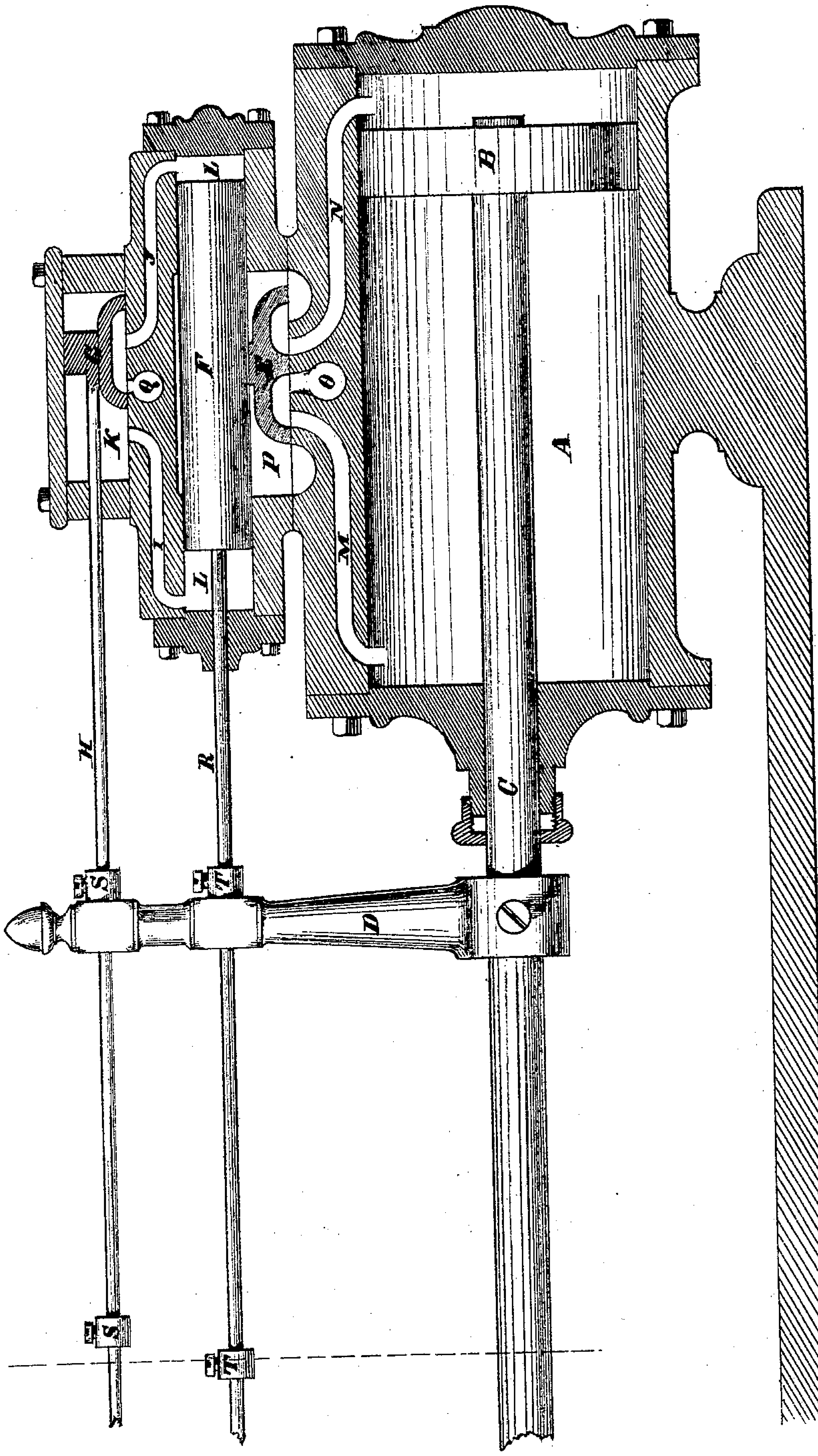
L. J. KNOWLES.

Improvement in Steam-Pumping Engines.

No. 114,506.

Patented May 2, 1871.



Inventor Lucius J. Knowles

Witnesses

UNITED STATES PATENT OFFICE.

LUCIUS J. KNOWLES, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN STEAM PUMPING-ENGINES.

Specification forming part of Letters Patent No. **114,506**, dated May 2, 1871.

To all whom it may concern:

Be it known that I, LUCIUS J. KNOWLES, of the city and county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Steam Pumping-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, which represents a central vertical section through the steam-cylinder and valve-boxes.

To enable those skilled in the art to which my invention belongs to make and use the same, I will proceed to describe it more in detail.

The nature of my invention consists in the combination, with the valve-driving piston, of a valve-rod and tappets, as hereinafter described.

In the drawing, the part marked A represents the steam-cylinder; B, the piston; C, the piston-rod; D, the tappet-arm; E, the main valve; F, the valve-driving piston; G, the supplementary valve, and H the supplementary valve-rod. I and J indicate the passages from the supplementary valve-chamber K to the cylinder L of the valve-driving piston F, and M N indicate the passages from the main valve-chamber P to the steam-cylinder A. O and Q indicate the eduction-passages from the main and supplementary valves respectively.

I arrange a main valve-rod, R, in the end of the valve-driving piston F, which extends across the machine parallel to and beneath the supplementary valve-rod H. Both valve-rods pass through openings in the tappet-arm D, and both are provided with adjustable tappets S and T, which may be actuated by the tappet-arm D when the machine is in operation.

In steam pumping-engines as heretofore constructed the supplementary valve G is operated by the tappet-arm D and rod H, and regulates the flow of steam into and from the cylinder L of the valve-driving piston F, which piston F operates the main valve that governs the flow and exit of steam in the principal steam-cylinder A.

Now, in case the passages I or J, which are of small size, become choked with water, and prevent or retard the flow of steam to the valve-driving piston F, the main valve E will not operate with the proper dispatch, and the piston B is liable to be driven against the cylinder-head, and thereby do serious damage to the engine.

To obviate this difficulty, I apply the rod R to the valve driving piston and arrange the tappets T upon said rod in such positions that the tappet-arm D will come into contact with one of the tappets T and move the main valve E before the piston B has reached the cylinder-head, and the steam, entering the cylinder in front of the piston, changes the direction of its motion before any damage can be done.

The drawing shows the parts as they would appear when the piston had moved to its utmost extent and the main valve had been opened by the aid of the tappet-arm and rod R.

When the engine is running at ordinary speed and the passages are perfectly clear, the tappet-arm will not strike the tappets T, because the valve-driving piston F and valve E will be operated by the effect of the steam before the arm reaches the tappet T. But when the engine is working very fast, or when first started, the steam is liable to condense in the passages I and J, and thereby prevent the perfect action of the main valve; hence the need of some device to insure its operation at all times and under all circumstances. Combining with the valve-driving piston F the rod R and tappets T accomplishes this object in a very efficient and simple manner, and render the working of the valves positive under all circumstances, and thus insure the perfect action of the engine.

Having described my improvement in steam pumping-engines, what I claim therein as new and of my invention, and desire to secure by Letters Patent, is—

The combination, with the valve-driving piston F and tappet-arm D, of the valve-rod R and tappets T T, substantially as and for the purposes herein set forth.

LUCIUS J. KNOWLES.

Witnesses:

THOS. H. DODGE,

CHAS. H. BURLEIGH.