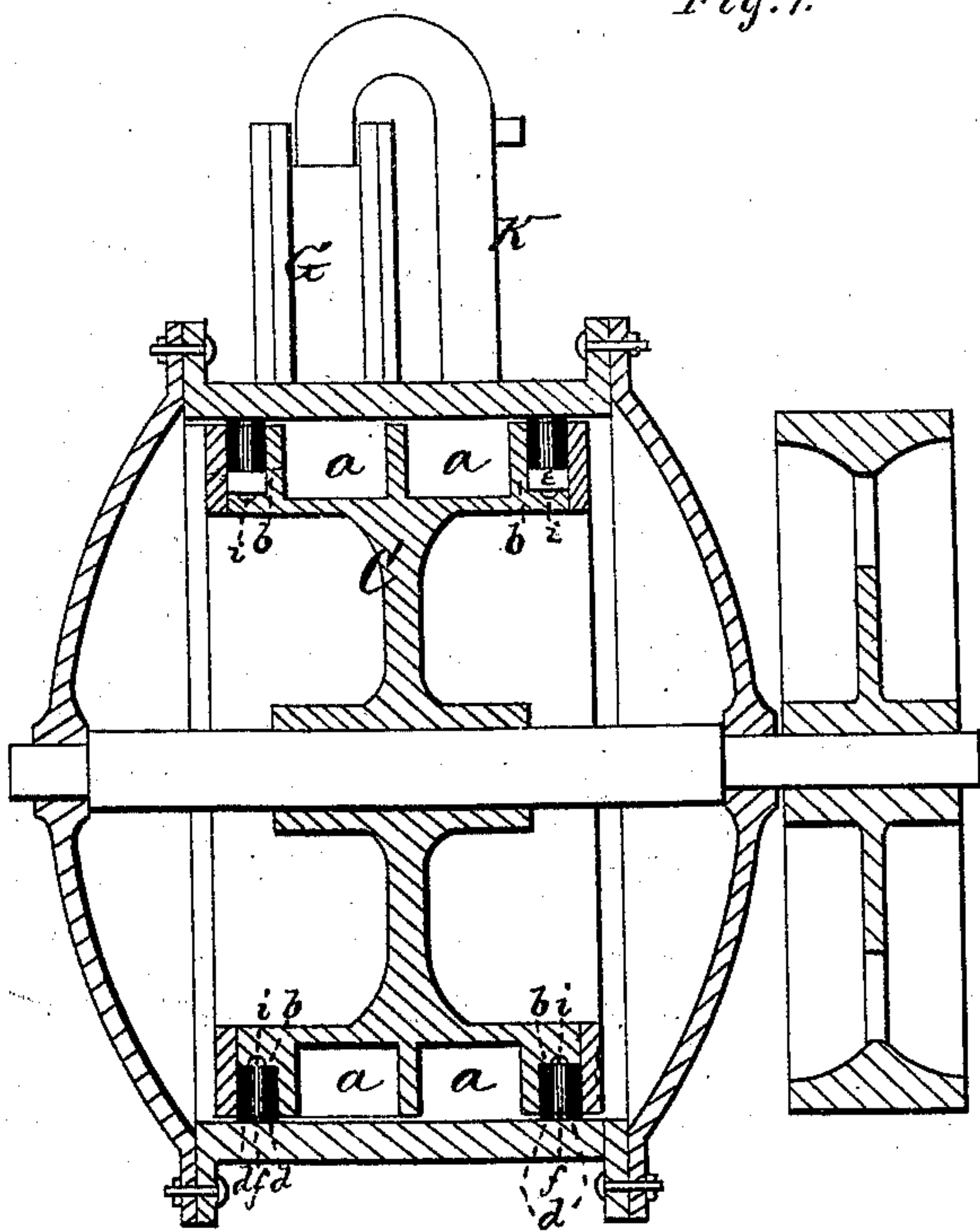


W. P. EAYRS.
Rotary-Engines.

No. 136,981.

Patented March 18, 1873.

Fig. 1.



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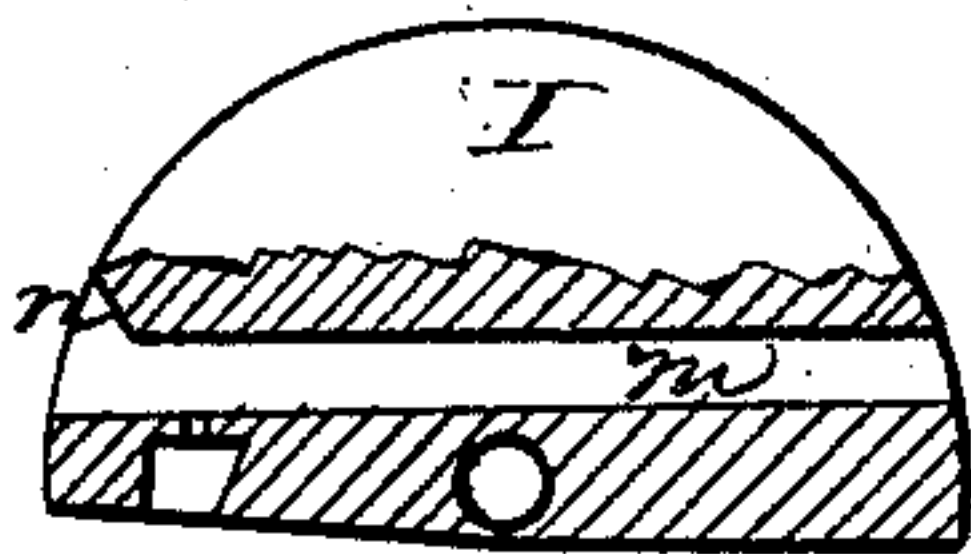
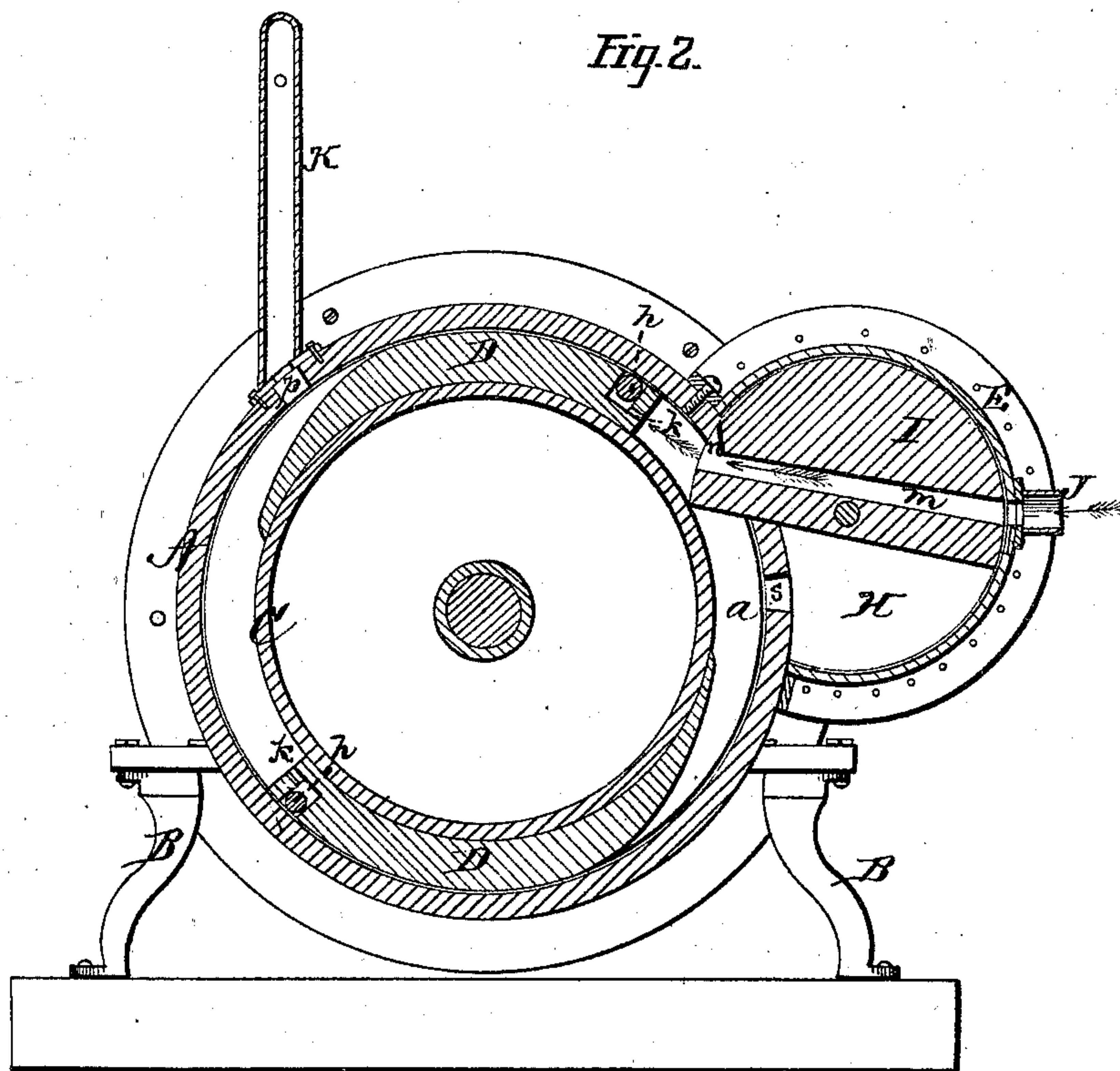
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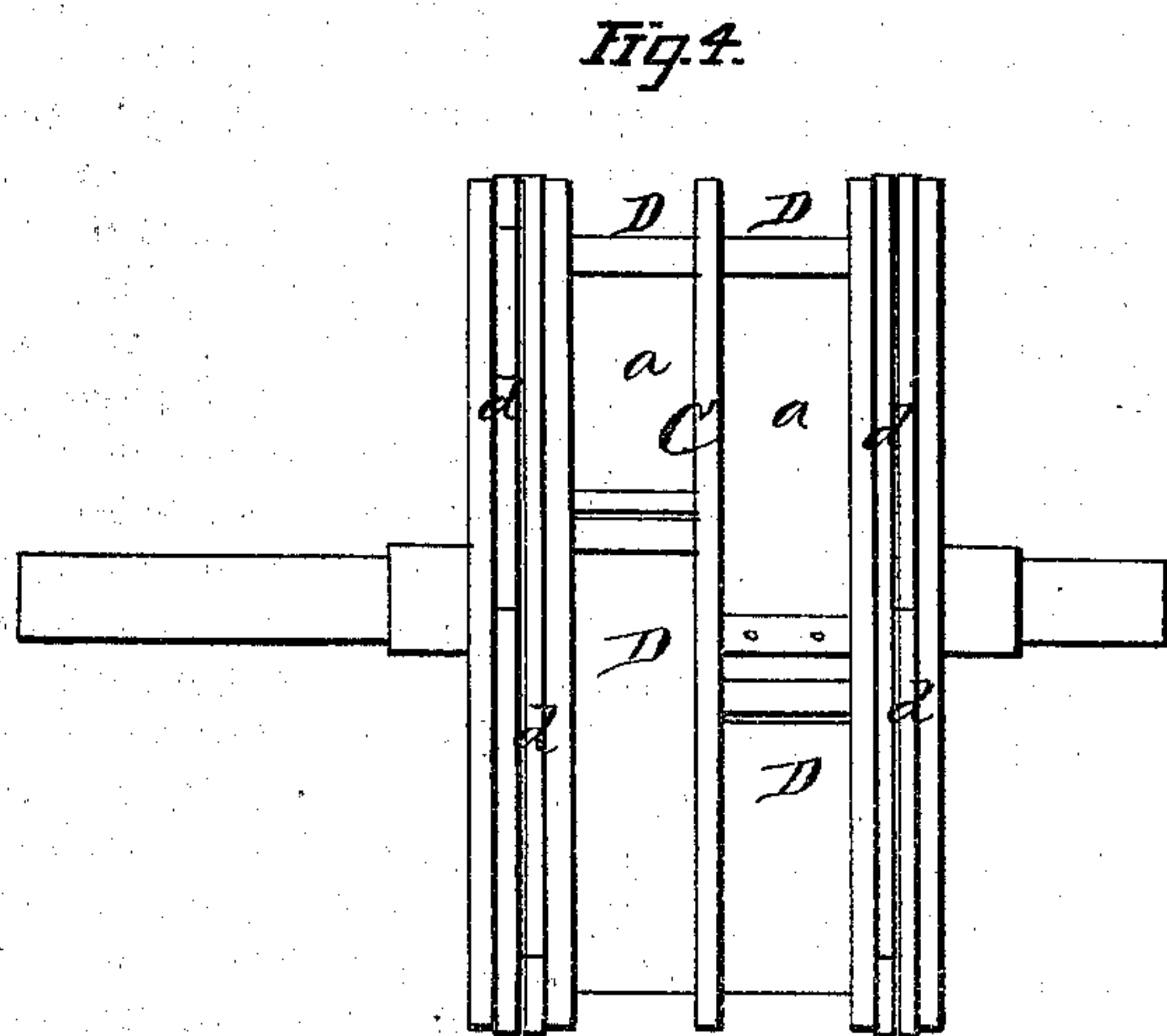
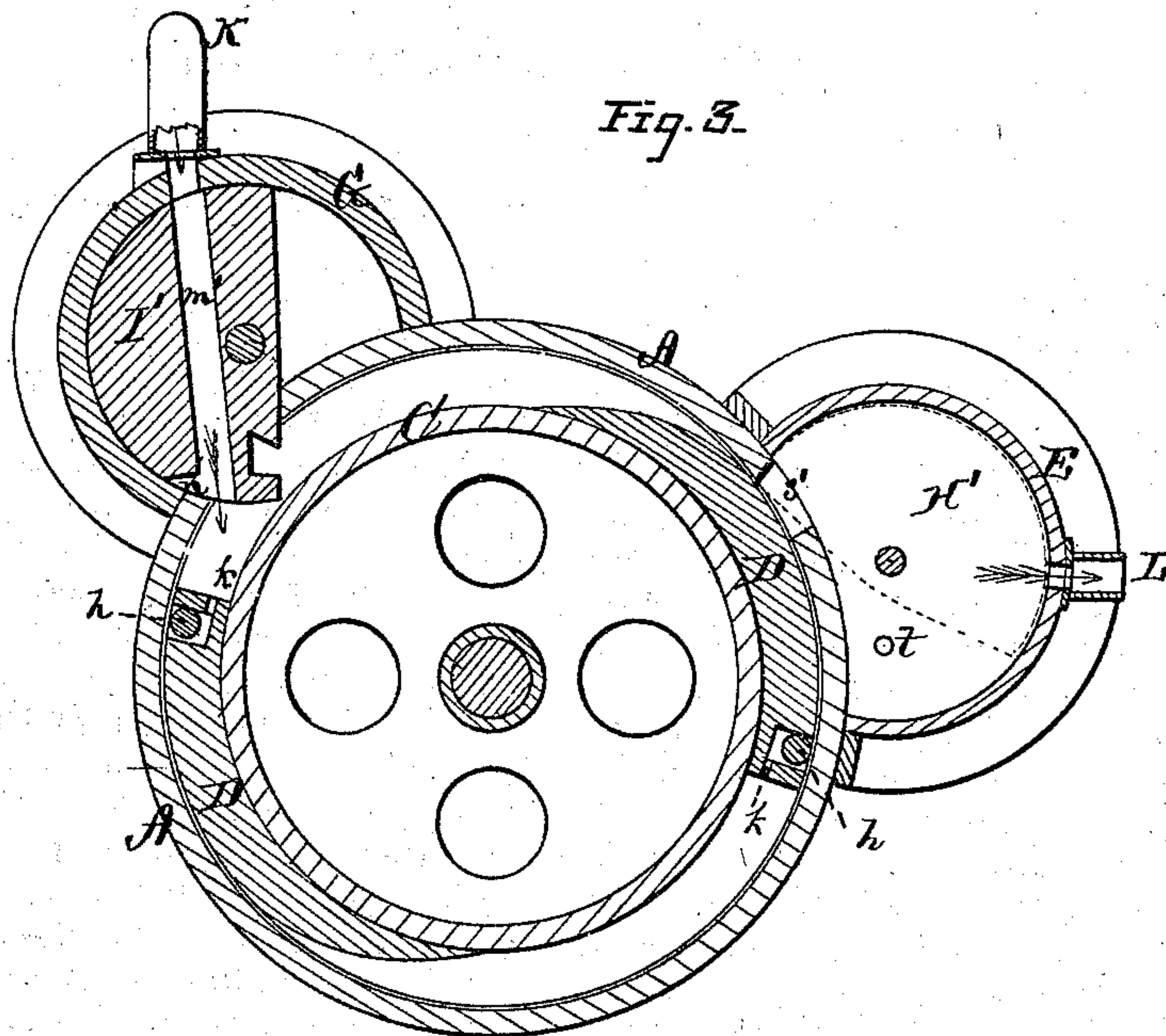
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UNITED STATES PATENT OFFICE.

WINSLOW P. EAYRS, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF HIS RIGHT TO T. E. STEWART, OF SAME PLACE.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. 136,981, dated March 18, 1873.

To all whom it may concern:

Be it known that I, WINSLOW P. EAYRS, of Boston, in the county of Suffolk and in the State of Massachusetts, have invented certain new and useful Improvements in Rotary Engine; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The nature of my invention consists in the construction and arrangement of a rotary engine, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a transverse vertical section of my engine. Figs. 2 and 3 are longitudinal sections of the same, and Fig. 4 is a side view of the interior revolving wheel.

A represents an ordinary steam-cylinder for a rotary engine supported on a suitable frame, B. C is the interior revolving wheel, provided with or attached to a central shaft which passes through the heads of the cylinder A.

The wheel C is provided with four circumferential grooves, *a a* and *b b*, the side grooves *b b* being for the reception of sectional packing-rings *d d*, and the middle grooves *a a* forming the steam-channels. In each of the grooves *b* are placed two packing-rings, *d*, each ring made in sections, and the sections so arranged as to break joints, as shown in Fig. 4. The packing-rings *d d* rest upon rollers *e e* placed in recesses formed in the bottoms of the grooves *b b*. Along the center in the bottom of each groove *b* is formed a smaller groove, *i*, as seen in Fig. 1. The packing-rings *d d* are thrown outward against the inner surface of the cylinder A by steam passing through short transverse grooves or channels formed on the inside of the cylinder A, and then through passages or channels *f* formed on the inner side of each packing-ring, and down into the groove *i*. The steam filling this groove presses the packing-rings outward, forming a steam-tight joint to prevent the steam from escaping from the steam-channels *a a* in the wheel. In each of the channels *a*

are secured two cam-shaped abutments, D D, which are arranged as shown in Fig. 4—that is, the abutments in one channel extend beyond or in front of the corresponding abutment of the other channel. In the outer surface of each abutment D, at or near the square end of the same, is a recess for the reception of a roller, *h*, which is forced outward against the inner surface of the cylinder A by steam entering the recess under the roller through a passage, *k*, in the end of the abutment, as shown in Figs. 2 and 3, thereby preventing the steam from passing by the same. The abutments might be made so as to fit closely the interior of the cylinder, but there would be a large amount of friction and they would soon wear; but by the employment of the rollers the friction is reduced to the minimum amount, and the steam packs the joint perfectly even if the surfaces should be worn. On the outside of the cylinder are secured two valve-boxes, E and G, the former of which is divided by a central longitudinal partition into two compartments, H H'. In the compartment H of the box E is hung a semicircular or segmental valve, I, through which is a passage, *m*, for the entrance of the steam, and in the cylinder is a suitable aperture, through which the end of the valve may drop into one of the channels *a* on the wheel. J is the inlet-port for the steam into the compartment H of the box E. The valve I being in the position shown in Fig. 2, the steam from the port J goes through the passage *m* in the valve into one of the channels *a* in the wheel and pressing against the abutment in front of it, revolves the wheel until this abutment passes a passage or aperture, *p*, in the cylinder, at which time the next abutment has advanced and turned the valve I on its pivot in the position shown by dotted lines in Fig. 3.

The steam which passed, as above described, through the valve I and turned the wheel C, goes through the aperture *p* and a pipe, K, into the valve-box G, where is hung a similar valve, I', with passage *m'*. The steam throws this valve down into the other steam-channel *a* to operate against the abutments in that channel. Thus the same steam which operates in one channel to turn the wheel a certain distance, goes through another valve into

the second channel to continue to revolve the wheel, and in like manner it may be used more than twice by having more than two steam-channels in the wheel and a corresponding number of valves. The steam is finally exhausted through the compartment H' in the box E and exhaust-pipe L. The steam in the channel, where the valve I' operates, exhausts through a port, *s*, directly into the compartment H', while the steam in the other channel goes through a port, *s'*, into the compartment H under the valve, and thence through a passage, *t*, into the compartment H'. The upper side of the passage *m* (or *m'*) in the valve I (or I') is cut out at *n*, so that when the valve is closed and an abutment has passed this end of the valve there will be a larger surface on one side for the steam to operate against and therefore it will tip the valve into position again for the steam to enter.

It will be noticed that all the parts of my engine are circles or parts of circles, and are arranged so as to be balanced, thereby reducing the friction. The wheel C is constantly surrounded by steam, whereby the friction of the journals or central shaft is reduced to almost nothing, thus preventing wear of these parts. The packing-rings move upon rollers, the abutments have rollers, and the inner end of each valve may also have a recess with a roller, all contributing to make the engine easy running and not liable to get out of order.

For road-engines the rotating wheel should

be, so to say, double—that is, have additional steam-channels with abutments running in the opposite direction, and the steam-pipes or entrances so arranged that the steam can be thrown into either set of channels, and thereby readily reverse the engine and cause the same to run in either direction.

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

1. In a rotary engine the wheel C provided with two or more circumferential steam-channels, *a*, each having abutments D provided with packing and rollers *e* and a balanced valve, constructed to operate as and for the purposes herein set forth.

2. The packing-rings *d*, made in sections and placed in grooves *b* on the rotating wheel, in combination with the rollers *e*, groove *i*, and passages *f*, substantially as and for the purposes herein set forth.

3. The combination of the cylinder A, wheel C with grooves *a* and *b*, packing-rings *d*, and abutments D, the valve-boxes E G, valves I I', pipe K, and the various ports, all constructed and arranged substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

WINSLOW P. EAYRS.

Witnesses:

C. M. ALEXANDER,
EDM. F. BROWN.