(No Model.) 2 Sheets—Sheet 1.

J. L. MITCHELL.

ROTARY ENGINE.

No. 314,389. Patented Mar. 24, 1885.

Fig. 1.

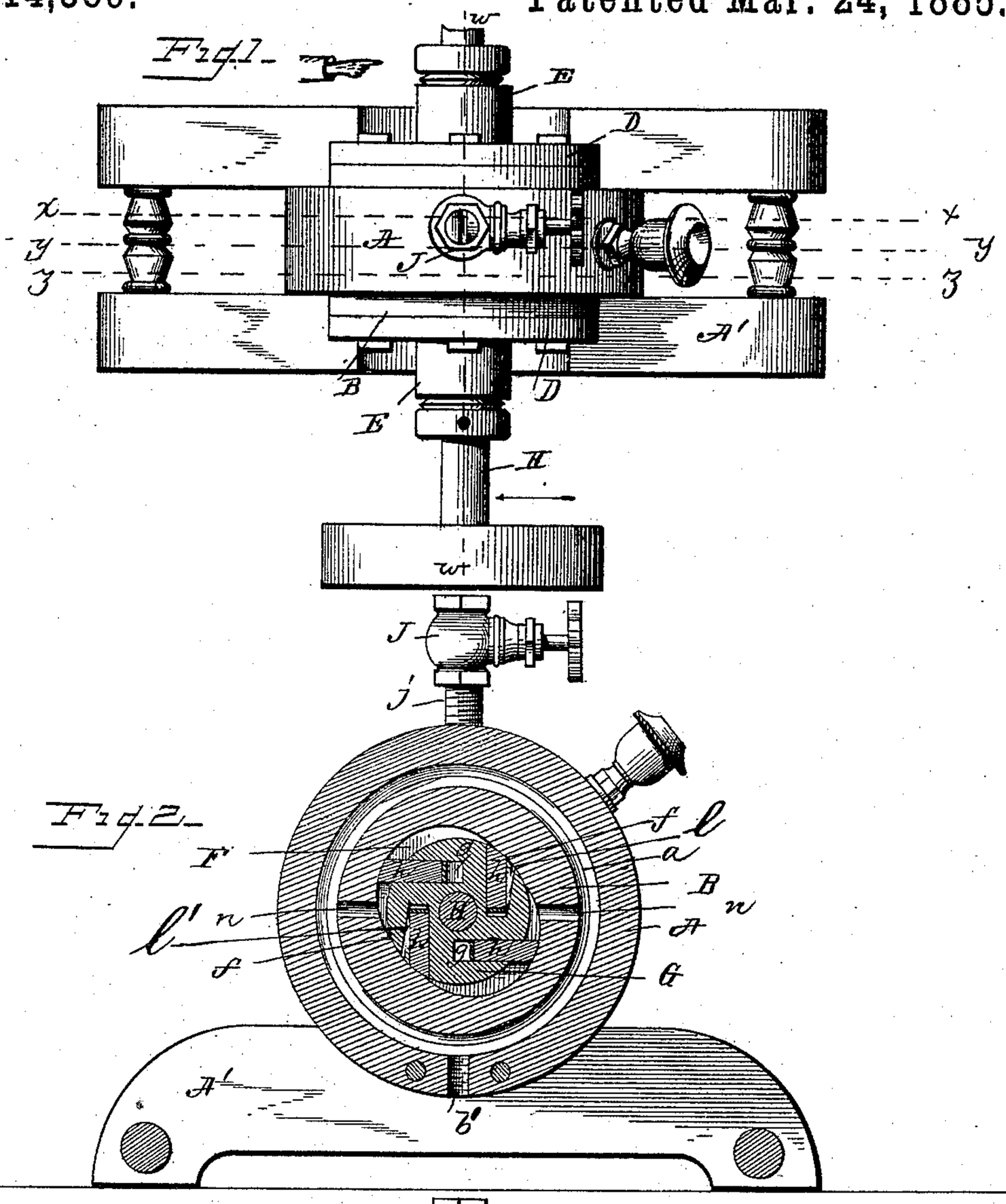
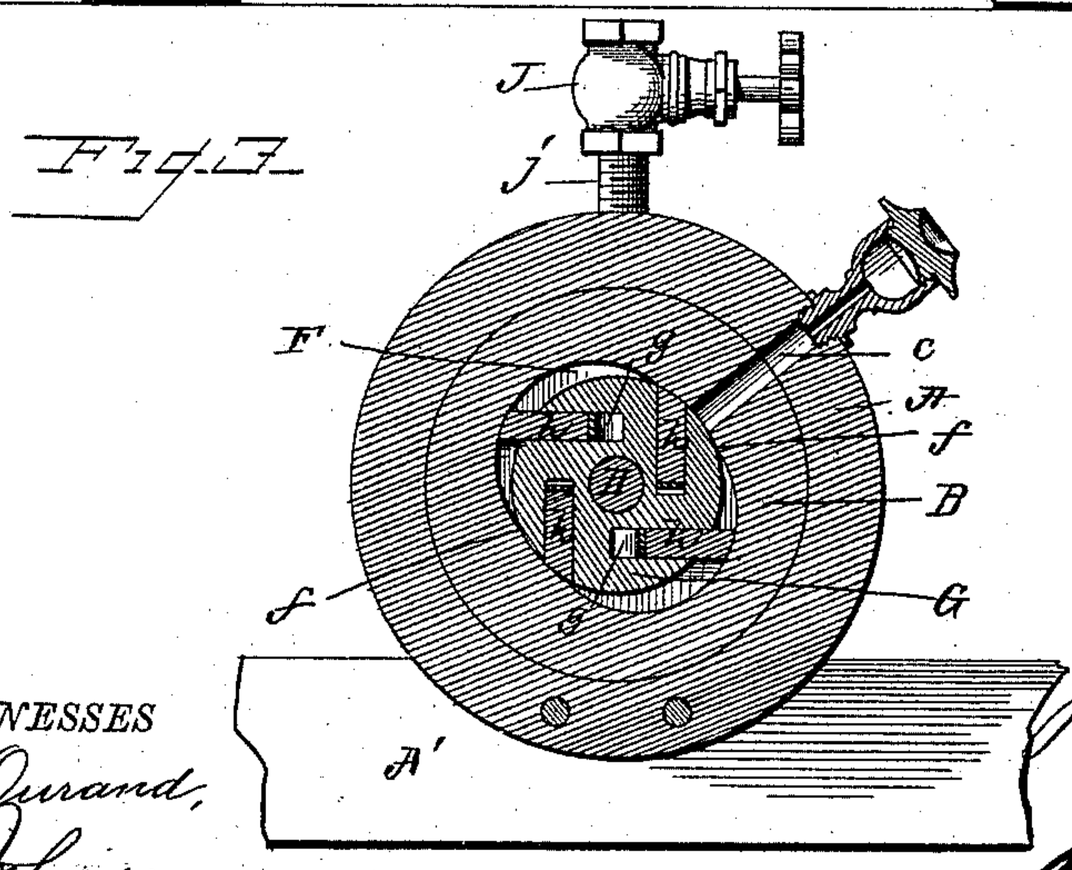


Fig. 2.

Fig. 3.



WITNESSES
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

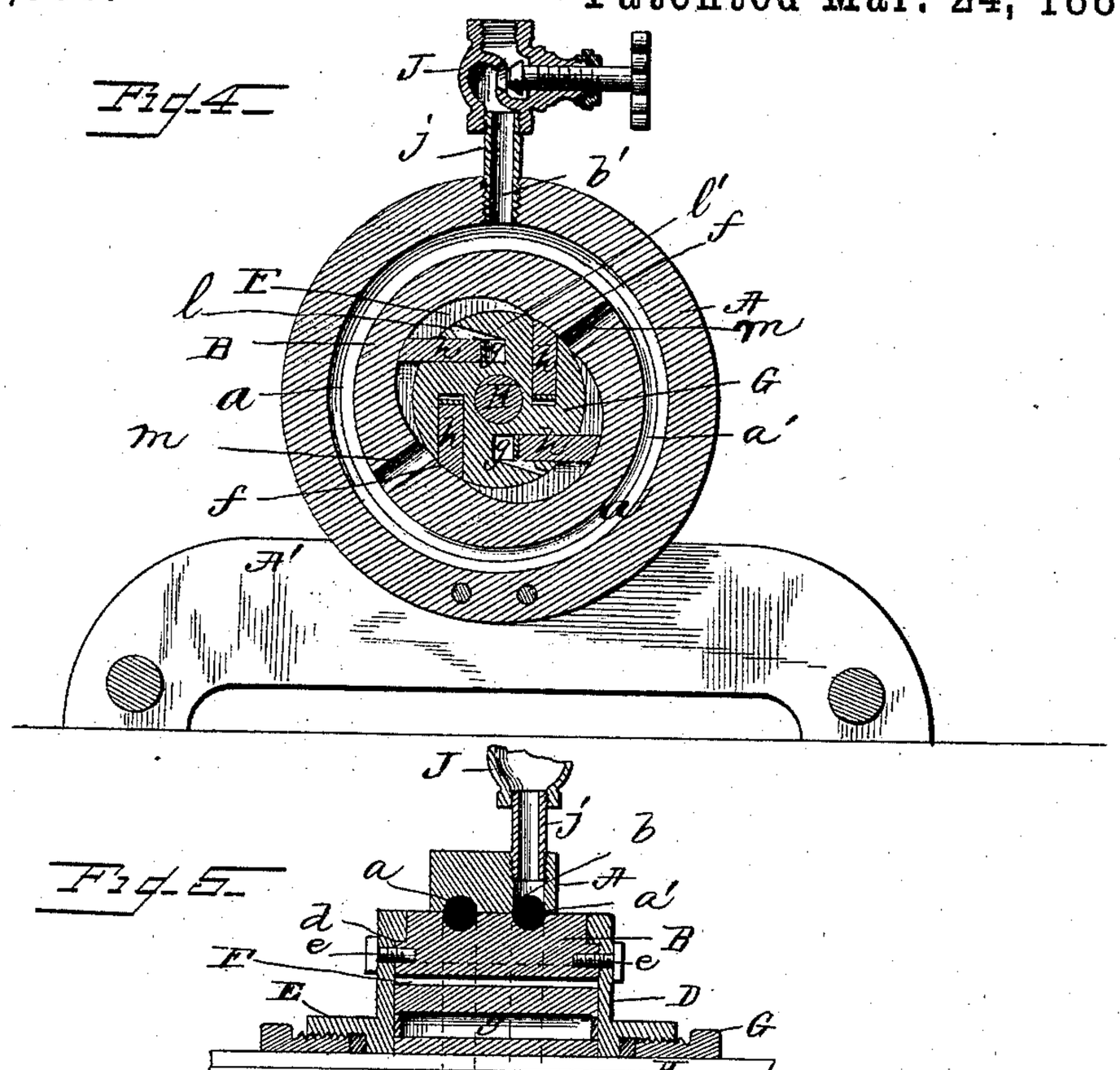


Fig. 5.

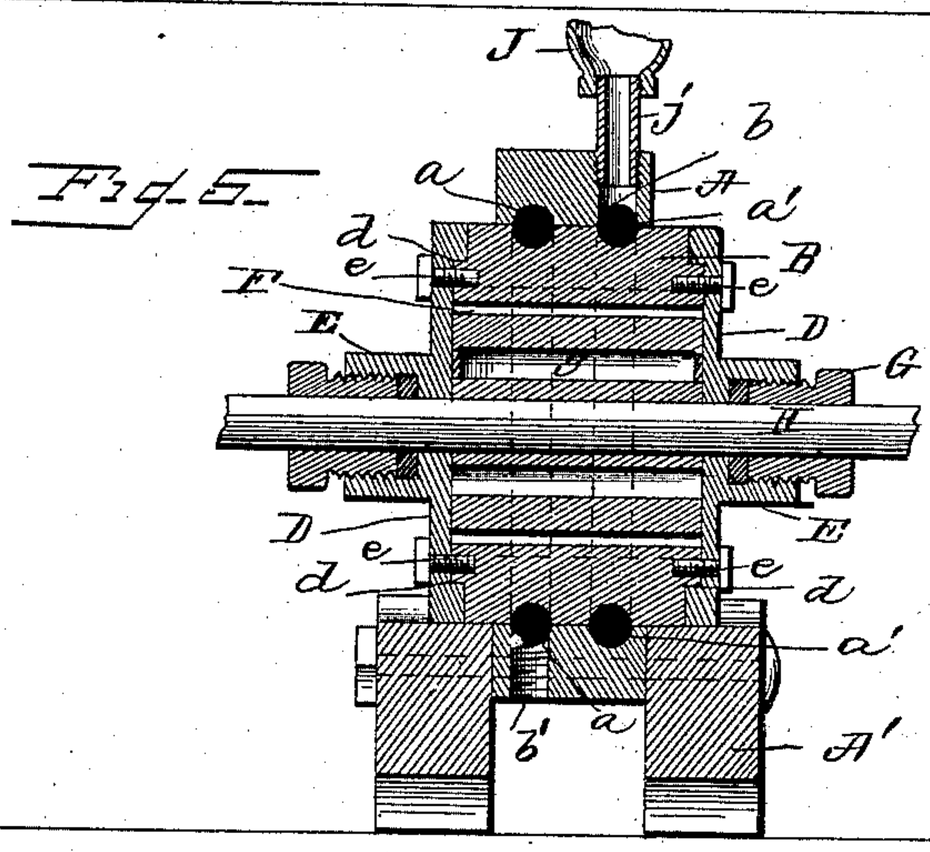


Fig. 6.

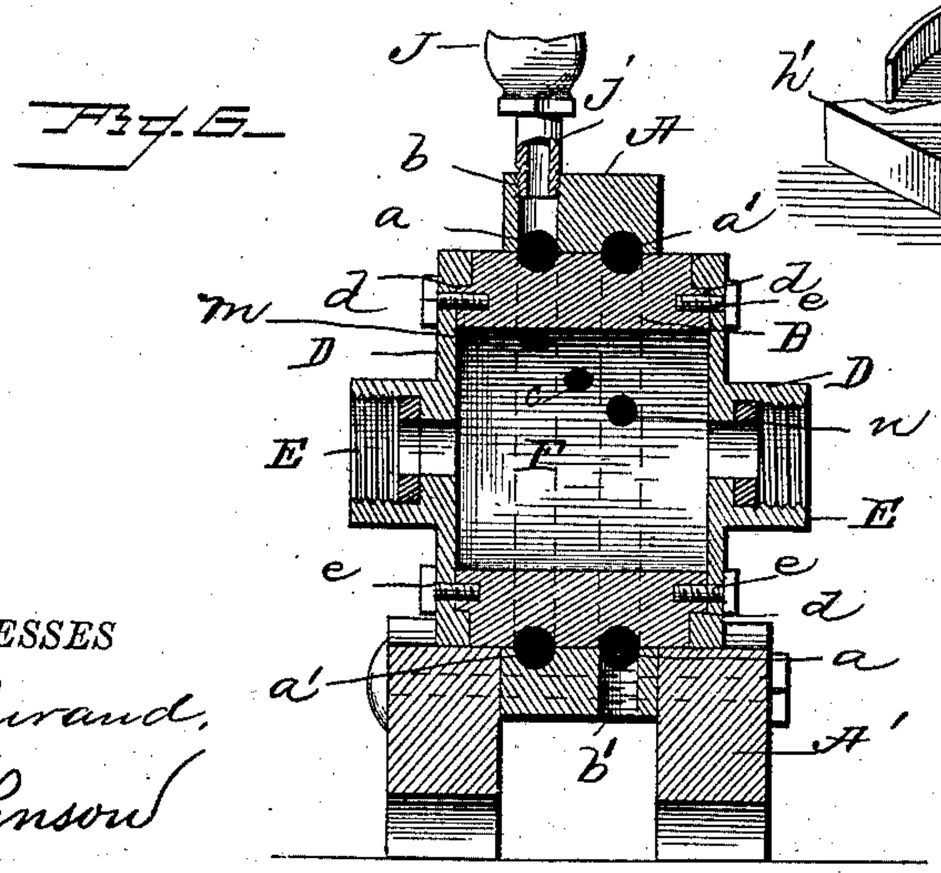
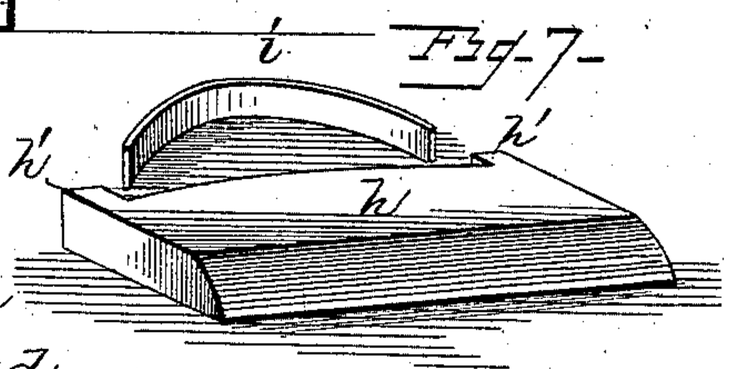


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES. L. MITCHELL, OF KENTON, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 314,389, dated March 24, 1885.

Application filed July 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. MITCHELL, a citizen of the United States of America, residing at Kenton, in the county of Hardin and State of Ohio, have invented certain new and useful Improvements in Rotary Engines; and I do hereby 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.

This invention relates to certain new and useful improvements in rotary steam-engines, the object of my invention being to provide an engine of this class with but few movable parts, whereby it can be constructed more cheaply and is not liable to get out of order.

In the accompanying drawings, which illustrate my invention, Figure 1 is a plan view. Fig. 2 is a vertical section through the line *x x* of Fig. 1. Fig. 3 is a vertical section through the line *y y*. Fig. 4 is a vertical section through the line *z z*. Fig. 5 is a section through the line *w w* of Fig. 1, looking in the direction indicated by a dark arrow. Fig. 6 is a section through the same line looking in the direction indicated by the index-hand, the movable portion of the engine being removed; and Fig. 7 is a detail view.

A represents the outer casing or cylinder, which is provided on its interior adjacent to its edges with semicircular grooves *a a'*. Openings *b b'*, located upon opposite sides of the outer casing, extend through the same to the semicircular grooves, the opening *b* entering the groove *a*, while the opening *b'* connects with the semicircular groove *a'*. At the central portion of the casing is provided a straight passage for lubricating the rotary disk, as will be hereinafter set forth, this opening being indicated by the letter *c*. The outer casing, A, is of sufficient thickness to be pierced by bolts without interfering with the openings formed therein, by means of which bolts the engine is secured to a suitable base, A'. Secured within this outer cylinder or casing is the inner cylinder, B, the exterior circumference being the same as the interior of the outer cylinder, and said inner cylinder is provided with coinciding semicircular recesses, so that when the two cylinders or casings are placed within each other circumferential passage-ways will be provided. The inner cylinder, B, is of greater width than the outer cylinder, and is provided at its side with a step, *d*, over which are placed similarly-constructed heads, D, which are secured to the inner cylinder by means of bolts *e*, which pass through the heads and into screw-threaded perforations in the inner cylinder. The heads are provided centrally with boxes E, through which passes the shaft. The inner and outer cylinders are secured rigidly to each other by shrinking one upon the other, thereby rendering the parts substantially integral with each other, and providing a casing of great strength. The inner cylinder is provided with an opening, F, in which the rotary disk or hub and its pistons operate. This opening has its greatest length at about an angle of forty-five degrees with the base, the shape of said opening being formed somewhat as an oblate, and consists of three portions, the portions *f f* being the segments of a circle, which is of the same diameter as the rotary disk or hub, while the ends are segments of slightly less circumference, which have their centers at a slight distance to each side of the centers of the segments *f f*. By means of this construction I provide crescent-shaped openings at each side of the rotary disk or hub. The rotary disk or hub G is shrunk upon the shaft H and fits snugly within the sides *f f* of the opening F in the inner cylinder. This rotary disk is provided with cut-away portions or recesses *g* for the reception of the pistons *h*, which play within said recesses. These pistons *h* are cut away at their outer edges so as to correspond with the outer circumference of the disk or hub G, and at their bases have shoulders *h'*, for the retention of springs *i*, which bear upon the base of the recesses *g* and upon the pistons, so as to exert a pressure which will force said piston outward from the recesses and against the walls of the opening F. The induction-port *b* is provided with a connecting-pipe, *j*, which is provided with a cut-off valve, J, and the eduction-port may be provided with a similar pipe-connection for conveying the waste steam to a suitable discharge. A lubricating-cup is also attached to the outer cylinder, A,

over the opening *c*, which is located at the center portion of the same between the passages *a a'*, and extends through the inner cylinder, B, as shown. The inner cylinder is pierced at two points, which are diametrically opposite each other on each side of the portions *f* of the opening F, so as to provide a communication with a passage-way, *a*, said openings being indicated by the letters *m m*, and on opposite sides of the portions *f f* with passage-ways *n n*, which communicate with the eduction-opening *a'*.

From the foregoing it will be seen that I provide a rotary engine which is extremely simple in construction, and has but few parts which are not formed so as to be substantially integral with each other.

The operation of my invention is as follows: Steam being admitted into the induction-port enters the passage *a*, passes through the openings *m*, and from thence to the rear of the pistons, causing a rotation of the hub. When the hub rotates substantially one-quarter, the live steam passes through the openings *n* into the passage *a'*, and from thence to the eduction-opening. It will be seen from the construction that though a single passage-way is provided for the entrance and exit of steam between the inner and outer cylinders, and short passages located diametrically opposite each other and connected thereto, that the supply of steam and exhaust are continuously being effected upon the rotary disk or hub.

The lubrication of the pistons and surface of the rotary disk is readily effected by the lubricating-passage *c*, which is provided with a lubricating-cup, as shown. The outer surface of the rotary disk or hub being a true cylinder can be readily turned, and the outer edges of the opening F, being also the segments of a circle, will be constructed cheaply and truly by the same process. The radial openings *g*, which are for the reception of the pistons, are provided with openings *l* and grooves *l'*, which extend to the base of said recesses and afford a simple and effective means for lubricating said pistons.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary steam-engine, an inner and an outer casing provided with circumferential passage-ways formed within the same, induction and eduction openings located on opposite sides of the cylinder and provided with openings for the admission of steam on opposite sides of a rotary disk, and openings connected with the eduction-passage similarly located, so that steam will be admitted against the pistons at each quarter-turn of the disk, substantially as shown, and for the purpose set forth.

2. In a rotary engine or motor, an inner and outer cylinder provided with circumferential passage-ways formed within said cylinders and adjacent to the opposite sides thereof, said cylinders being shrunk upon each other so that the sections of the passage-way will coincide, substantially as set forth.

3. In a rotary engine or motor, the inner and outer cylinders, A B, having circumferential openings or passages *a a'* located between the cylinders and formed therein on opposite sides thereof, and provided with passage-ways *n n*, located opposite each other and connecting the openings *a a'* with the opening for the reception of the rotating parts of the engine, substantially as shown and set forth.

4. In a rotary engine, the cylinders A B, provided with circumferential openings *a a'* on opposite sides thereof, each of said openings being provided with two ports located diametrically opposite each other, and an opening in the inner cylinder with steam-spaces, as shown, in which the live steam enters and exerts a pressure upon the piston on each side of the rotary disk, substantially as shown, and for the purpose set forth.

5. In a steam-engine, the outer casings, A B, provided centrally with a passage-way, *c*, adapted to convey lubricants to the rotary disk, said rotary disk being provided with openings and grooves adjacent to the movable pistons, whereby said pistons may be lubricated and a passage-way provided between the grooves in which the pistons slide and the inner cylinder, substantially as shown.

6. In a rotary engine, the casings A B, having adjacent to their edges circumferential passage-ways, openings through the outer casing connecting therewith, and openings *m n* upon different horizontal planes connecting the circumferential passage-ways with the opening F, a rotary disk with sliding pistons, and means for lubricating the surfaces of the disk and pistons from the exterior of the casing, the parts being combined and organized substantially as shown.

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

JAMES L. MITCHELL.

Witnesses:
JOHN B. SOUTH,
JAMES MAY.