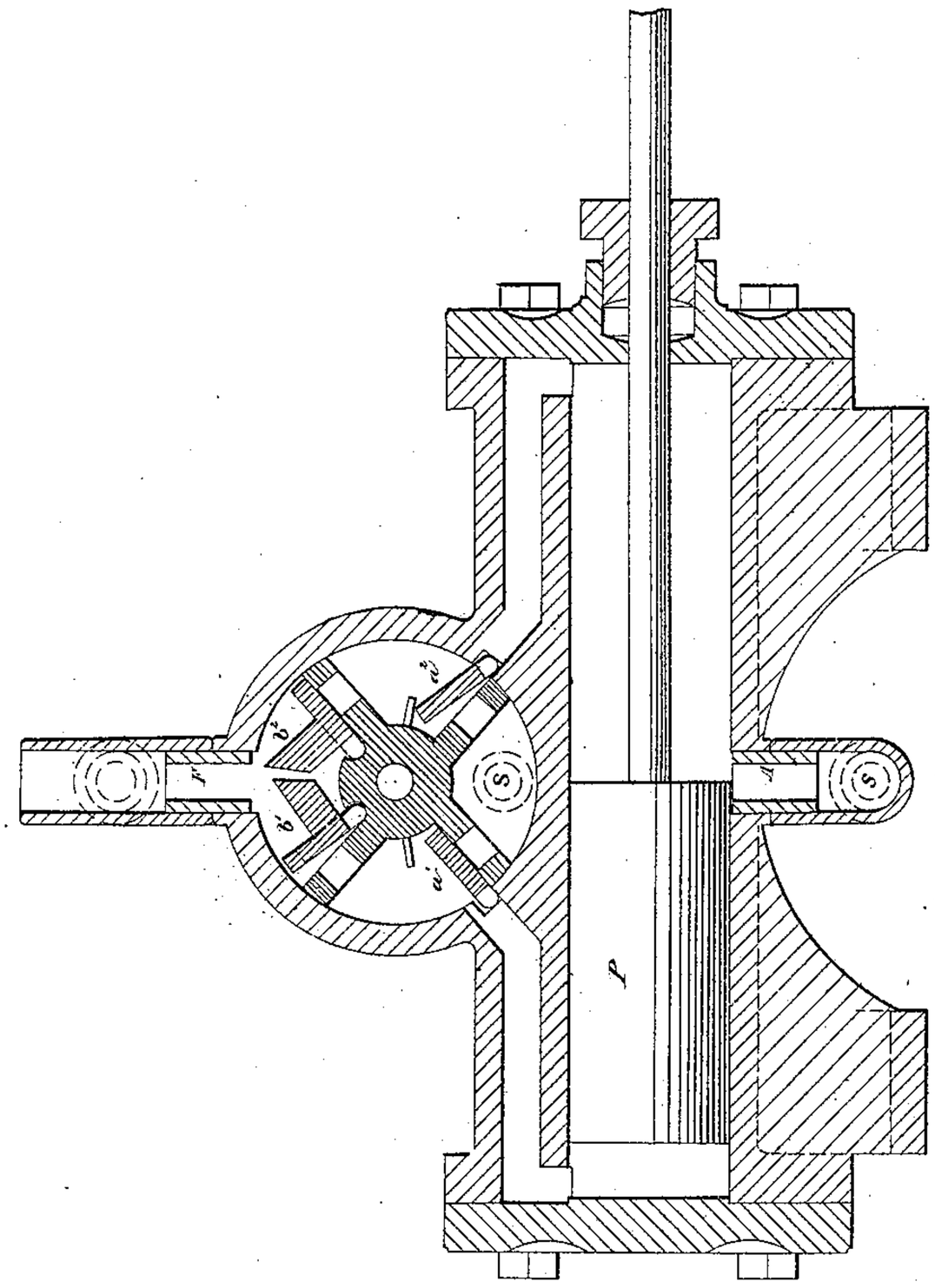

Fig. 1.

UNITED STATES PATENT OFFICE.

HENRY R. WORTHINGTON, OF BROOKLYN, NEW YORK.

DIRECT-ACTING HYDRAULIC STEAM-PUMP.

Specification of Letters Patent No. 13,370, dated July 31, 1855.

To all whom it may concern:

Be it known that whereas on the 3d day of April, 1849, Letters Patent of the United States were granted to the undersigned and Wm. H. Baker for a new and improved method of insuring the action of steam-valves in direct-action pumping-engines, of which patent the undersigned is now sole owner by virtue of an assignment duly recorded, and whereas in said patent claim is made to but one method or plan of construction whereby the general principle of their invention may be carried out, now therefore be it known that I, HENRY R. WORTHINGTON, of the city of Brooklyn, county of Kings and State of New York, have invented another method of carrying the object of said Worthington and Baker's invention into useful operation and that the following is a full and exact description thereof, reference being had to the annexed drawings, making part of this specification.

In the specification making a part of the Letters Patent granted as aforesaid to Worthington and Baker it is stated that in their improved manner of constructing direct-acting pumping engines the momentum of the moving parts and the expansion of the steam are made to conspire to carry the steam valve through its full distance of travel by making two openings into each end of the pump cylinder, coming together into one main opening. Now when the piston arrives nearly at the end of the stroke, the resistance is suddenly reduced for the reason that the water piston passes between the two openings, and allows the fluid pressed before it to pass with little or no obstruction behind it. When the resistance is thus suddenly relieved the momentum of the moving parts and the expansion of the steam already within the cylinder act to push the steam valve with quickness and certainty entirely over the openings. My improved method of producing this necessary effect of reducing or relieving the resistance at or near the end of the stroke may be thus described:

The drawings represent a double acting pump with the piston rod broken off. The steam cylinder and the attachment of the pump thereto are not shown, as the arrangement may be that of the direct action pumping engine as ordinarily constructed and particularly explained in the before mentioned specification of Worthington and Baker, to which reference may be had for a more complete understanding of this class of engines.

Figure 1 is a longitudinal section of the pump and Fig. 2 a transverse section thereof.

The suction valves a^1 a^2 admit the water at the proper time from the supply pipe S and the force valves b^1 b^2 deliver the same into the discharge pipe F. An opening A is made into the middle of the water cylinder or chamber, connecting with the force pipe at B by means of the connecting pipe H. It is practically a matter of no consequence where this connection with the fluid beyond the force valves is made, as the pipe may be longer or shorter to suit convenience. The piston P is made sufficiently wide to keep the opening A covered until the stroke is nearly completed. At that point the piston passes off from the opening into the position represented in the drawing and allows the fluid from the force pipe to flow through the pipe H and the opening A into the chamber behind the piston. Here it will act to produce pressure upon the piston P. In practice, this pressure may not and probably will not be equal to that which resists the motion of the piston on the opposite side, but it will approximate thereto. Upon this equalization of pressure on both sides of the piston or approximation thereto I depend for the necessary reduction or removal of the resistance to the motion of the piston. This being obtained, the expansion of the steam already within the cylinder or the momentum of the moving parts or both conjoined will act precisely as stated in the aforesaid specification of Worthington and Baker, to propel the steam valve across the ports so suddenly as to give it its full motion.

Having thus described my improved method of carrying the object of said Henry R. Worthington and Wm. H. Baker's invention into effect, what I claim as new and desire to secure by Letters Patent is—

The within described mode of counteracting the resistance to the motion of the pump piston in direct action pumping engines by which the steam valve is moved—that is to

say, by making a passage into the pump chamber or cylinder, so arranged that said passage or opening shall for a time be uncovered or disclosed at or near the end of each stroke of the piston by which the fluid which is beyond or above the force valves passes behind the water piston and makes pressure thereupon in the direction of said piston's motion for the purposes herein set forth.

HENRY R. WORTHINGTON.

In presence of—
DAUPHINE L. HINES,
A. WORTHINGTON.