

Witnesses:

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Inventor:

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BENJAMIN S. LAWSON.

Improvement in Engine Governors.

No. 120,982.

Patented Nov. 14, 1871.

Fig. 3.

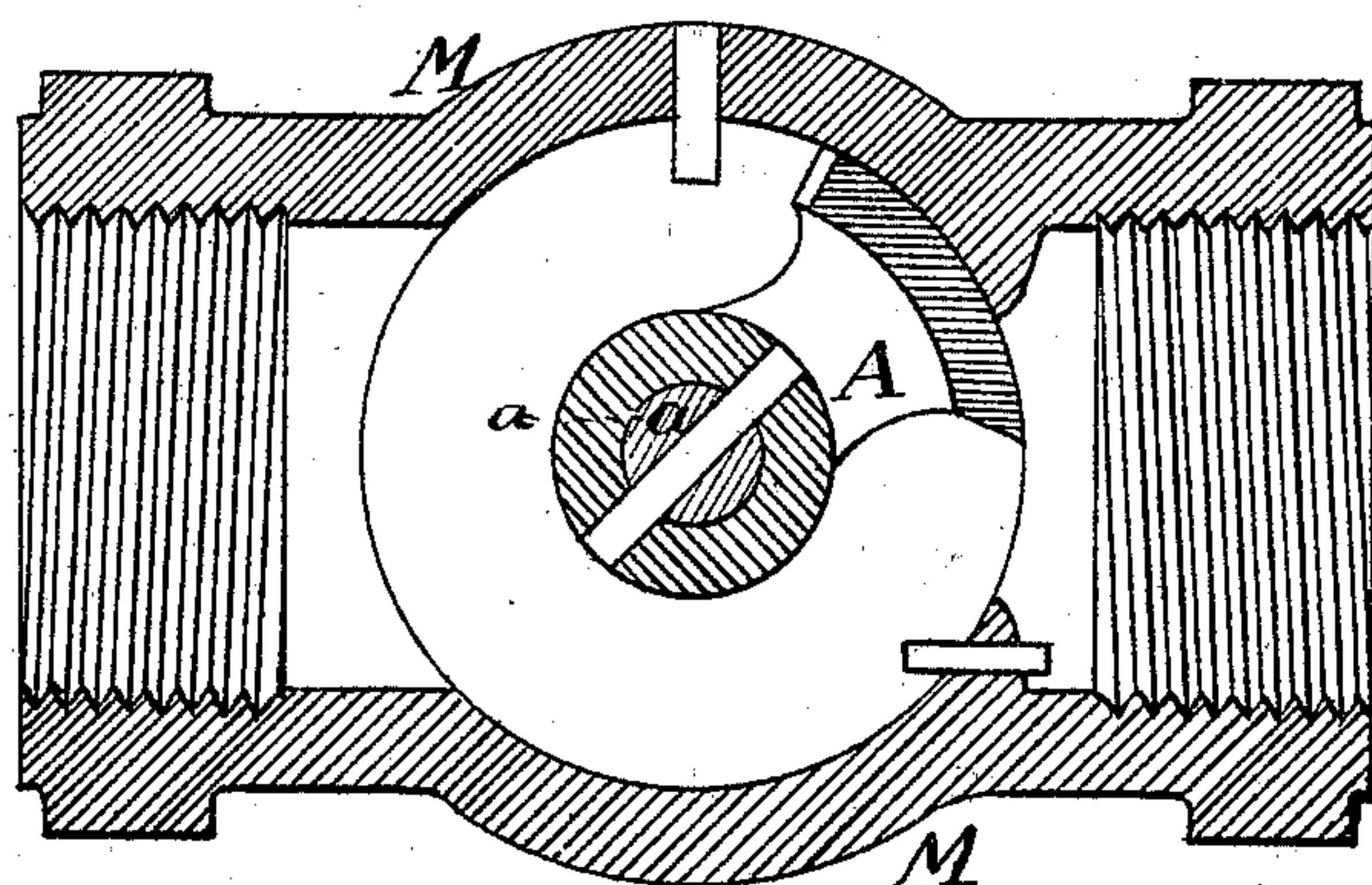


Fig. 4.

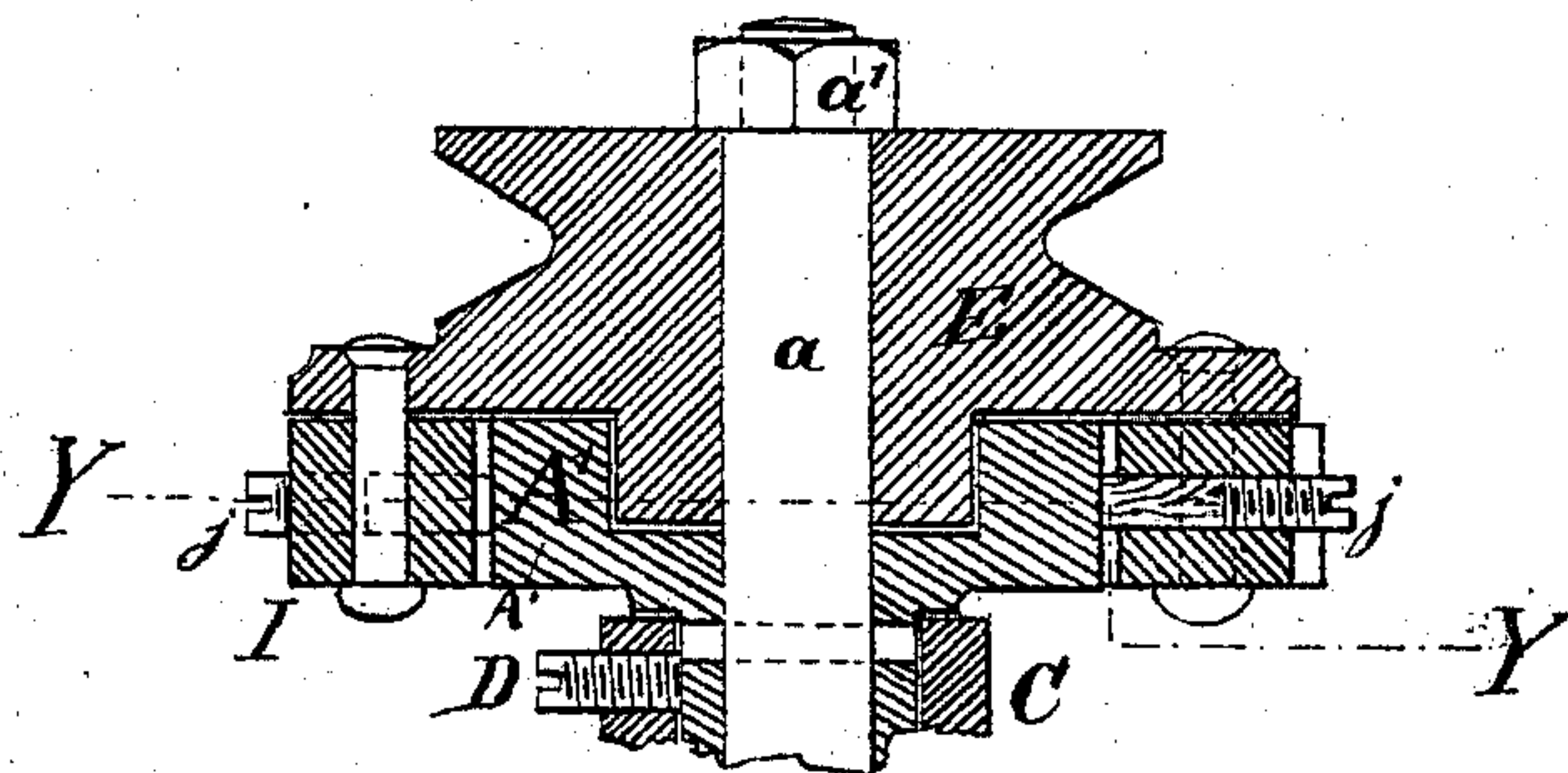
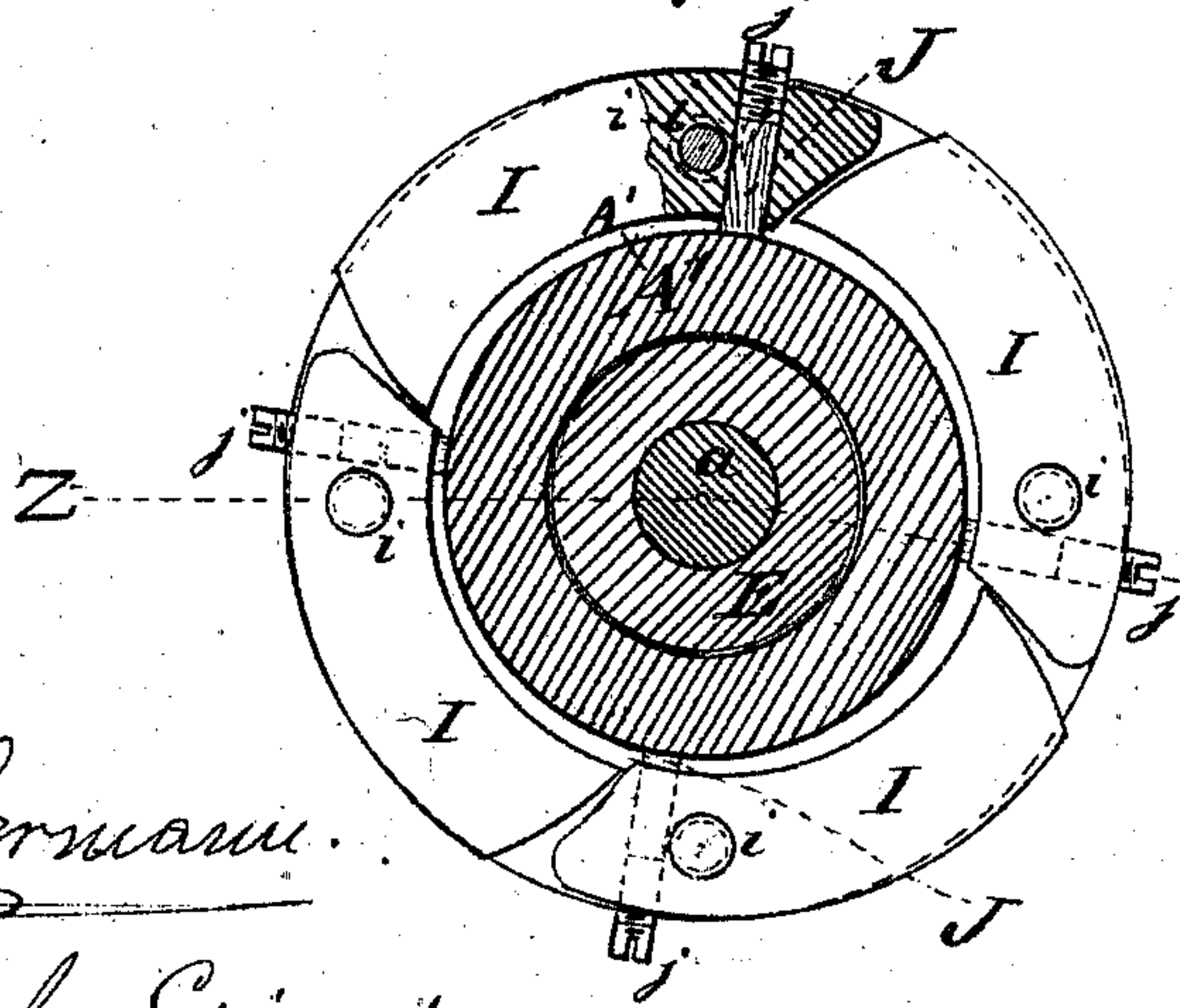


Fig. 5.



Witnesses:

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# UNITED STATES PATENT OFFICE.

BENJAMIN S. LAWSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND HANDREN & RIPLEY, OF NEW YORK CITY.

## IMPROVEMENT IN ENGINE-GOVERNORS.

Specification forming part of Letters Patent No. 120,982, dated November 14, 1871.

*To all whom it may concern:*

Be it known that I, BENJAMIN S. LAWSON, of Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Governors, of which the following is a specification:

The invention is intended more especially for very small stationary and portable engines where the regulation should be very quick and the apparatus cheap and light. It offers a constant resistance by friction, but too slight to be of importance, and its action in opening and closing the valve is remarkably quick and efficient.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a central vertical section through my improved governor on the line X X in Fig. 2. Fig. 2 is a horizontal section on the line S S in Fig. 1; and Fig. 3 is a horizontal section on the line T T in Fig. 1.

The remaining figures represent a modification of the main upper portion of my improved governor. I prefer to use this arrangement in most cases by reason of its cheapness and great simplicity of construction.

Fig. 4 is a vertical section on the line Z Z in Fig. 5; and Fig. 5 represents a horizontal section on the line Y Y in Fig. 4, seen from below.

Similar letters of reference indicate like parts in all the figures.

M is the casing of a freely-turning but approximately close-fitting valve, which, by turning a portion of a revolution in one direction or the other, opens the steam-passage to its full extent or closes it altogether. It in practice generally stands at some intermediate position, and opens and closes rapidly, according as more or less steam is required. The spindle *a*, fixed to the valve A, is extended out through a stuffing-box and is encompassed by a flat spring, B, which is fixed firmly at its inner end to the side of the valve-spindle and at its outer end to a post, M', fixed on the casing M, or on the bonnet or cover, which forms in effect a part of the same. The spring B is fixed to the side of the valve-stem through the medium of an adjustable piece, C, which is secured by a set-screw, D, and may be shifted around on the valve-spindle as required.

This allows the tension or force with which the spring B tends to close the valve A to be adjusted at pleasure. In case it be desired to make it shut with more force the screw D is slackened and the collar or turning-piece C is forcibly moved around on the spindle to a quarter of a revolution or any other desired extent, and then the screw D is again set up tightly. To diminish the force of the spring the piece C is adjusted in the reverse direction. A' is a friction-wheel on the spindle *a*, and adapted to be turned by the friction of a part or parts, which travel around on its periphery and are forcibly pressed thereon in proportion as the speed of the engine is accelerated. Referring to Figs. 1 and 2 the periphery of the wheel A' is formed of lignum-vitæ firmly held by screws to a thin skeleton wheel of metal. The periphery of this ring of wood is pressed on by metallic levers. In the form shown in Figs. 4 and 5 the wheel A' is entirely of metal, but the levers carry each a piece of wood adjustable as the wood wears away, so that in both forms the friction is between a metallic and a hard-wood surface. This is desirable to produce a uniform and reliable friction. In both forms of the construction the same general principles are involved; but the form shown in Figs. 4 and 5 I consider the most perfect, all things considered. In both forms E is a loose wheel revolving freely on the projecting end of the spindle *a*, and secured against escaping therefrom by the nut *a'*. One portion of the periphery of the wheel E is grooved to receive a round belt, G, driven from a pulley on the main shaft of the steam-engine, not represented. It results that the wheel E revolves actively with a velocity exactly proportional to the speed of the engine. I I I I are loaded levers turning on the pivots *i*, fixed in the periphery of the wheel E. One arm of each lever I is much longer than the other and has a preponderance of weight. The centrifugal force tends to throw the long and loaded arm of each lever I out from the center of the spindle *a*, and this induces a pressure of the short and light end of each lever I against the periphery of the wheel A', which is fixed to the valve A through the medium of the valve-spindle *a*, and consequently controls its position.

When by reason of an increase in the velocity of rotation of the main shaft of the engine the wheel E and its connections are rotated more



rapidly than usual the heavy ends of the levers I are thrown outward with such force as to press their short and light ends against the wheel A' and increase the frictional contact. The motion of the wheel E is always in the direction tending to shut the valve A; and when the friction is thus above the usual amount it moves the valve A in the direction to close it. The closing of the valve A diminishes the quantity of steam supplied to the engine, and this soon induces a corresponding reduction in the velocity of the engine. When the velocity becomes less than the ordinary amount it so diminishes the centrifugal force that the friction on the wheel A' becomes less than usual, and the spring B is able to turn the valve A backward, or in the direction to open it in opposition to the friction of the loaded levers I.

In Figs. 1 and 2 the levers I are simply pieces of iron, cast or wrought, with knobs or balls on the ends of their long arms and plain bearing surfaces on their short arms. In Figs. 4 and 5 the levers I are in the form of segments of a ring, and there is no knob or ball on the long end, but the weight of the arm itself is made sufficient to yield a proper amount of force. The short arms are in this modification of the invention provided with adjustable pieces of wood, J, which are adjustable in position by the screws j, tapped in the outer end of the hole, through which the plugs or small pieces of wood J are inserted. By turn-

ing these screws j in one direction or the other the position of the pieces of wood J can be adjusted outward or inward at pleasure. I prefer to adjust them so that the levers J are always operated nearly in the position of segments of a perfect ring.

The whole of my governor need not exceed four or five inches, and the whole weight, including the valve A, exclusive of the casing M, need not be more than four or five pounds.

I claim as my invention—

1. The quick-acting governor having a valve, A, in a suitable case controlled by the friction-wheel A', subjected to the influence of loaded levers I, revolved around it by the action of the engine and inducing friction thereon, tending to close the valve, while an opposing force B tends to open the valve, all substantially as herein set forth.

2. In connection with the above, the frictional pieces J and adjusting means j, arranged and operating relatively to each other, the levers I, and friction-wheel A', controlling the valve A, all substantially in the manner and for the purposes herein set forth.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

BENJAMIN S. LAWSON.

Witnesses:

ARNOLD HOERMANN,

CAMPBELL C. LIVINGS.

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