

(No Model.)

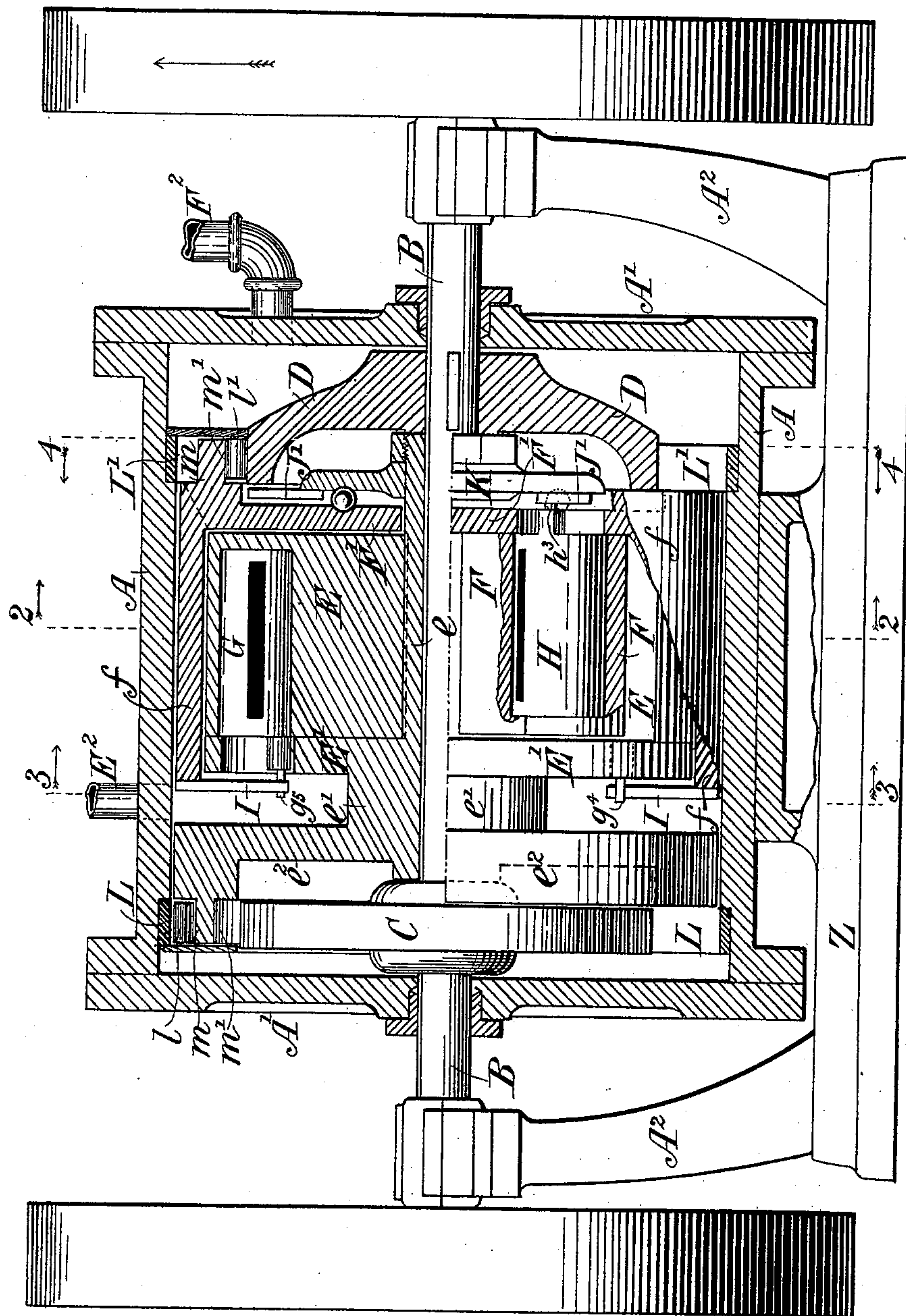
D. LE R. DRESSER.
ENGINE.

3 Sheets—Sheet 1.

No. 602,059.

Patented Apr. 12, 1898.

Fig. 1



(No Model.)

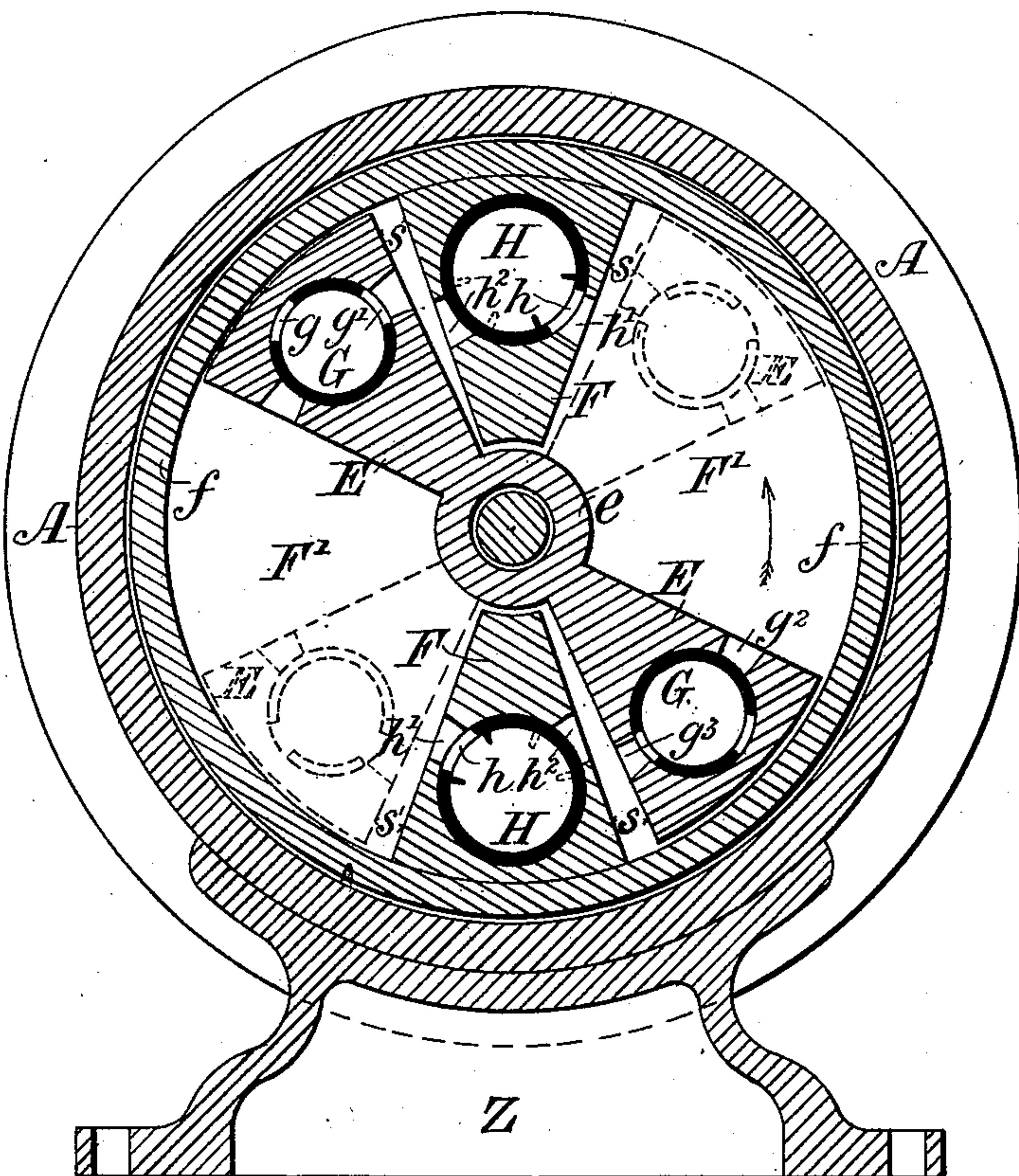
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D. LE R. DRESSER.
ENGINE.

No. 602,059.

Patented Apr. 12, 1898.

Fig. 2



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(No Model.)

3 Sheets—Sheet 3.

D. LE R. DRESSER.
ENGINE.

No. 602,059.

Patented Apr. 12, 1898.

Fig. 3

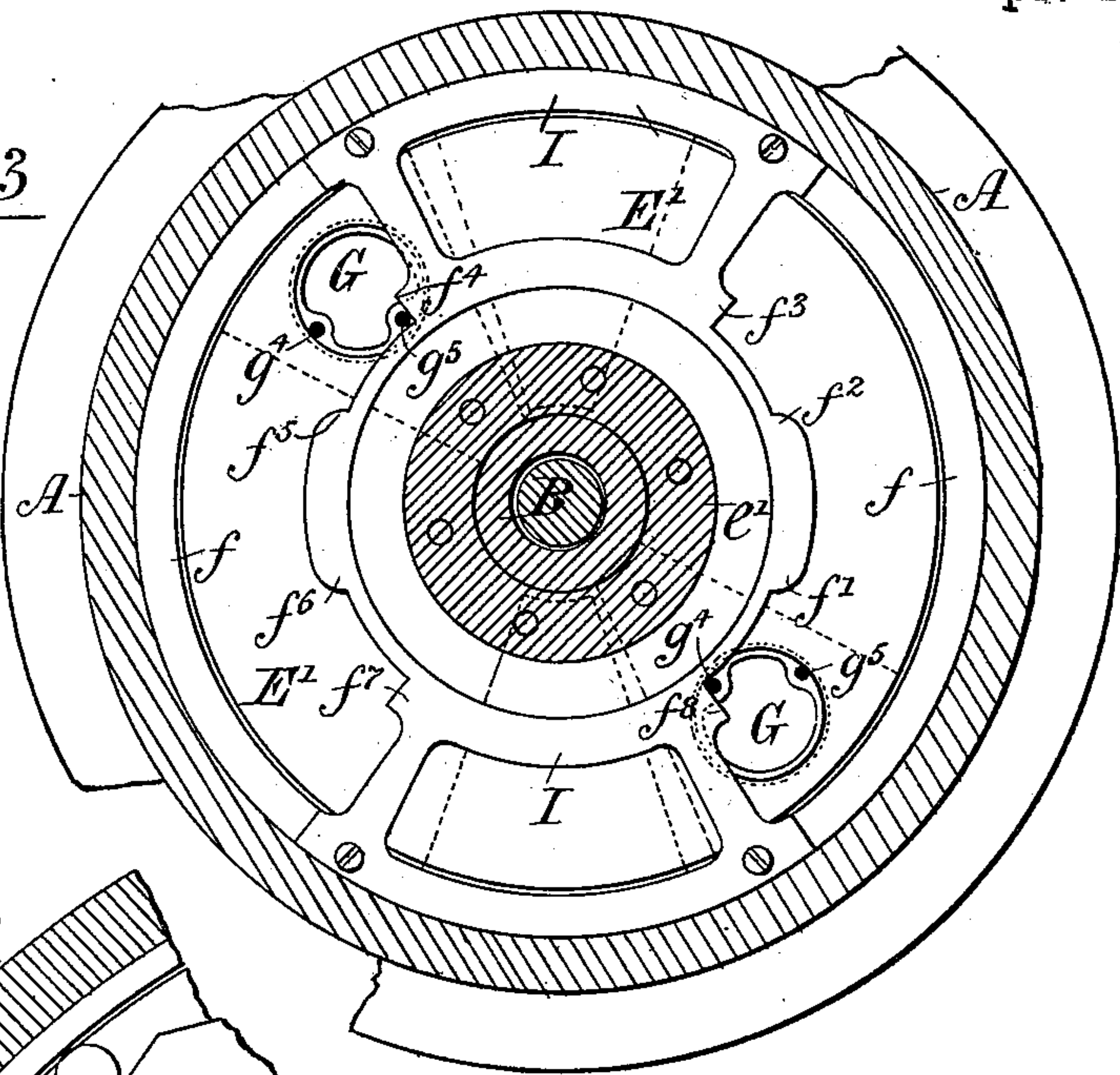


Fig. 5

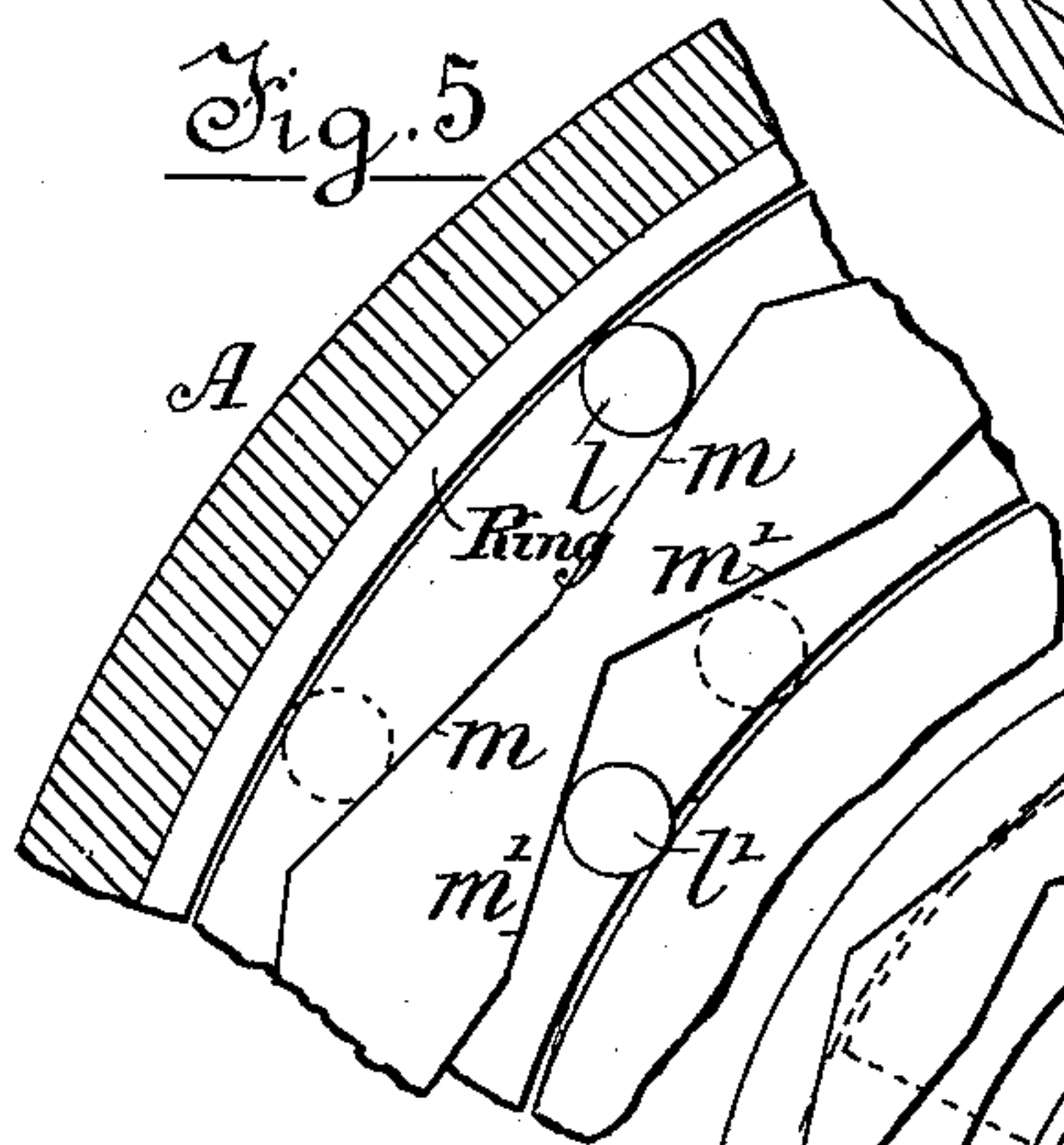
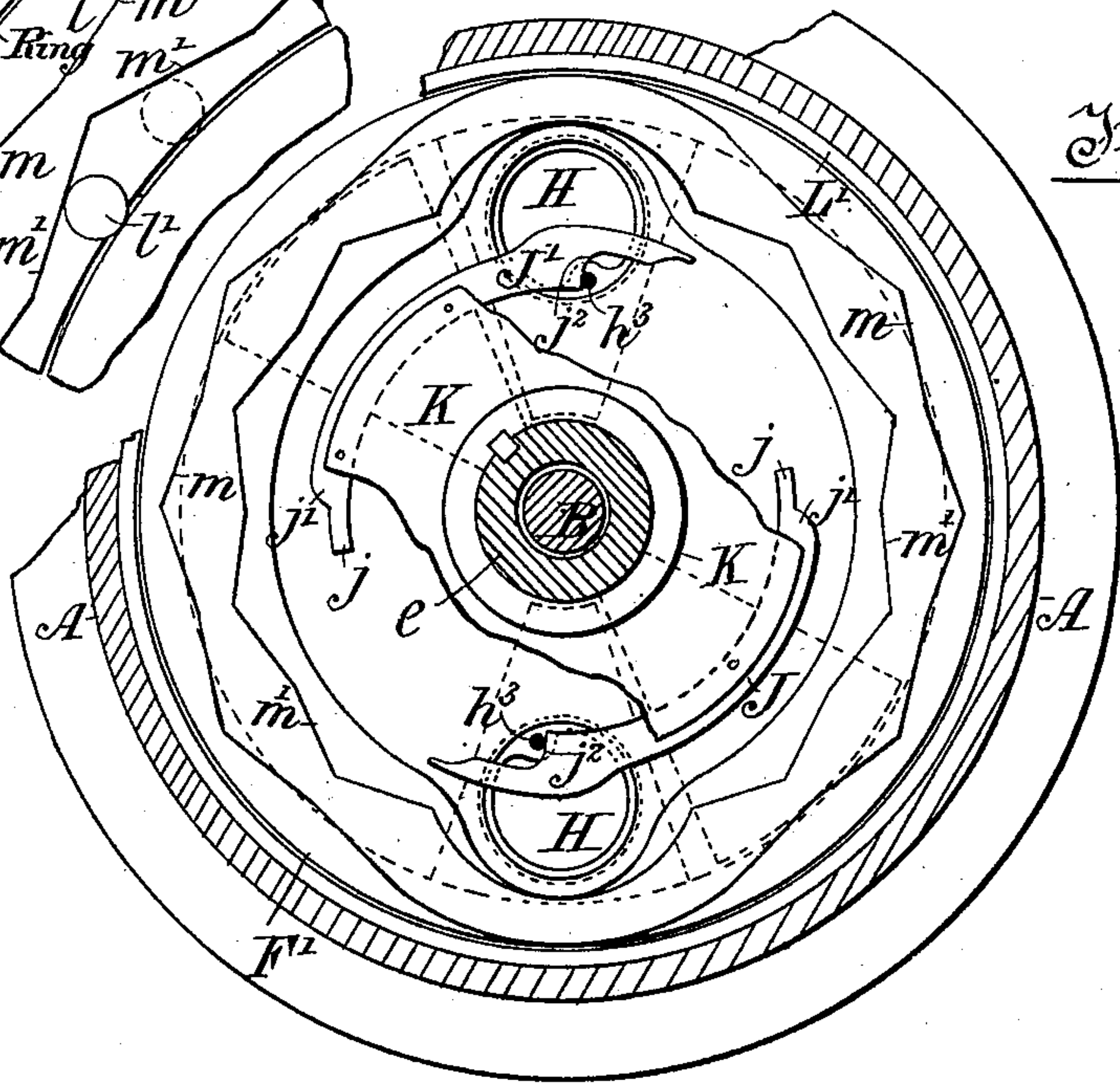


Fig. 4



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UNITED STATES PATENT OFFICE.

DANIEL LE ROY DRESSER, OF FLUSHING, NEW YORK.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 602,059, dated April 12, 1898.

Application filed May 1, 1893. Renewed September 20, 1897. Serial No. 652,369. (No model.)

To all whom it may concern:

Be it known that I, DANIEL LE ROY DRESSER, a citizen of the United States, residing at Flushing, Queens county, in the State of New York, have invented certain new and useful Improvements in Engines, of which the following is a specification.

This invention relates to rotary engines operated by steam, gas, or other fluid or vapor, and has for its objects to improve and simplify the construction, to render the operation positive and direct in all cases, to insure a perfect balance, and otherwise increase the efficiency of the engine.

The main features of my engine include two or more pistons or sets of pistons projecting inward from two end disks carried loosely upon a common central shaft, said pistons working in and dividing an annular space formed by inner and outer circumscribing cylinders in connection with the end disks, arranged so that each piston or set of pistons shall be free to make a partial circumferential or rotary movement within the annular space at each admission of steam and be prevented from backward or reverse movement while the other piston or set of pistons makes a similar circumferential or rotary movement, certain valve and cut-off arrangements in which the movement of one piston or set of pistons operates the valves in the other piston or set of pistons, and arrangements whereby the motion of the pistons is imparted to the central shaft through the medium of collars keyed upon it.

For full comprehension of my improvements reference must be had to the accompanying drawings, forming part of this specification, whereon I have illustrated a preferred form of engine embodying my invention.

In said drawings, Figure 1 represents a longitudinal sectional elevation of the engine; Fig. 2, a transverse vertical section taken on the line 2 2; Fig. 3, a similar section taken on the line 3 3, and Fig. 4 a similar section taken on the line 4 4, all these sections being viewed in the direction indicated by their respective arrows in Fig. 1. Fig. 5 is a detail of a preferred form of friction or holding device for preventing backward movement of the pistons and also imparting forward movement to the shaft.

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

A represents the outer cylinder or casing, having heads A' A' bolted thereto in the usual manner.

B is the central shaft, passing through suitable stuffing-boxes in the cylinder-heads and journaled in standards A² A², carried by the bed-plate Z of the engine. Upon the outer ends of the shaft B are mounted the usual fly-wheel and belt-wheel.

Within the cylinder-heads collars C and D are keyed to the shaft B, these collars serving to communicate rotary motion to the shaft from the pistons, as will be hereinafter described.

I have shown two pairs or sets of pistons, but wish it to be understood that the principle of my invention may be carried out by the use of two single pistons or that more than two pairs may be used with like effect. I, however, prefer the arrangement shown particularly in Fig. 2, where a pair of segmental pistons E E project inward from a disk E', which is mounted loosely upon the central shaft B, within the fixed collar C, already alluded to, this disk having a cylindrical extension e, surrounding the shaft and extending close up to the collar D, and also a hub portion e', upon which is formed an annular ring e², which hub abuts against the collar C, the arrangement being such that rotary motion may be imparted to the latter by means of the frictional devices to be hereinafter more fully explained. This construction insures the formation of a steam-space between the disk E' and the ring e², into which steam is led through a steam-inlet E², situated at any convenient point of the circumference of the outer cylinder or casing A. I prefer to employ rotary valves G G and seat them one in each of the segmental pistons E, although it is apparent that these valves and their seats may, if desired, be arranged within the disk E' and not project into the pistons proper. As shown clearly in Fig. 2, these valves are hollow, with closed ends, and have two peripheral openings g g' to coincide with ports g² g³ in the pistons E, in which the valves are seated. These valves G G are to be considered as forming the steam-inlets for operating the pistons E and have devices in connection therewith

whereby they are automatically operated from the pistons, as will be presently explained.

Corresponding with the pistons E E just described is another pair of segmental pistons F F', carried by disk F', which is mounted loosely upon the cylindrical extension *e* of the disk E', and these pistons F project inward in the same manner and are adapted to rotate in the same path as the pistons E. They are provided with rotary valves H H, similar to the valves in the other pistons save that they may have only one opening *h*, which is brought into communication with ports *h'* *h*² alternately, said ports being formed in the pistons F, which afford seats for such valves. These valves are to be considered as exhaust-outlets for the steam and communicate with a space formed between the disk F' and the adjacent cylinder-head A', through which head, as indicated by the dotted lines in Fig. 1, I prefer to lead the exhaust-pipe F².

The disk F' has formed upon its inner face, at or near its rim, a projecting annular flange *f*, or, as I term it, a "circumscribing cylinder," which extends past and substantially incloses the disk E' and pistons E. A double tappet I is fastened to the outer edge of this circumscribing cylinder *f*, so as to rotate therewith and with disk F', and, as shown in Fig. 3, has formed upon it eight shoulders *f'* *f*² *f*³ *f*⁴ *f*⁵ *f*⁶ *f*⁷ *f*⁸, adapted to strike against pins or projections *g*⁴ *g*⁵ formed on the outer ends of the steam-inlet valves G G, and thus rotate them to open and close communication between their openings *g* *g'* and the ports *g*² *g*³ of the pistons E at the proper times to effect the operation to be hereinafter described.

The exhaust-valves H H have each a pin or projection *h*³, projecting beyond the face of the disk F', and these pins are engaged by tappets J and J', fixed upon a plate or disk K, carried by the cylindrical extension *e*, so as to rotate therewith and with the disk E'. Ball-bearings are interposed between the plate K and the disk F, as in Fig. 1, if found necessary. These tappets are each formed with shoulders *j*, *j'*, and *j*², which strike alternately against the pins *h*³, and thus rotate the exhaust-valves H H and bring their ports into proper position with regard to the ports *h'* or *h*² for receiving or discharging steam, according to the relative positions of the pistons.

The friction devices which I prefer to employ for preventing backward movement of the pistons when taking steam and for communicating motion to the shaft are shown in Figs. 1 and 5.

L L' are steel friction-rings let into the metal of the cylinder or casing A at points adjacent to the peripheries of the collars C and D, respectively, and concentric therewith. *l* *l* are friction-rollers working against the inner surfaces of the rings and against inclined surfaces *m* *m*, and *l'* *l'* are similar

rollers working between other inclined surfaces *m'* *m'* and the peripheries of the disks E' and F', respectively, these inclined surfaces *m* and *m'* being formed in the one case upon the face of the annular ring *e*² of the disk E' and in the other case directly upon the outer face of the disk F', as indicated in Fig. 1.

In place of the frictional devices just described I may use pawl-and-ratchet arrangements or eccentrically-mounted cams arranged so that the angle of their center line to the normal at the point of contact shall be less than the angle of friction, or other suitable devices may be substituted by the exercise of mechanical skill and judgment.

The operation of my engine may be described as follows: Assuming the pistons E and F to be in the relative positions shown particularly in Fig. 2, the valves G G are then in position to admit steam, gas, or other fluid or vapor into the spaces *s* *s* between the two pairs of pistons, and this tends to force the pistons E away from the pistons F and causes the former to make a rotary movement in the direction of the arrow until the dotted position is reached. The pistons F are meanwhile held from revolving in the opposite direction by the frictional devices *l* *m* L', and the motion of the pistons E is communicated to the fixed collar C and shaft B through those frictional devices *l'* *m'* which are adjacent to said collar C. Upon the pistons E reaching their dotted positions the position of the valves G G is reversed, which reversing operation has been effected by contact of the valve-pins *g*³ *g*³ and *g*⁴ *g*⁴ with the shoulders *f'* and *f*³ and *f*⁵ and *f*⁷, respectively, of the tappet *f* during the movement of the pistons E E, and these valves are now in position to admit steam into the spaces *s'* *s'*. The admission of steam at these points forces the pistons F F forward and causes them to travel in the same direction as the preceding pistons E E and for a similar distance, the last-named pistons being meanwhile held from backward movement by the frictional devices *l* *m* L, and the described forward movement of the pistons F F has been imparted to the collar D and shaft B through the medium of those frictional devices *l'* *m'* which are adjacent to the collar D. At the end of the movement of the pistons F F the position of the exhaust-valves H H will be found to have changed, the operation having been effected by contact, in succession, against the valve-pins *h*³ of the shoulders *j* *j'* of the respective tappets J J', moving with the disk E' and cylindrical extension *e*, and the steam is thus allowed to exhaust through the ports *h*² *h*² of the pistons F F into the space between the disk F' and cylinder-head, and thence through the exhaust-pipe F².

It will be readily understood from the foregoing and from the drawings that the continual rotation or changing of position of the pistons E and F and their connections, as de-

scribed, will bring their respective valves and valve-pins and the shoulders f^2, f^4, f^6 , and f^8 of the tappet f and the shoulders j^2, j^2 of the tappets J, J' into their proper relative positions during the operation of the engine to effect a continuous supply and exhaust of steam, so that further description of the action of these parts will be unnecessary, and especially as I do not limit myself to the valve- and -tappet arrangements herein specified. The details of construction of these and other parts of my engine may be varied without departing from the principle or sacrificing the advantages of my invention.

What I claim, and desire to secure by Letters Patent, is as follows:

1. In a rotary engine, the combination with an outer cylinder, or casing, and a central shaft, of two pistons or sets of pistons, so arranged that each piston or set of pistons shall make a partial revolution or circumferential movement at each admission of steam and impart its motion to the shaft while the other piston, or set of pistons, is held from movement, and valves for controlling said pistons, the said valves being carried by the pistons, substantially as set forth.

2. In a rotary engine, the combination with an outer cylinder or casing, and a central shaft, of two pistons or sets of pistons adapted to move alternately, valves in connection with each piston or set of pistons, and means whereby the valves in one piston or set of pistons are operated by the movement of the other piston or set of pistons, substantially as set forth.

3. In a rotary engine, the combination with an outer cylinder or casing, and a central shaft, of two pistons or sets of pistons adapted to move alternately in the same circumferential path, inlet-valves in connection with one piston or set of pistons, and outlet or exhaust valves in connection with the other piston or set of pistons, and means for automatically operating said valves, substantially as set forth.

4. In a rotary engine, the combination with

an outer cylinder or casing having a steam-inlet and a steam-outlet, and a central shaft, of two disks carried by the shaft, pistons projecting from both of said disks toward each other and dividing an intervening annular space, valves automatically operated by the movement of said pistons, and two collars fixed upon the central shaft, one adjacent to each of said disks, and adapted to receive rotary motion therefrom, substantially as set forth.

5. In a rotary engine, the combination with an outer cylinder or casing having a steam-inlet and a steam-outlet, and a central shaft, of two disks carried by the shaft, pistons projecting from both of said disks toward each other, valves automatically operated by the movement of said pistons, two collars fixed upon the central shaft one adjacent to each of said disks, and means in connection with the casing, the disks and the collars, whereby motion is imparted to the shaft through each of the collars alternately, and the disks and pistons are held alternately from backward or reverse movement, substantially as set forth.

6. In a rotary engine, the combination with an outer cylinder or casing, and a central shaft, of a disk carrying pistons and valves and having a cylinder or sleeve loosely surrounding said shaft, a disk also carrying pistons and valves and mounted loosely upon said cylinder or sleeve near its end and having an annular flange or rim extending to or beyond said first-named disk, said sleeve and said flange circumscribing the space in which the pistons rotate, and having devices, as tappets, for operating the valves, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL LE ROY DRESSER.

Witnesses:

ANTHONY GREF,
ROBT. A. KELLOND.