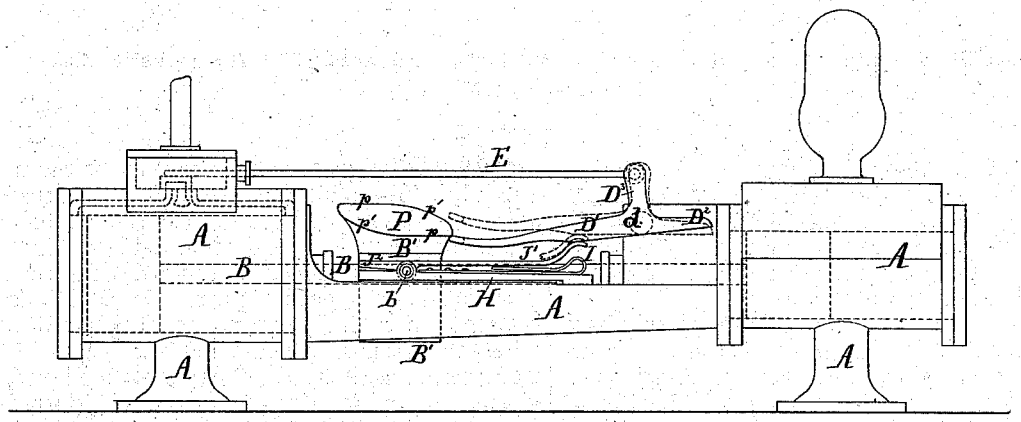
B. S. LAWSON.

STEAM-PUMP VALVE-GEAR.

No. 186,584. Patented Jan. 23, 1877.



Witnesses:

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UNITED STATES PATENT OFFICE.

BENJAMIN S. LAWSON, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-PUMP VALVE-GEARS.

Specification forming part of Letters Patent No. **186,584**, dated January 23, 1877; application filed December 23, 1876.

To all whom it may concern:

Be it known that I, BENJAMIN S. LAWSON, of New York city, in the State of New York, have invented certain new and useful Improvements relating to Steam-Pumps, of which the following is a specification:

The pump is of the direct-acting class, where the pump-piston and steam-piston are, practically, parts of the same reciprocating mass. The improvements lie in the means for throwing the valve.

Letters Patent issued to me dated December 23, 1873, No. 145,806, describe an arrangement wherein a spring is carried on the reciprocating parts, which, as the piston reciprocates, changes its point of pressure from one end to the other of a lever, and thereby, as the piston approaches either end of its stroke, causes the lever to rock and change the position of the valve to induce the return stroke. A crank was employed in that construction to control the movement of the lever which operated the valve.

I find the crank may be dispensed with, and have devised means whereby I obtain a prompt and reliable movement of the valve without any such incumbrance. I have wrought out the invention with devices to insure that the valve will be thrown to the proper extent before the piston has moved far, in case the spring is insufficient to induce the proper extent of motion; and I have provided means for restraining the action of the spring, so as to prevent its acting beyond the proper limit in case it shall, as is usually the fact with a new spring, have more than the proper amount of force.

The accompanying drawing forms a part of this specification, and is a side elevation. The pistons are to the left. The valve-lever is shown in the dotted line in the position to which it is thrown by the spring so soon as the pump has passed the center. The strong line shows the position in which it is held a moment previous.

Referring to the drawing, A is the fixed framing and cylinders. B is the piston-rod, extending through from the steam-cylinder to the pump, the steam-cylinder being at the left. On the piston-rod B is keyed a part, B′, which extends down, and is guided in a longitudinal slot in the framing A, and also extends upward and carries a cam, P, formed as represented. This cam is incapable of any motion but a direct reciprocation with the pistons. Its several parts will be designated by further letters, as *p p′*. A peculiar lever, having several arms or separate parts, D^1 D^2 D^3, is mounted on a fixed center or rocking shaft, *d*. The valve-stem E is connected to the arm D^3, and reciprocates by the rocking of the lever, thereby working a valve, (shown in dotted lines,) which performs its usual functions. A center or pivot bolt, *b*, is fixed in the side of the part B′, to which are knuckled two levers. The lever H travels smoothly backward and forward, being guided on the framing A, and forms simply a support or shoe for a spring, I. A lever, J^1 J^2, is also knuckled on the pivot-bolt *b*, which is capable of a slight rocking motion. The long arm J^1 is forced upward by the spring I. The short arm J^2 serves simply as a stop to prevent the other arm, J^1, from being thrown too high. The arm J^1 finds a smooth bearing against the under face of the lever D^1 D^2, being rounded (or, if preferred in any case, provided with a shoe) to accommodate the bearing to the changing angle of the lever against which it rocks.

As the part B′ and its connections traverse alternately to the right and the left, the bearing of the lever J^1 against the lever D^1 D^2 changes its position from end to end. As it approaches either end of its stroke, the corresponding end of the lever D^1 D^2 is pressed upward. The cam P restrains its motion, and forbids any movement until the pistons have completed their stroke. Then the side projection (which will be understood is on the end of the arm D^1) is liberated by having passed beyond the end of the cam P; and the parts, being thus set free, are thrown by the force of the spring I, acting through the arm J^1, and the valve-stem E is moved to change the position of the steam-valve. In case the throw thus effected is not quite complete, as is indicated by the dotted lines in the figure, and only a partial opening of the steam-valve is effected, the commencement of the motion of the pistons will bring the part *p′* of the cam P into action, and thus carry the arm D^1 up or down, as the case may be, to its full proper extent.

In case the motion resulting from the action of the spring I should, instead of thus being too little, be in any case too much, and should tend to throw the parts too far, the contact of the arm J^2 against the adjacent portion of the part H arrests the movement.

Various modifications may be made in the forms and proportions of the parts without defeating the objects of the invention. Various refinements may be added—as, for example, a screw may be inserted through the arm J^2, to adjust the point at which the rise of the arm J^1 under a too forcible action of the spring I shall be arrested. A roller may be provided on the side projection on the arm D^1, to form a rolling contact, rather than a sliding one, with the cam; but I do not believe any such necessary in ordinary cases. That portion of the cam P which holds the parts against being thrown too early is designated *p*. It may be of the form represented, exactly parallel to the piston-rod, with a rounded corner; or it may be further rounded; or variously modified, so long as it holds the valve against being thrown too early.

I claim as my invention—

The spring I and cam P *p*, each traversed as specified, in combination with a rocking lever traversed and operated by the joint action of the spring and cam, and with the lever J^1 J^2, connected valve-rod E, and the cylinders and pistons of a steam-pump, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 20th day of December, 1876, in the presence of two subscribing witnesses.

BENJAMIN S. LAWSON.

Witnesses:

THOMAS D. STETSON,

CHAS. C. STETSON.