

(No Model.)

2 Sheets—Sheet 1.

J. T. METCALFE.

STEAM ENGINE.

No. 337,184.

Patented Mar. 2, 1886.

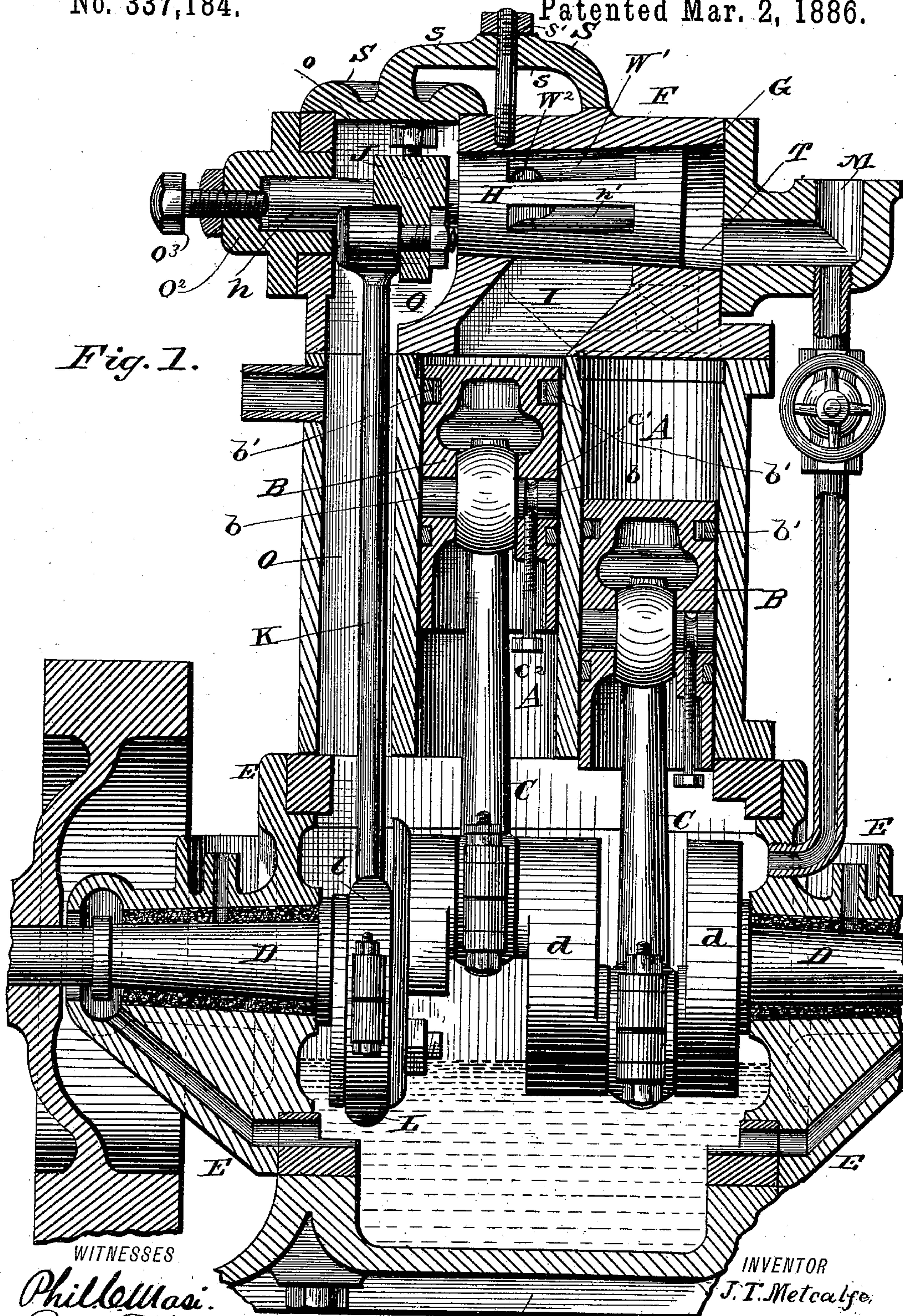


Fig. 1.

WITNESSES

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By his Attorneys.

Anderson Smith



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Fig. 2.

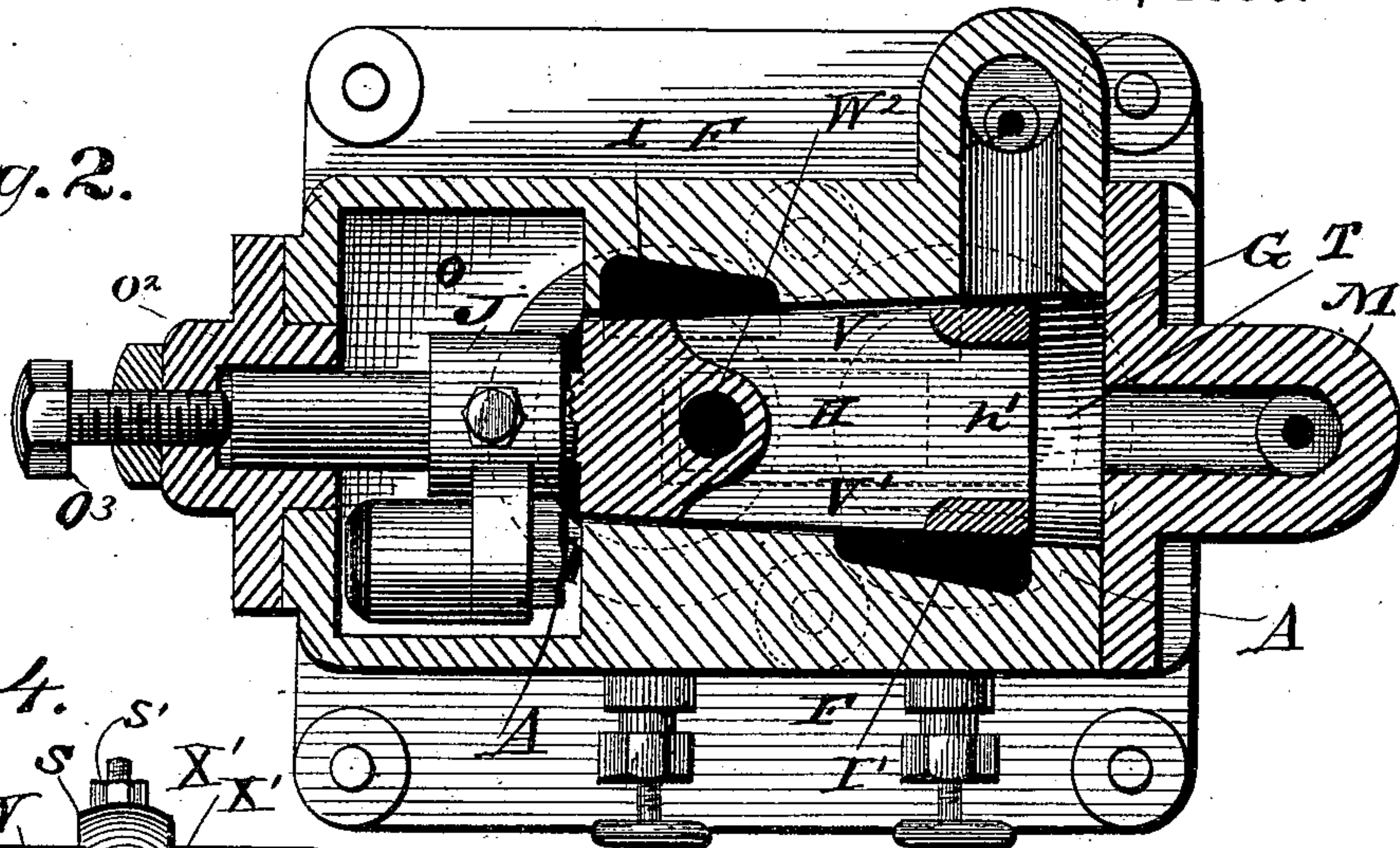


Fig. 4.

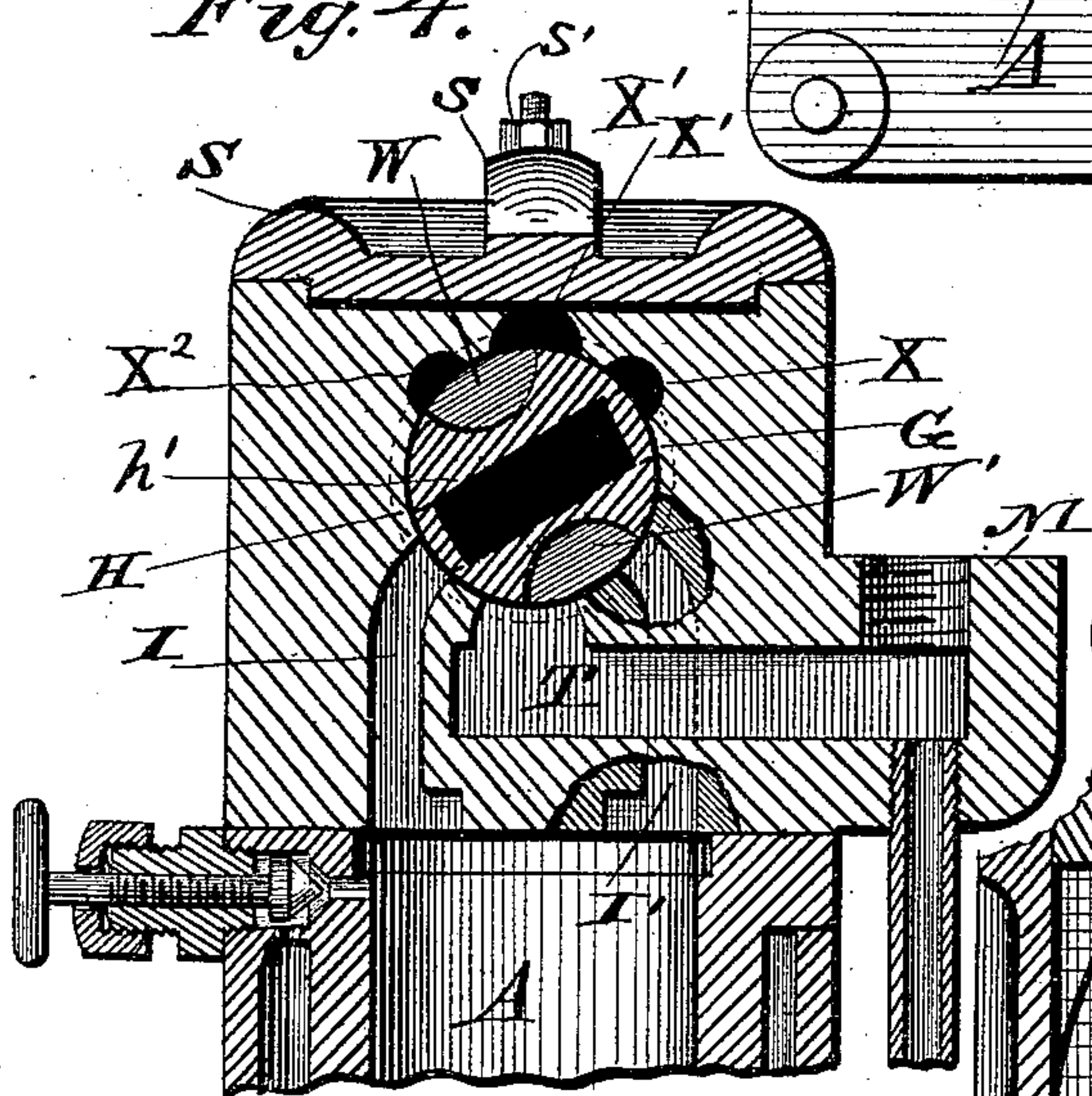


Fig. 3.

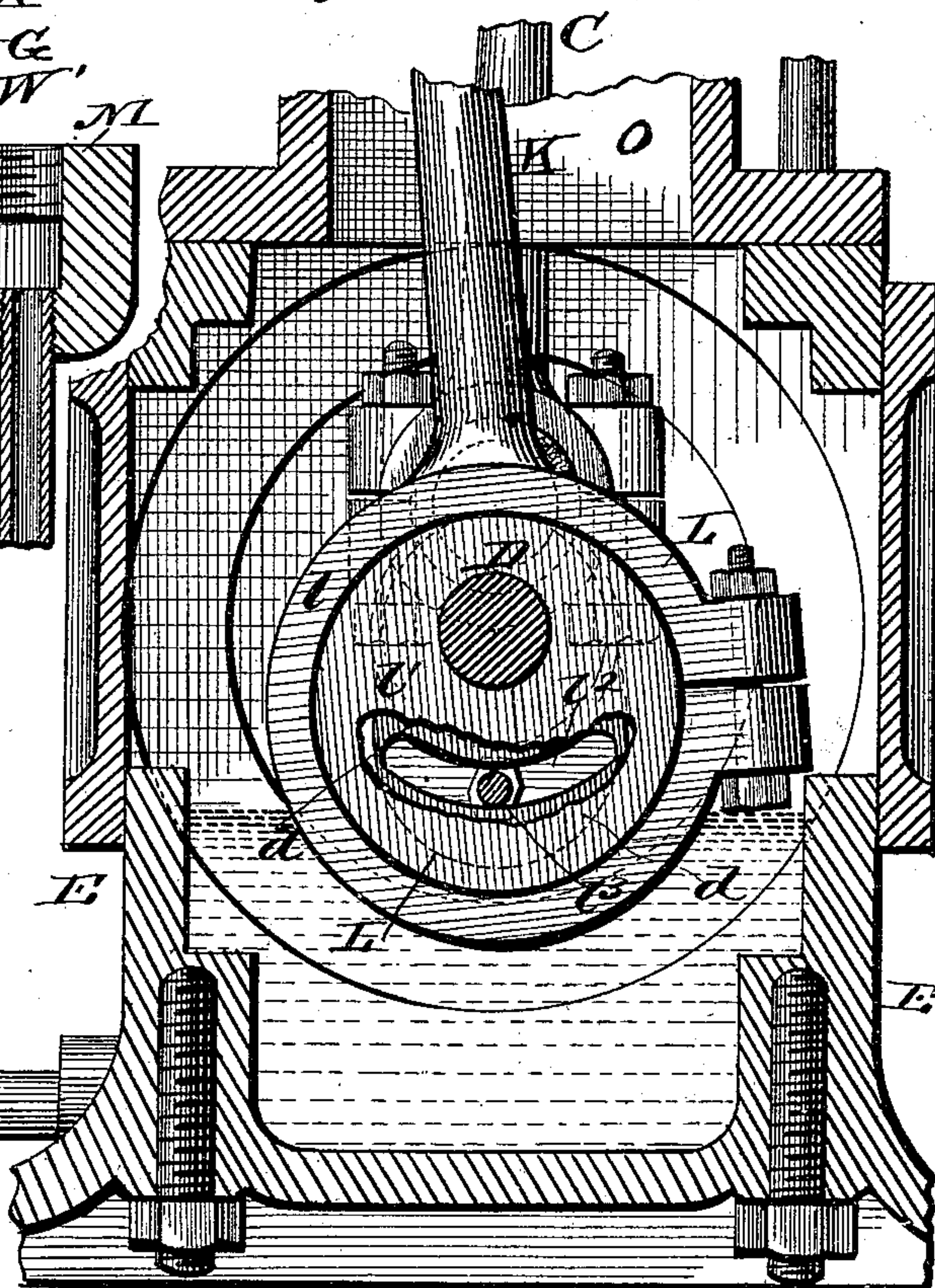
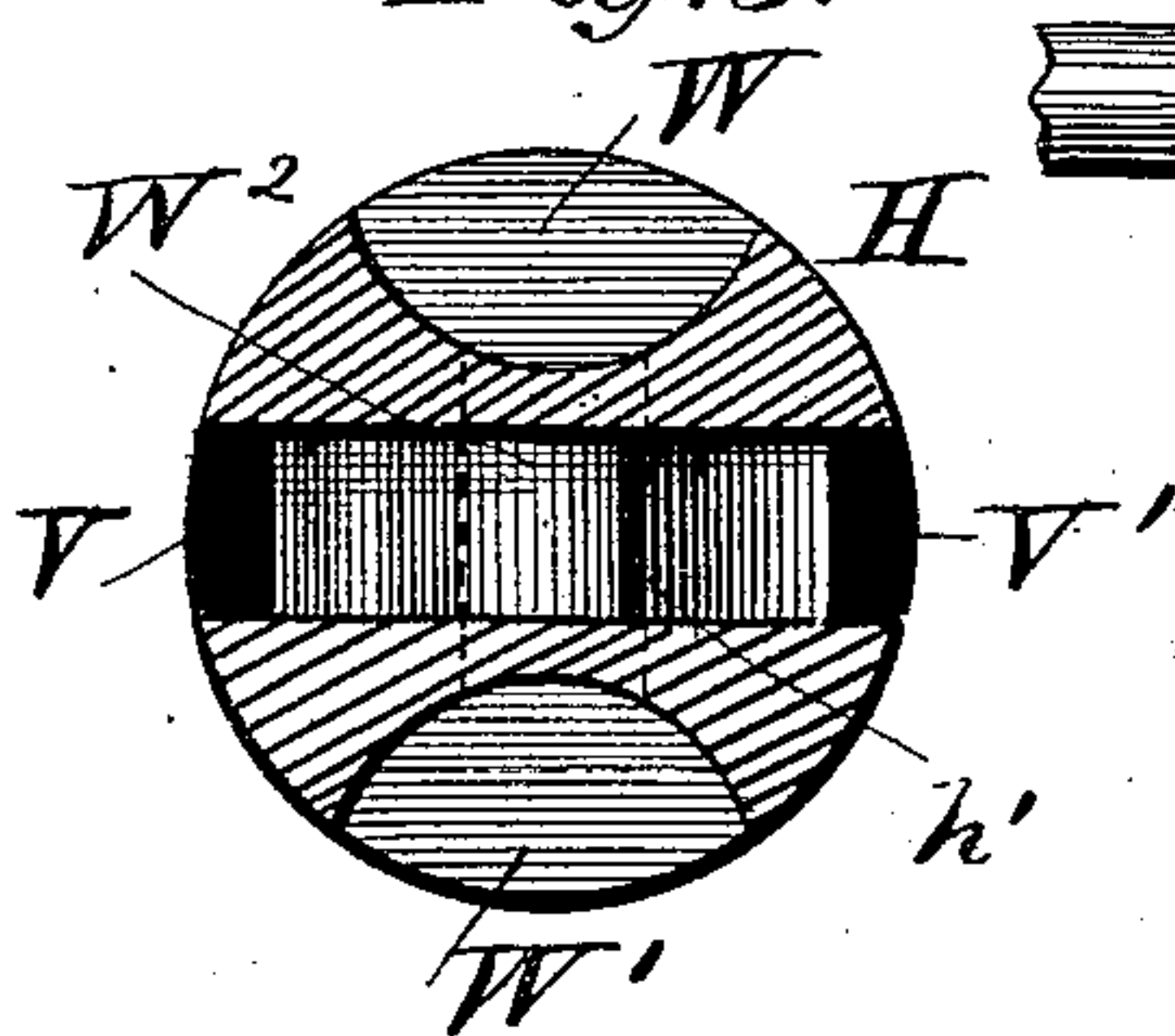


Fig. 5.



WITNESSES

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# UNITED STATES PATENT OFFICE.

JOHN T. METCALFE, OF QUINCY, PENNSYLVANIA.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 337,184, dated March 2, 1886.

Application filed November 12, 1885. Serial No. 182,613. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. METCALFE, a citizen of the United States, residing at Quincy, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a vertical transverse section. Figs. 2, 3, 4, and 5 are sectional details.

This invention relates to the class of steam-engines having two single-acting cylinders the pistons of which work alternately, and has especial reference to the valve mechanism for controlling the ports thereof.

The invention consists in the construction and novel arrangement of parts hereinafter described, and pointed out in the claims appended.

In my application, Serial No. 164,918, filed May 9, 1885, the valve mechanism is shown, as it is necessary to the understanding of other parts of the engine; but no claims are therein made to said valve mechanism, as it is subject-matter for another application.

Referring to the accompanying drawings by letter, A designates each of the two cylinders of the engine, in which move the pistons B B. C C are the connecting-rods, attached in the usual manner to the diametrically-opposite cranks *d d* on the shaft D, which has bearings at its ends in the heads of the casing E.

F is a casing secured to the top of the cylinders, and forming therewith the valve-chamber G.

J is a crank on the stem *h* of the valve H, by means of which crank and the eccentric-rod K the valve is oscillated.

M is the steam-pipe from the boiler to the valve-chamber G.

The ports I I' of the cylinders A open above through the floor of the casing F into the chamber G. The said ports open on the valve H at opposite points below its center.

O is a vertical chamber in the casing of the machine, in which chamber the rod K moves.

L is the eccentric, composed of the ring *l*, from which the rod K ascends, and the disk *l'*, provided with the slot *l''*, concentric with the shaft D.

*l'''* is a set-screw passing through the arm of the adjacent crank *d*. By means of said screw and slot the eccentric can be set to reverse the engine. Thus when the disk *l'* is set with the screw *l'''* in one end of the slot *l''* the engine will throw in the reverse direction to that which it does when the screw is in the other end of the slot.

The spindle or stem *h* of the valve H has a bearing in the outer wall of the chamber O, through which wall passes the horizontal adjusting-screw *o'''*, to regulate the position of the valve, and upon which the end of the stem *h* turns. The taper of the valve is such that it will wear in its bearing equally with the wear of the end of the stem against the screw *o'''*, so that the valve will always keep tight. The valve-chamber opens into the space *o*, and the valve will enter therein slightly as it wears, so that by this construction no stuffing-boxes are necessary.

S is a removable cap which fits above the open end of the space *o*, and *s* is a retaining-bar, which, by means of the screw, *s'*, holds the cap in place. By taking the screw out the cap may be removed to examine the parts within the space *o*.

T is the exhaust-chamber, descending from the bottom of the valve-chamber between the ports I I', and then running outward, as shown.

The valve H has a central longitudinal recess, *h'*, running from its base inward, and provided with the side openings, V V', so situated that the former communicates in succession with the port I, the mouth of the exhaust-chamber, and the port I', as the valve oscillates in one direction, and communicates reversely with the same when the valve oscillates reversely. W W' are opposite longitudinal recesses on the surface of the valve midway between the openings V V', and communicating together through the canal W<sup>2</sup>.

X, X', and X<sup>2</sup> are longitudinal recesses in the roof of the valve-chamber, respectively opposite the port I, the mouth of the exhaust-chamber T, and the port I', and having the same length and width thereof. As the opening V moves over the port I, the mouth of the ex-



haust-chamber, and the port I', the opening V' moves over the recesses X, X', and X<sup>2</sup>, so that exactly the same exhaust or pressure is created on each side of the valve, which is consequently  
5 steam-balanced.

The recess W' is so situated that when the port I is taking steam from the opening V it will make communication between the port I' and the mouth of the exhaust-chamber and the  
10 reverse, and when port I' is exhausting, as the recesses W W' communicate, the recesses X' X<sup>2</sup> will also exhaust, as is plain from the description and drawings.

The steam-pressure from the pipe M being  
15 always upon the base of the valve will keep it always tight and will drive it farther inward as it wears.

It is evident from the foregoing description and from the drawings that the cylinders must  
20 be adjusted to each other, and that the eccentric and rod must be to one side of the cylinders, otherwise the construction of the valve would have to be different.

Having described my invention, I claim—

1. In a double-cylinder single-acting engine, 25 the combination of the valve-crank chamber having the bearing o<sup>2</sup>, the oscillating valve H, provided with the stem h, supported in said bearing, the said valve receiving steam-pressure at its large end, and the adjusting-screw 30 o<sup>3</sup>, engaging the said stem, substantially as specified.

2. In a steam-engine, the combination, with a valve-casing having a plurality of recesses arranged, respectively, at diametrically-opposite 35 points to the eduction and induction ports and the exhaust-aperture, and an oscillating valve having a transverse aperture adapted to communicate with the said ports and recesses, and the longitudinal aperture connecting with the 40 steam-ports, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN T. METCALFE.

Witnesses:

D. M. GOOD, Jr.,  
JOHN L. METCALFE.