

(No Model.)

L. F. DAVOLL.
ROTARY ENGINE.

No. 364,093.

Patented May 31, 1887.

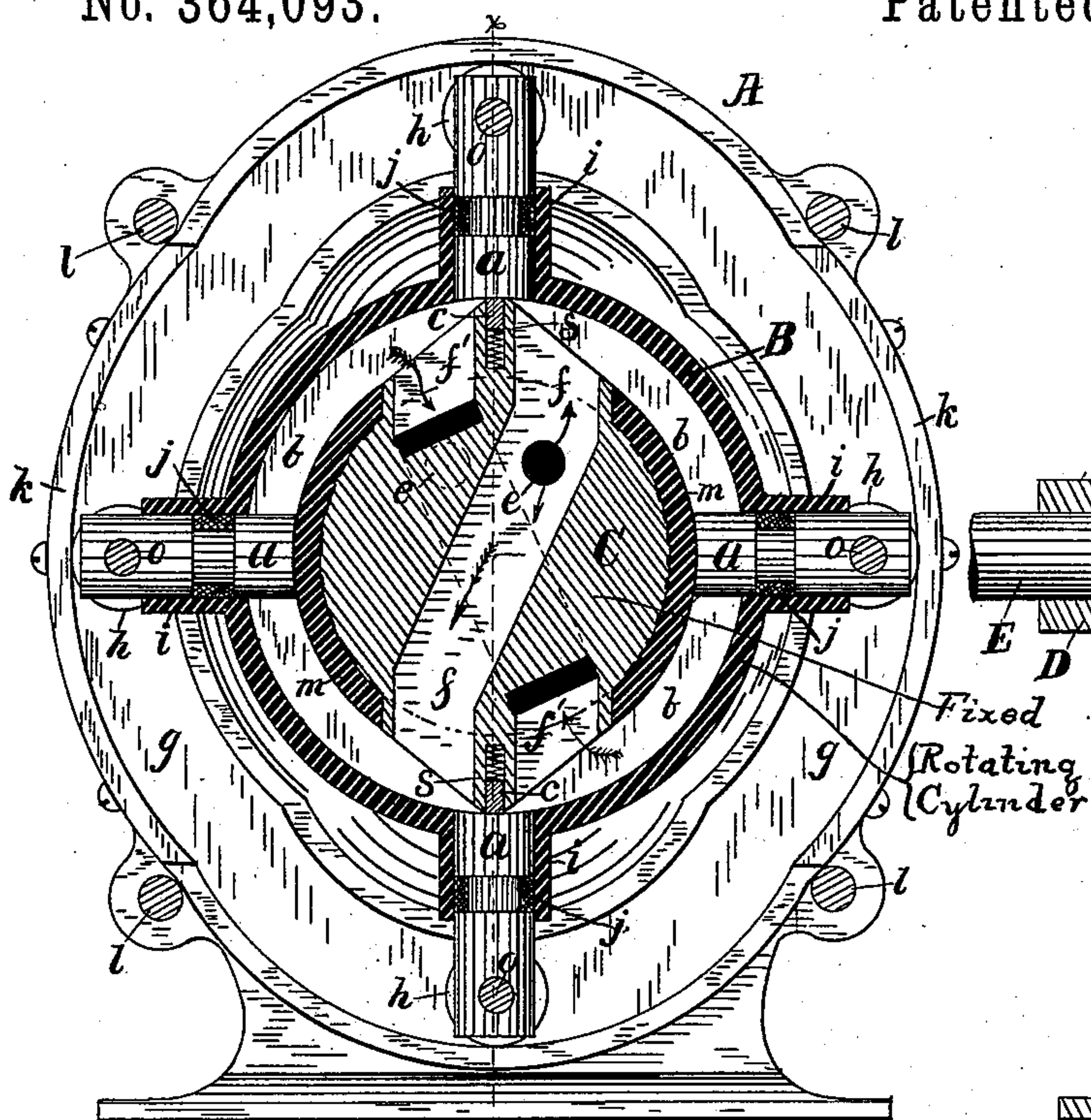


FIG. 1.

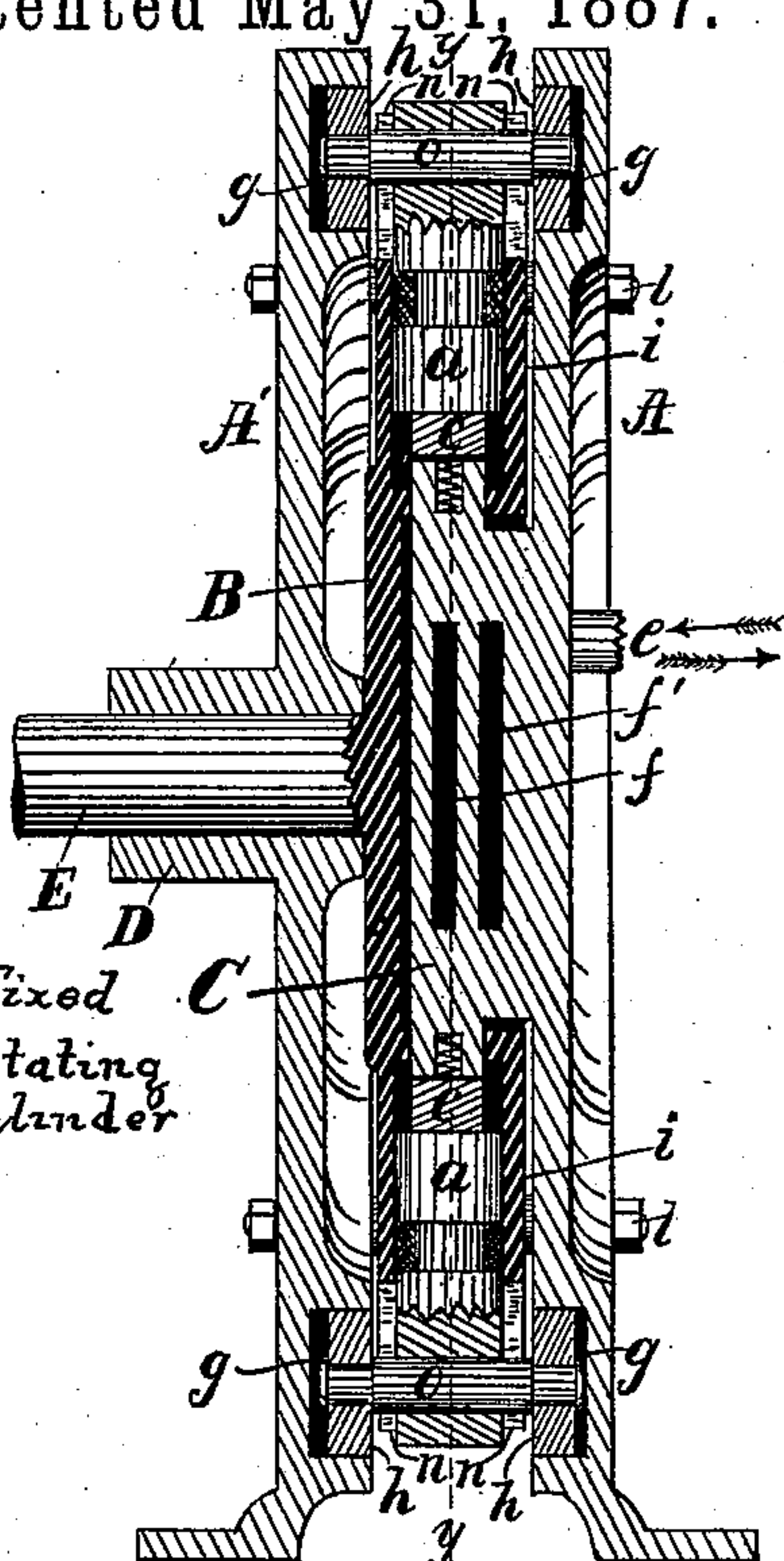


FIG. 2.

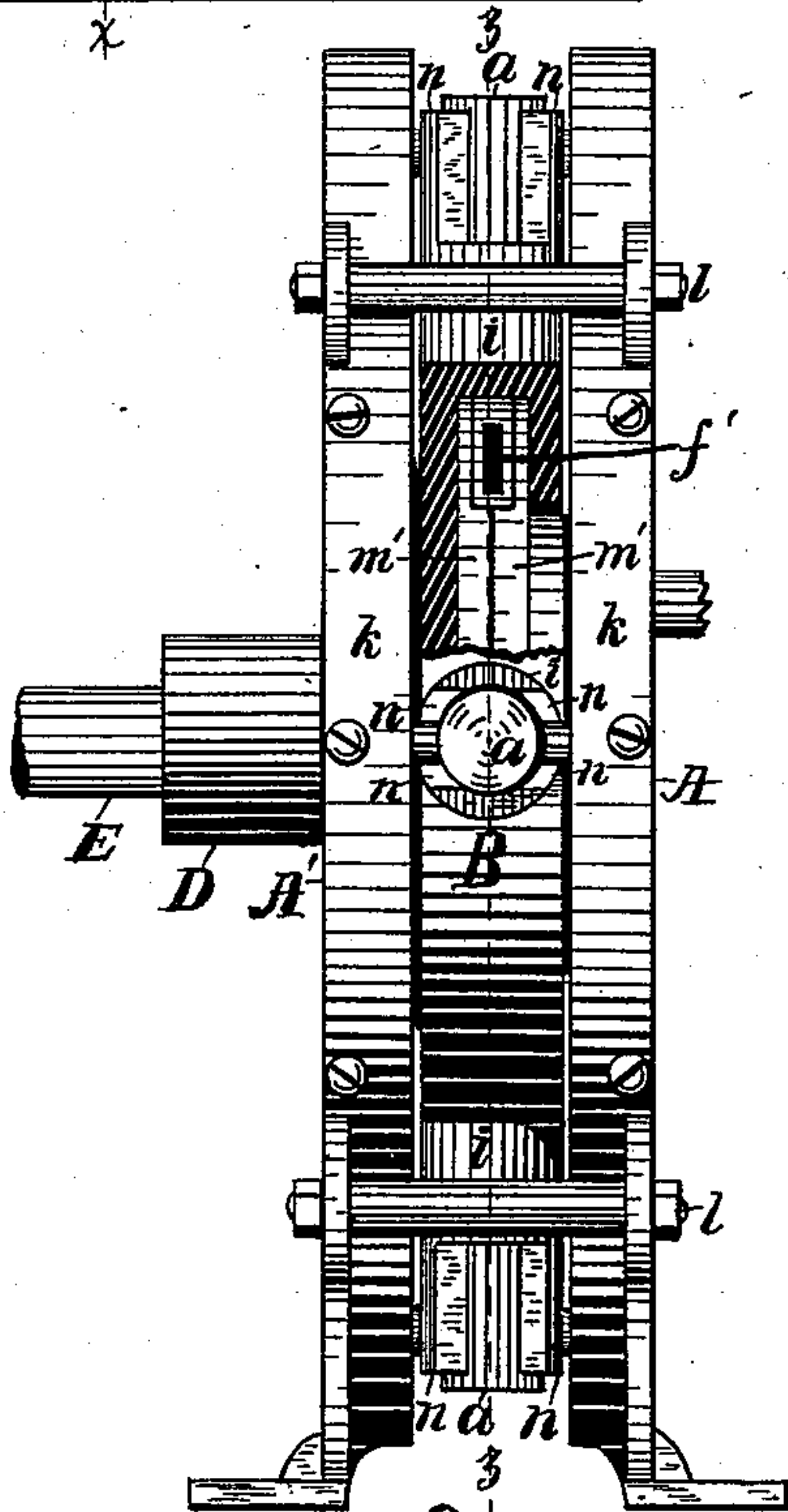


FIG. 3.

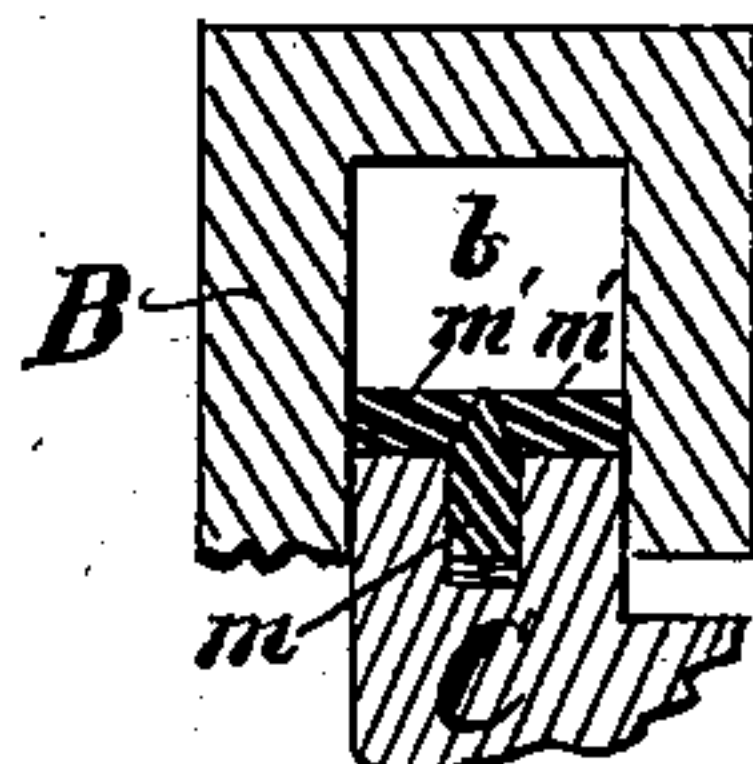


FIG. 4.

Witnesses

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ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 364,093, dated May 31, 1887.

Application filed March 5, 1887. Serial No. 229,874. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. DAVOLL, a citizen of the United States, residing at Boyne Falls, in the county of Charlevoix and State of Michigan, have invented a new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention relates to improvements in rotary engines in which a rotary cylinder attached to the shaft operates in conjunction with a stationary steam-chest; and the object of my invention is to avoid side pressure and consequent friction upon the parts, and to provide valve mechanism of cheaper and simpler construction and readily accessible for oiling or repairs; also, to provide a self-adjusting packing for the joint between the steam-chest and cylinder.

In the accompanying drawings, Figure 1 is a vertical section on the line *yy* of Fig. 2 and *zz* of Fig. 3; Fig. 2, a vertical section at right angles to that of Fig. 1 on the line *xx* of Fig. 1; Fig. 3, a side elevation of the machine with a portion of the cylinder broken away, showing the edge of the steam-chest and one port; and Fig. 4, a detail showing the manner of packing the joint between the cylinder and steam-chest.

Like letters refer to like parts in all the figures.

The plates *A A'* and the bolts *l*, which secure said plates to each other, constitute the frame-work of the machine, within which the working parts are arranged, which consist of a rotating cylinder, *B*, attached to a shaft, *E*, journaled in a suitable bearing, *D*, at the center of the plate *A'*, and a stationary steam-chest, *C*, attached to the center of the plate *A* and inclosed within said rotary cylinder *B*.

Between the steam-chest and cylinder is an annular space, *b*, which constitutes the working-space for the steam. This space is divided into two equal parts by abutments *s s* upon opposite sides of the steam-chest, which have spring-packing *c*, operating against the inner surface of the cylinder *B*. The end of the cylinder toward the plate *A* has a large central opening, as shown, through which the steam-chest connects to the said plate, with which it may be made integral, if desirable.

Induction and eduction pipes are connected

at *e e*, which may be provided with suitable sliding abutments, for reversing the direction of the current of steam for the purpose of reversing the motion. Said pipes *e e* open, respectively, into crossed ports *ff'*, each of which respectively opens into the upper end of one and the lower end of the other chamber *b*, so that at all times one port opens in advance and the other port in the rear of two opposite sliding abutments, *a*, of which there are four arranged radially and equidistant upon the circumference of the cylinder *B*. Said valves are cylindrical and of somewhat greater diameter than the chamber *B*, and are provided with packing *j*, operating to make them steam-tight within the radial cylinders *i*.

Through the outer ends of the sliding abutments *a* are pins *o*, upon the ends of which are rollers *h*, which engage with cam-grooves *g* in the plates *A A'*. The inner ends of said sliding abutments are made concave to fit the convex surfaces of the steam-chest *C*. The segments *k* of the outer flanges of said cam-grooves are detachable for the purpose of adjusting the sliding abutments *a* against the surface of the steam-chest, and also for the removal of said sliding abutments, as occasion may require. To prevent the sliding abutments *a* from rotating upon their axes, the cylinders *i* are prolonged at either side of the pins *o*, as shown at *n*.

To secure a tight joint between the cylinder and steam-chest, I place upon the edge of said chest, at either side of the abutments *s s*, two strips, *m' m'*, of suitable material, the adjacent surfaces of which are beveled, as shown. Within a suitable groove in the edge of the steam-chest is a curved piece, *m*, the outer edge of which is beveled to fit said beveled surfaces of *m' m'*, this curved piece *m* being forced outward by a spring or steam, as most convenient. The strips *m' m'* extend along either side of the inclined sides of the abutments *s s*, and rest against the packing-strips *c c* at either end.

The operation of my invention is as follows: Steam being admitted to the port *f* through the pipe *e*, it will flow into the spaces *b b*, and, acting between the abutments *s s* and *a a*, will cause the cylinder to rotate to the right. Each valve, by the operation of the rolls *h*, in con-

junction with the grooves *g*, will in turn traverse the convex surfaces of the steam-chest during a quarter-revolution of the cylinder, then moving outward passes the abutment *s*, and again moves inward and comes in contact with the opposite curved side of the steam-chest, so that at all times there is interposed between the induction and eduction ports two of the sliding abutments *a*, one at each side of the steam-chest, and the pressure against each being in opposite directions and equal, and the steam-spaces also being opposite and equal, I avoid side pressure upon the parts. As the two valves against which the steam is acting reach points where they begin to recede and allow the steam to escape through the ports *f' f'*, the other two sliding abutments have passed the induction-ports and are in contact with the curved side of the steam-chest and ready to take steam. I thus secure a constant and uniform pressure at both sides with uniform motion and very little friction. Two sliding abutments being at all times in position to take steam, there is no dead-center, and it is only necessary to change the direction of the steam through the machine to reverse the rotation.

The operation of the packing *m' m'* is as follows: The strip *m* acts as a wedge, forcing them outward against the sides of the cylinder, and the steam presses them against the steam-chest, thus effectually closing the joint at the angles between the cylinder and steam-chest. The valves *a*, being cylindrical, are easily packed and fitted, and the construction of the machine is such that the parts are easy of access to oil or repair.

I am aware that engines having a rotary cylinder and stationary steam-chest are not new. I do not claim these, broadly.

What I claim is as follows:

1. In a rotary engine, a rotary cylinder attached to a shaft and provided with radial cyl-

inders containing sliding abutments adapted to divide the space between said cylinder, and an inclosed stationary steam-chest having abutments dividing said space, substantially as described.

2. In combination with a rotary cylinder provided with sliding abutments inclosing a stationary steam-chest provided with stationary abutments, said abutments adapted to divide an annular steam-space between said cylinder and steam-chest, plates adapted to support said cylinder and steam-chest in position, and having cam-grooves adapted to operate said sliding abutments, substantially as described.

3. In combination with a rotary cylinder inclosing a stationary steam-chest, consisting of the strips *m* and *m' m'*, and having steam-spaces between them, substantially as described, packing-strips adapted to close the joint between said cylinder and steam-chest, substantially as described.

4. In a rotary engine, a rotary cylinder provided with radial cylinders containing piston-abutments provided with rolls engaging with plates having cam-grooves adapted to operate said abutments, and a stationary steam chest provided with abutments dividing the space between said cylinder and steam-chest, and crossed ports opening into said divided spaces, and packing-strips adapted to close the joint between said cylinder and steam-chest, substantially as described.

5. In a rotary engine, in combination with a rotating cylinder provided with piston-abutments, a plate having a groove adapted to operate said abutments, the outer flange of said groove being detachable, substantially as described.

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Witnesses:

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M. DICKINSON.