

(No Model.)

3 Sheets—Sheet 1.

J. M. FARMER.  
ROTARY ENGINE.

No. 440,145.

Patented Nov. 11, 1890.

Fig. 1.

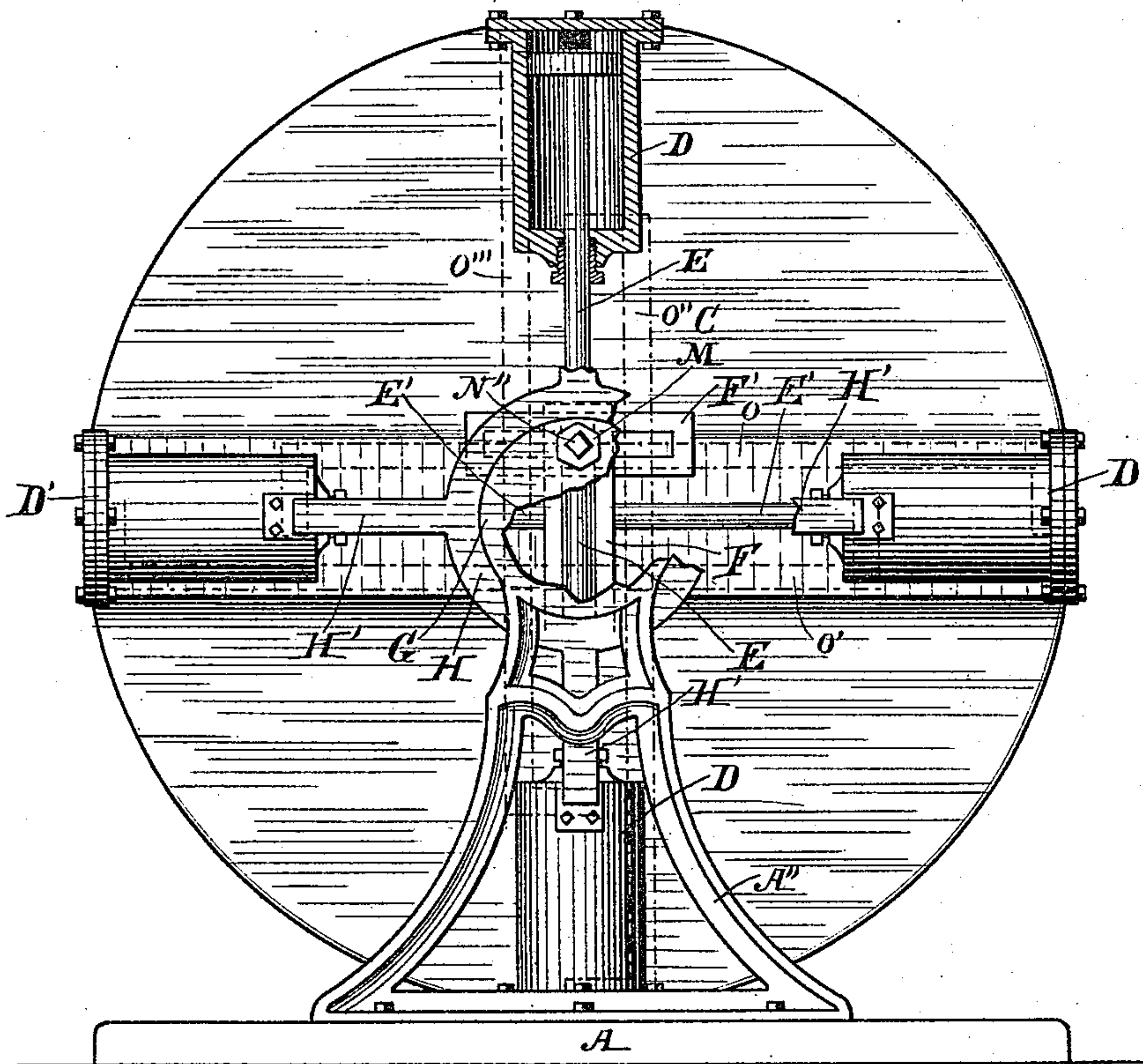


Fig. 5.

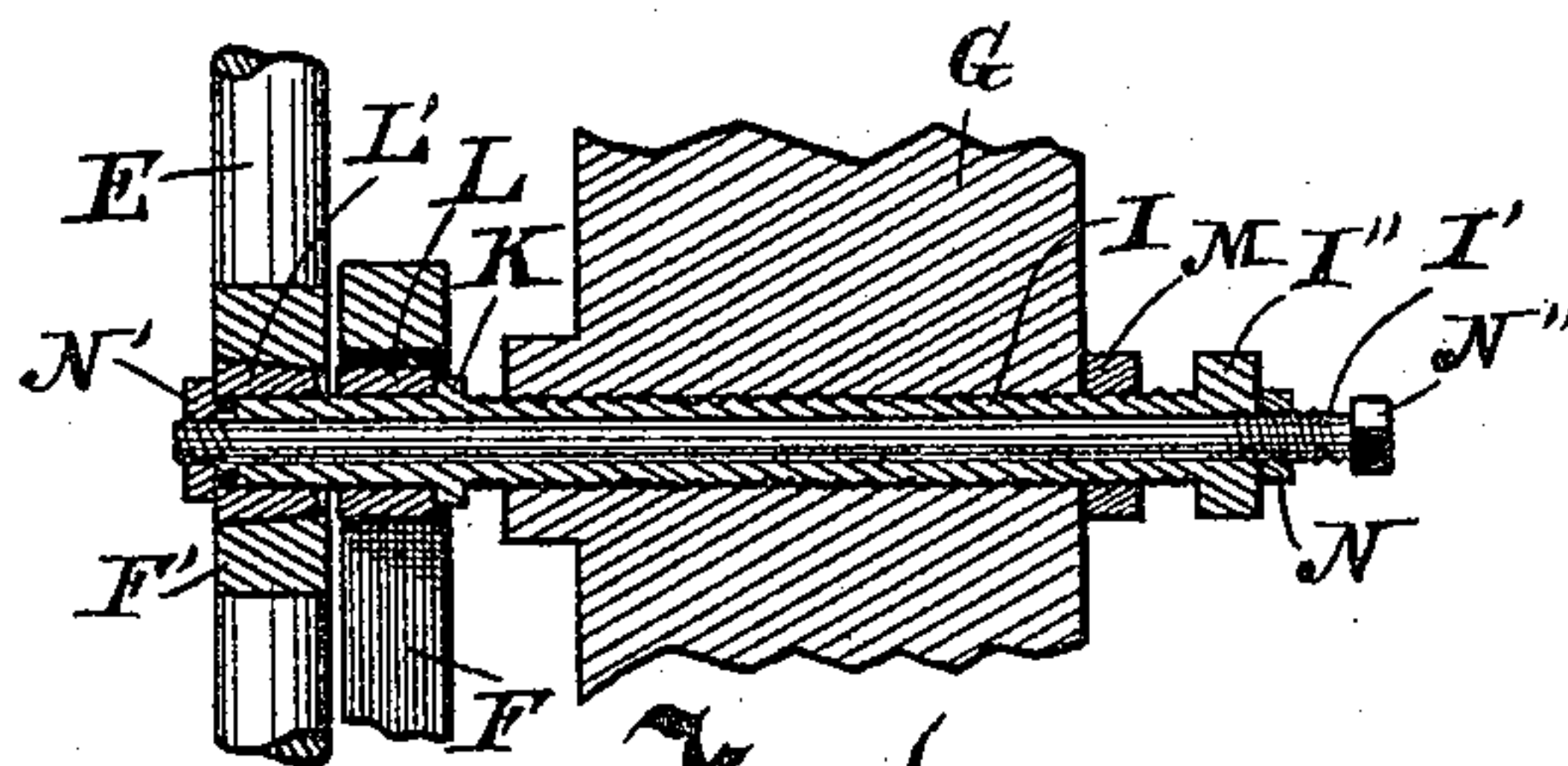
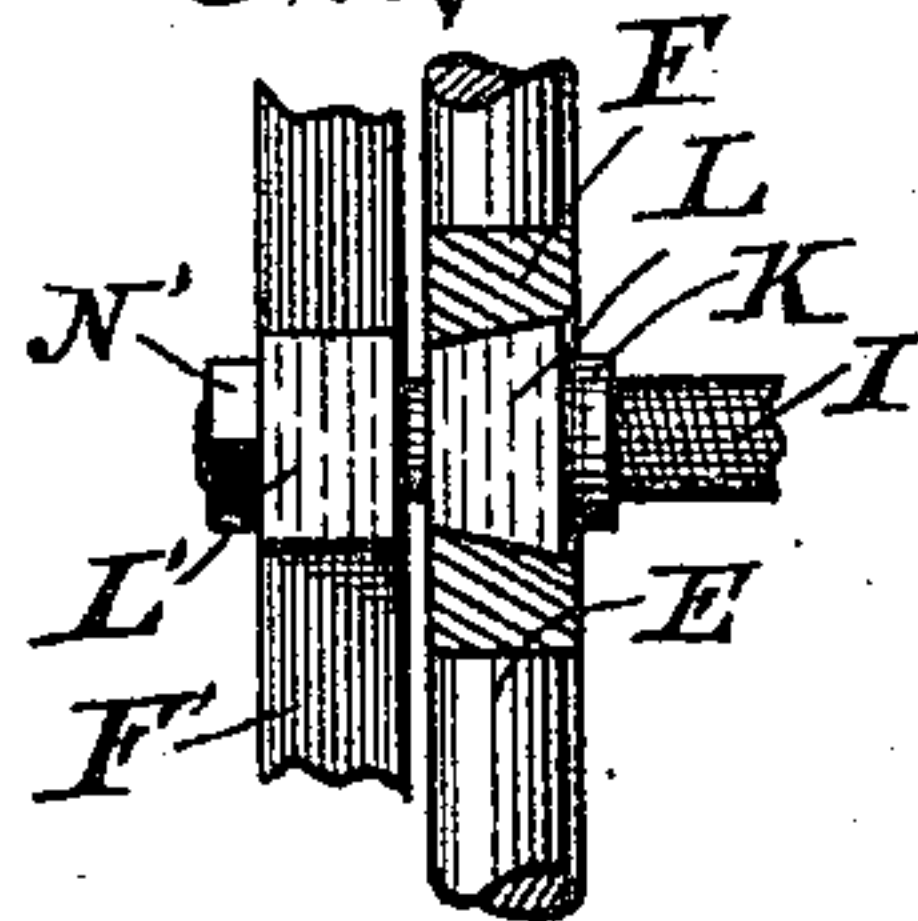


Fig. 6.



Witnesses.

*C. H. Keeney.*

*Anna Faust.*

Inventor.

*Julius M. Farmer*  
*By Edwin Benedict*  
*Attorneys.*

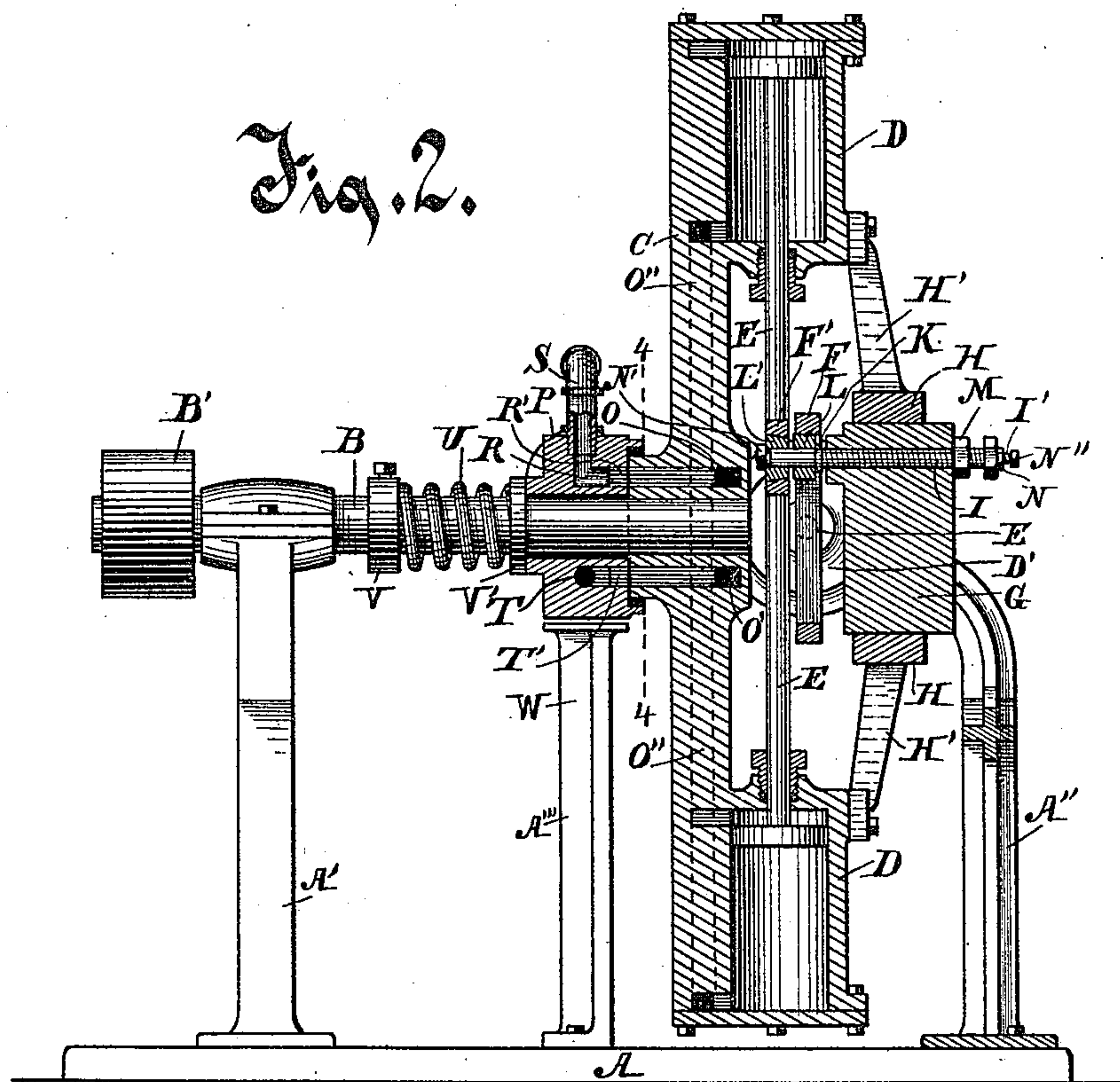
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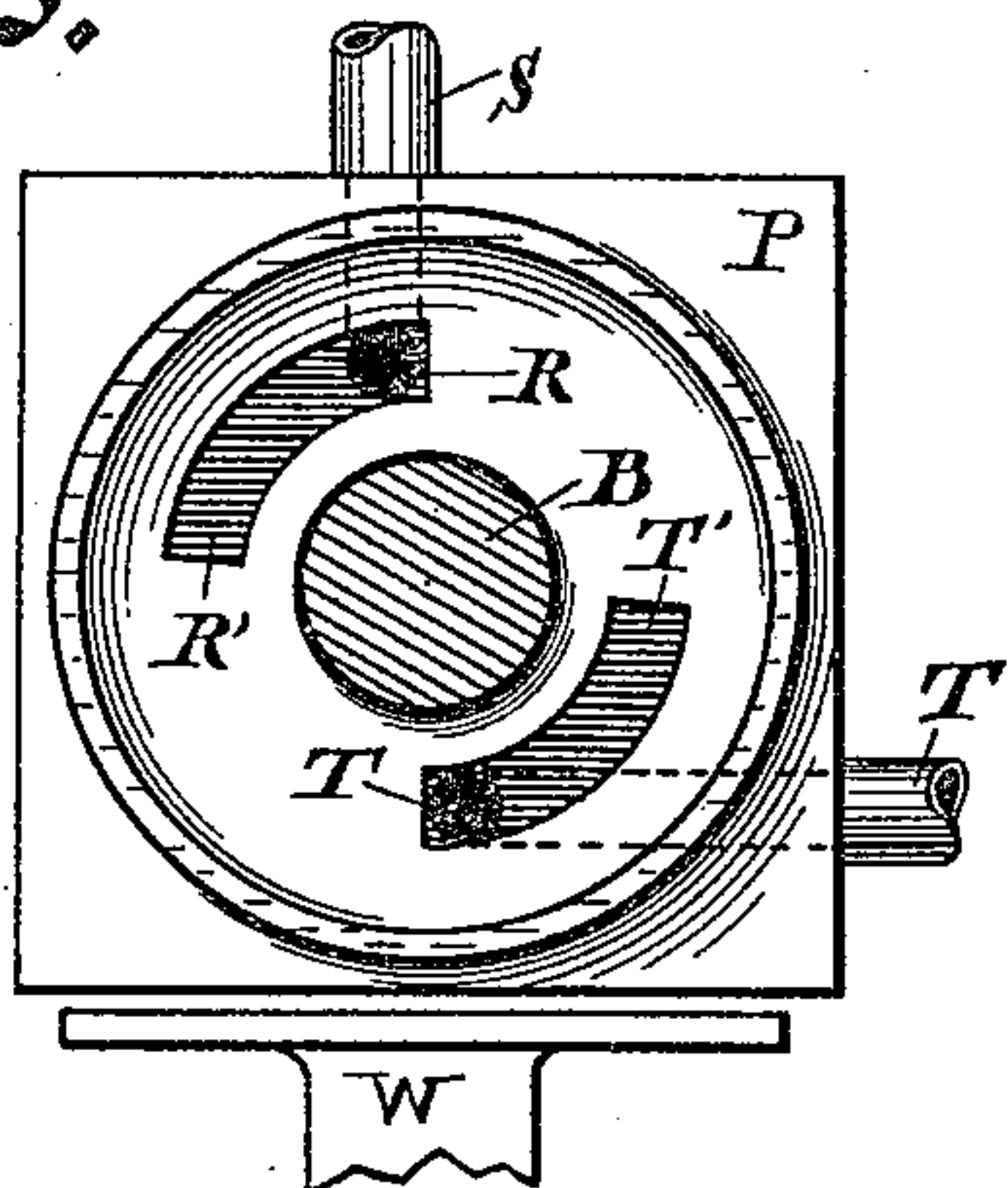
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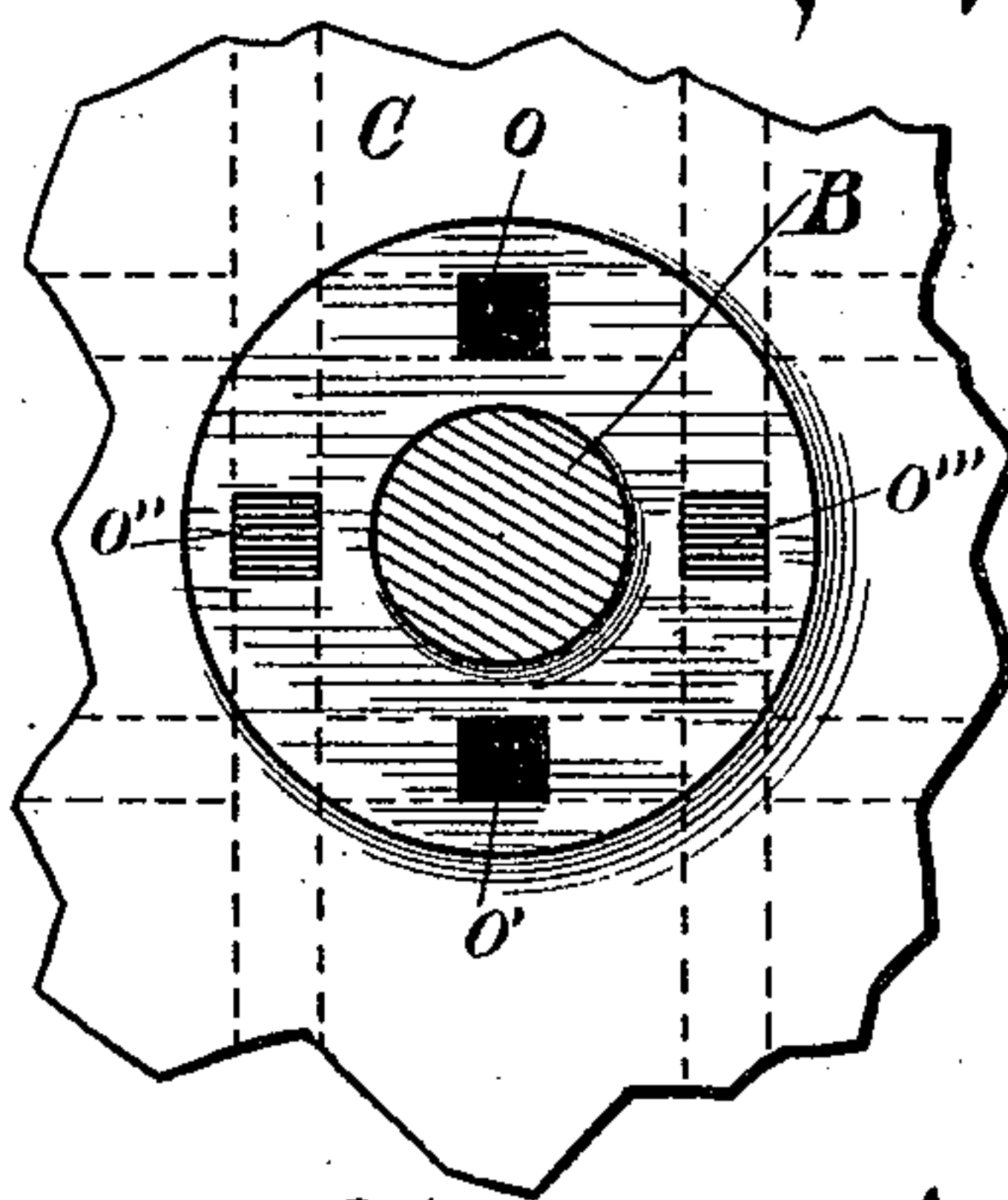
Patented Nov. 11, 1890.



*Fig. 3.*



*Fig. 4.*



Witnesses.

*W. H. Keeney.*

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(No Model.)

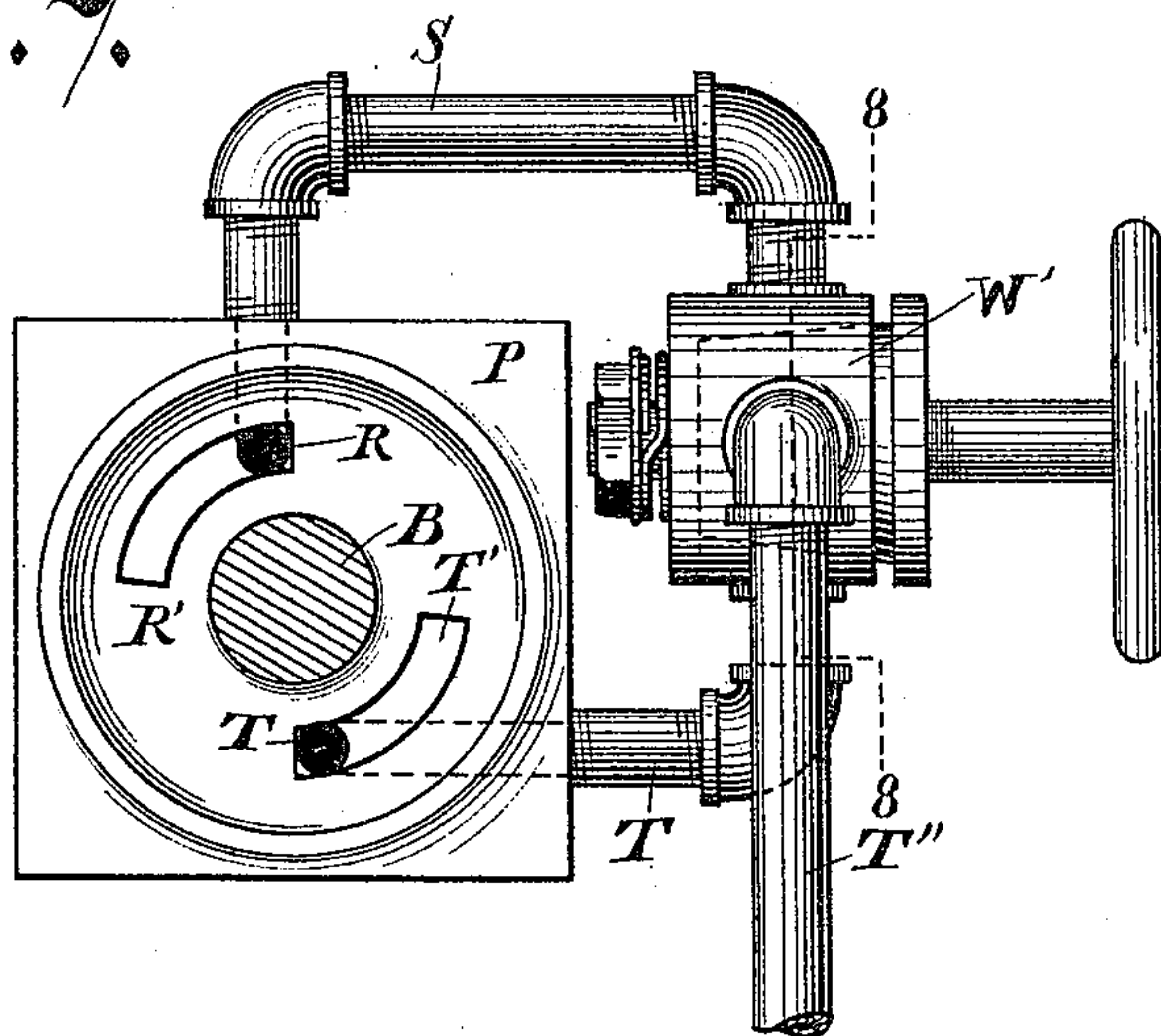
3 Sheets—Sheet 3.

J. M. FARMER.  
ROTARY ENGINE.

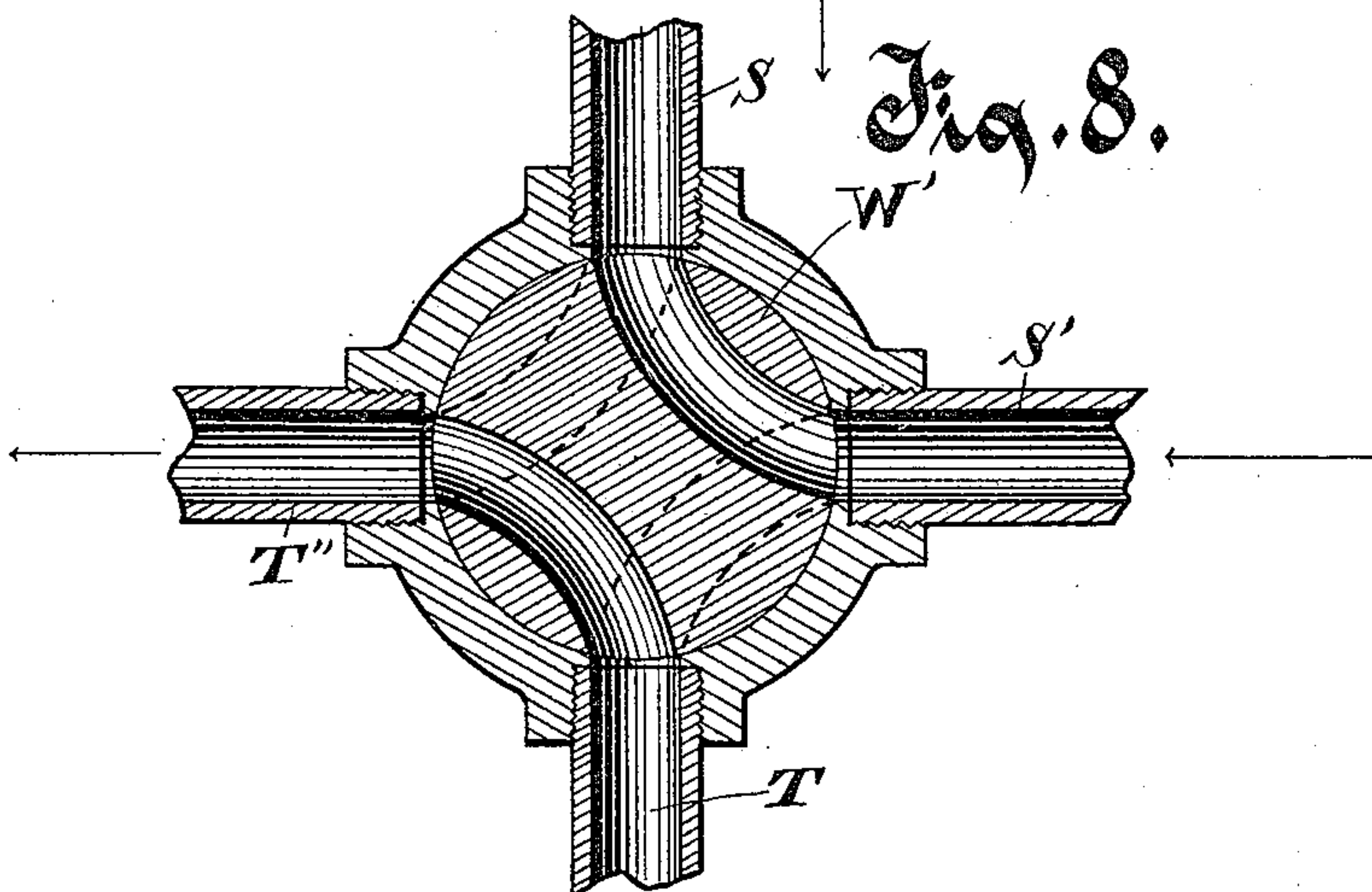
No. 440,145.

Patented Nov. 11. 1890.

*Fig. 7.*



*Fig. 8.*



*Witnesses.*

*C. H. Keeney.*

*Anna Faust.*

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*Julius M. Farmer*

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# UNITED STATES PATENT OFFICE.

JULIUS M. FARMER, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF TWO-THIRDS  
TO COLWERT K. PIER AND ISADORE LEISER, OF SAME PLACE.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 440,145, dated November 11, 1890.

Application filed December 26, 1889. Serial No. 334,955. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS M. FARMER, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in the rotary engine for which Letters Patent No 394,684 were issued to myself and others on December 18, 1888.

Figure 1 is a front elevation of an engine embodying my improvements, parts being broken away to show interior and rear parts. Fig. 2 is a central vertical section of the engine at right angles to Fig. 1. Fig. 3 is the face of a block containing the steam-ducts and showing the ports thereof. Fig. 4 is a part of the disk, showing the face or end of the hub of the disk, which hub contains steam-ducts and receives the bearing of the face of the block shown in Fig. 3 against it, forming a steam-tight joint therewith. Fig. 5 is a central longitudinal section of a device for guiding the cross-heads and taking up wear therein. Fig. 6 is a central longitudinal section of a part of the same device shown in Fig. 5, taken at right angles thereto. Fig. 7 is a view of the same block shown in Fig. 3, with the steam-pipes leading thereto and a four-way cock in the pipes for controlling the direction or passage of steam to the cylinders. Fig. 8 is a transverse section of the four-way cock on line 8 8 of Fig. 7.

The base A supports the standards A', A'', and A''' rigidly thereon. A horizontal shaft B has its bearings in the standard A', and is provided with a band-wheel B' for transmitting power therefrom. The shaft B also carries rigid thereon a disk C, to the face of which are secured four steam-cylinders preferably integral therewith, arranged in sets or pairs D D and D' D' opposite each other, the pistons in each set of cylinders being connected rigidly together by a single piston-rod E and E', respectively, which piston-rods are

each provided with a central slotted cross-head F and F', respectively.

The standard A'' terminates at its upper end in a short horizontal cylindrical head G, the center line of which is in the line of the axis of the shaft B. A hub H, bearing and rotatable on the head G, is provided with radial arms H' H', which at their outer ends are secured rigidly to the cylinders D D and D' D', whereby the cylinders are braced and held firmly in position on the disk. A cross-head guide I, supported in the head G at one side of the line of the axis of shaft B, is constructed of an interior bolt I' and a sleeve I'', which sleeve I'' turns by a screw-thread through the head G, and has a rigid collar K, which bears against a block L, beveled on two opposite sides, which beveled sides bear against and move on correspondingly-beveled walls of the slot in the cross-head F, by the turning inwardly of which sleeve the block L is forced into the slot in the cross-head F, being thus adapted to adjust the block, taking up any wear in the cross-head, and to guide the cross-head exactly in its reciprocation. A jam-nut M turns on the sleeve I'' against the head G and is adapted to lock the sleeve in position. The bolt I' passes movably through the sleeve I'', and is provided with a nut N, turning on it against the outer end of the sleeve I'', and with a nut N' turning on the other end of the bolt against a block L', having two opposite beveled sides which bear against horizontally-beveled walls of the slot in the cross-head F', whereby the block L' may be adjusted to the cross-head, taking up any wear therein, being thus adapted to guide the cross-head in its movements. The bolt I' is provided with a head N''.

The disk C is provided with two sets of steam-ducts, one set of which O and O' lead, respectively, from the outer surface of the hub to the inner end of one cylinder D and to the outer end of the opposite cylinder D, as shown in dotted lines in Fig. 1. Corresponding ducts O'' and O''' lead in the same manner to the inner and outer ends, respectively, of the two other steam-cylinders. A movable block P, which for convenience is in the form of a sleeve on the shaft B, is provided with a steam-



induction duct R, which at its outer end receives the live-steam-supply pipe S, and which at its inner end terminates in a segmental port R' in the inner surface of the block P.

5 This block is also provided with an eduction steam-duct T, provided at its inner end with a segmental port T' in the face of the block P, which duct at its other end is open to the air, preferably through the four-way cock W'.

10 The ports R' and T' are each so located as to be intermittingly in front of the ducts O, O', O'', and O''' as the disk C revolves. A steam-tight joint is formed between the block P and the hub of the disk C, the block being held

15 up to the hub by the spring U, around the shaft B, bearing against a collar V, fixed thereon, and the outer end of the block P, but preferably with the interposed washer V'. Only such slight movement in the block P is re-

20 quired as is necessary to permit its constant adjustment to the surface of the hub of the disk C, so as to make a steam-tight though movable joint between them, and this movement is permitted by the slight flexibility of

25 the steam-pipes S and T. To protect the block against any considerable rotatable movement, a standard W is provided, fixed on the base A and terminating in a flat top near to the bottom of the block P, against the top of

30 which standard the block would impinge and be held against rotation if such rotation beyond a slight movement were otherwise permitted.

The steam-ducts S and T preferably lead

35 by pipes into the same four-way cock W', which is provided with the live-steam pipe S' and exhaust-pipe T''. By means of this four-way cock W' the steam may be controlled as desired, either admitting it or shutting it off

40 from the cylinders, or transmitting the live steam through either port R' or T', the other port being thereby made the exhaust-port, thus being able to run the engine in either direction, or to reverse it at pleasure.

45 What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a rotary engine with a rotating disk provided with steam-ducts leading to cylinders thereon, of a movable

50 block provided with steam-ducts registering with the ducts in the disk, and a spring bearing against the movable block, whereby it is held closely but yieldingly to the hub of the disk, substantially as described.

55 2. In a rotary engine, the combination, with a disk provided with steam-ducts leading from the outer surface of its hub to steam-cylinders thereon and a shaft fixed in the disk,

of a block about the shaft, which block is provided with induction and eduction ducts 60 registering with the ducts in the disk and is connected with the live-steam supply, and a spring about the shaft bearing against a collar thereon and holding the block up to its work, substantially as described. 65

3. In a rotary engine, the combination, with a rotating disk provided with steam-ducts leading from the outer surface of its hub, of a slightly-movable block provided with steam-ducts and segmental ports registering with 70 the ducts in the hub of the disk, with which hub the block forms a movable steam-tight connection, substantially as described.

4. In a rotary engine, the combination, with a rotating disk having steam-cylinders thereon arranged in pairs opposite each other, the cylinders being provided with pistons connected together in pairs by rods crossing each other medially, and with steam-ducts in the disk leading thereto in sets from the hub of the 80 disk, of a movable block provided with steam-ducts registering with the ducts in the disk, and means, substantially as described, whereby the movable block is held yieldingly against the hub of the disk. 85

5. In a rotary engine having cylinders arranged in pairs opposite to each other on a rotating disk, the combination, with rods connecting the pistons in pairs, which rods cross each other medially and are provided with 90 transverse slots having a varying but constantly-existing crossing-point, of beveled sliding blocks fitted in the slots in the piston-rods, and a block adjuster and guide fixed eccentrically to the axis of the disk in a part of 95 the frame, consisting of a sleeve turning by screw-thread in the frame and a bolt turning by screw-thread in the sleeve, the sleeve and bolt being secured movably, respectively, to the blocks, substantially as described. 100

6. The combination, with the slotted cross-heads F and F', having a common point of cross movement opposite each other, of beveled blocks L and L', fitted to corresponding beveled walls of the slots in the cross-heads, 105 a bolt I', and a sleeve I'', carrying thereon the blocks L' and L, respectively, and adjustable in a fixed support G, substantially as described.

In testimony whereof I affix my signature in 110 presence of two witnesses.

JULIUS M. FARMER.

Witnesses:

C. T. BENEDICT,  
I. LEISER.