(No Model.)

3 Sheets—Sheet 1.

H. T. MORSE.

ROTARY ENGINE.

No. 395,711. Patented Jan. 8, 1889.

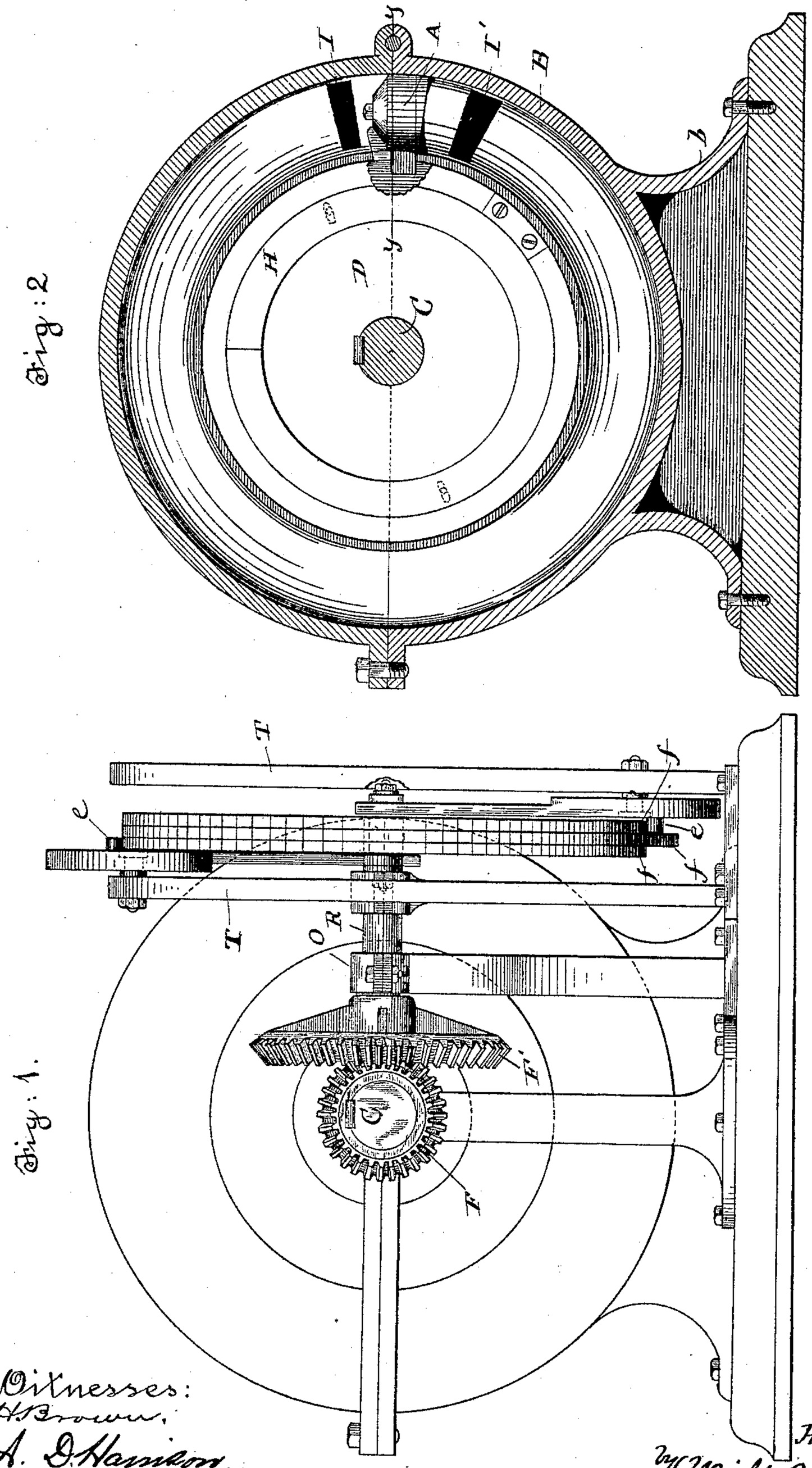

Fig: 1.

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A. D. Harrison.

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(No Model.)

3 Sheets—Sheet 2.

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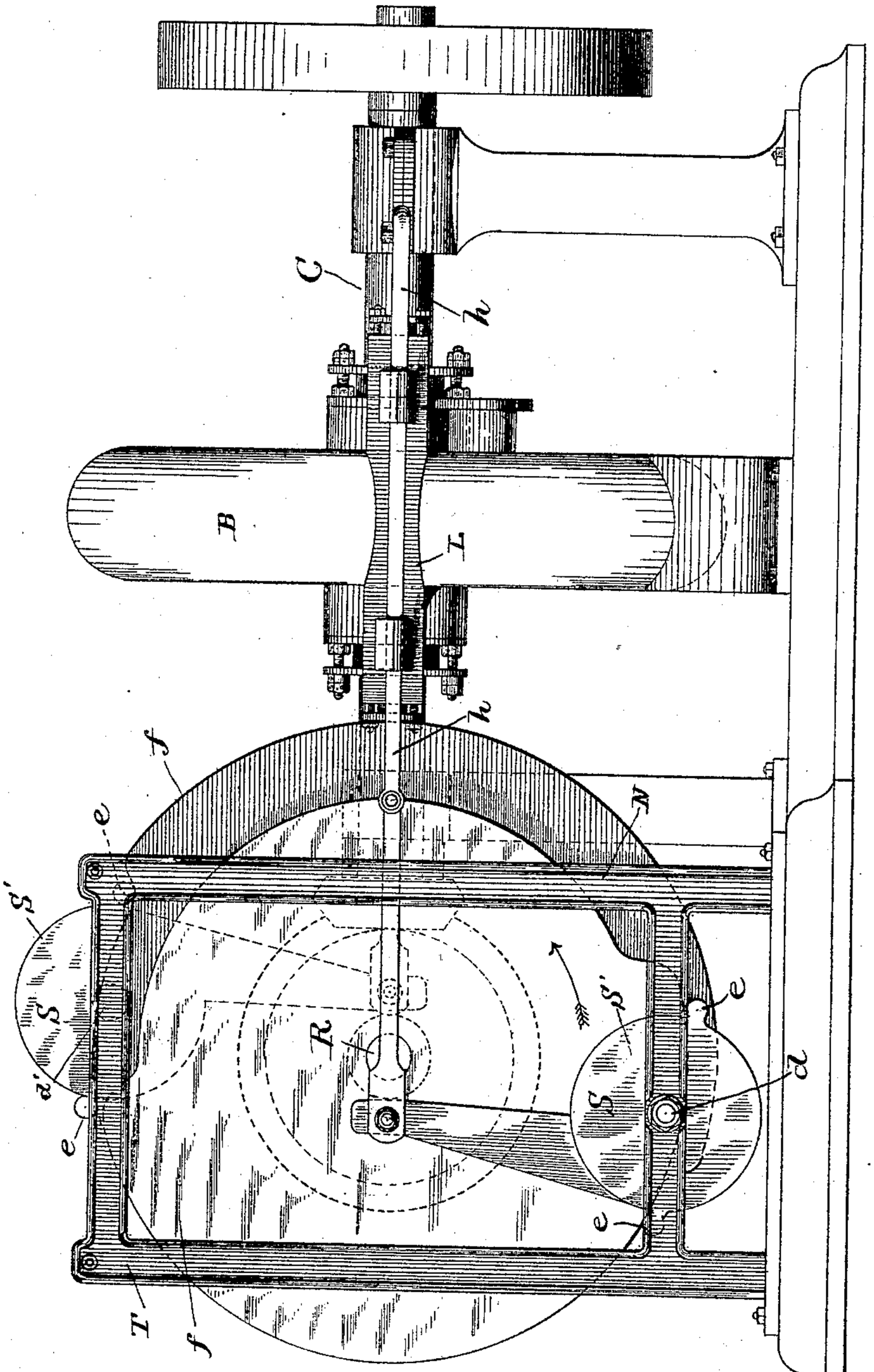
Fig. 3.



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ROTARY ENGINE.

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Fig. 5.

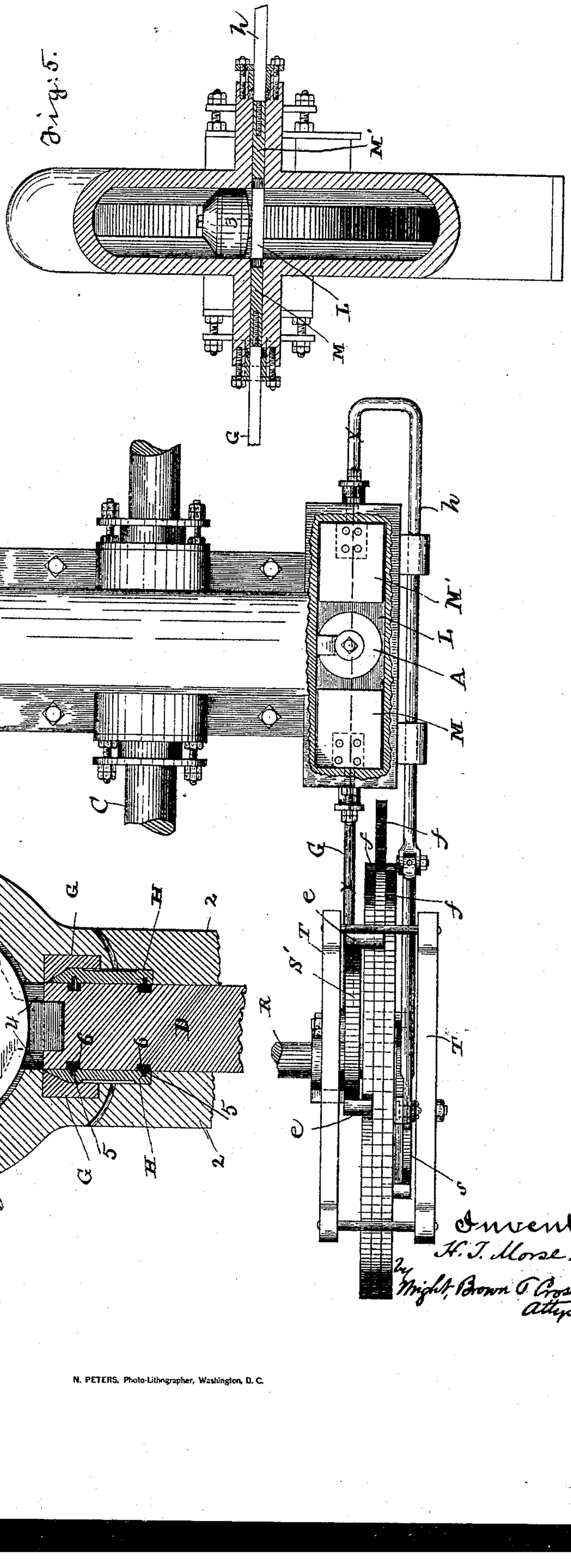

Fig. 4.

Fig. 6.

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UNITED STATES PATENT OFFICE.

HENRY T. MORSE, OF BOSTON, MASSACHUSETTS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 395,711, dated January 8, 1889.

Application filed June 15, 1886. Renewed June 18, 1888. Serial No. 277,483. (No model.)

To all whom it may concern:

Be it known that I, HENRY T. MORSE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to that class of rotary engines in which an annular cylinder is employed through which a piston is impelled by steam-pressure, the piston being attached to a disk mounted on the shaft driven by the engine.

The invention has for its object, first, to provide certain improvements in the means for packing the joint between the disk to which the piston is attached and the casing in which said disk rotates, and, secondly, to provide improved means for operating the abutments between the steam inlet and outlet ports of the engine, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of my improved engine. Fig 2 represents a sectional view of the casing and shaft and a side elevation of the piston and the disk to which it is attached. Fig. 3 represents an end elevation of the entire engine. Fig. 4 represents a top view of the same with a part of the abutment-casing broken away. Fig. 5 represents a section on line *x x*, Fig. 4. Fig. 6 represents an enlarged section on line *y y*, Fig. 2.

The same letters of reference indicate the same parts in all the figures.

In the drawings, B represents a casing composed of the annular cylinder which is supported by a suitable base, *b*, and inwardly-projecting plates or flanges 2 2, formed on the inner portion of said cylinder and extending inwardly to the shaft driven by the engine, the bearings for said shaft being preferably supported by said plates.

In the space between the plates 2 2 and extending from the shaft C nearly to the annular cylinder is a disk, D, which is rigidly attached to said shaft, and in thickness about fills said space.

A represents the piston, which is attached to the perimeter of the disk D. Any suitable means of attachment may be used, those here shown being a socket in the disk and a neck or shank on the piston fitting said socket. The piston has an expansive packing, 3, of metal, located between packing-heads, and the ends 4 4 of said packing are bent outwardly and enter the space between the plates and fit closely against the periphery of the disk D, as shown in Fig. 6.

I represents the steam-inlet port, and I′ the outlet-port. Between said ports is a steam-tight casing, L, having a chamber which communicates with the interior of the cylinder and extends across the same. In said chamber are fitted two slides, M M′, each of which is reciprocated in the casing L, so as to alternately extend across and obstruct the cylinder and leave the same unobstructed. The slide M is connected by a rod, G, with a lever, S′, which is pivoted at *d′* to the supporting-frame T, while the slide M′ is connected by a rod, *h*, with a lever, S, which is pivoted at *d* to said frame. The levers S S′ have enlargements (preferably circular) at their pivoted ends, and said enlargements are provided with studs *e e*, which bear on cams *f f f*, affixed to a shaft, R. Said shaft has a bevel-gear, F′, which meshes with and receives motion from a bevel-gear, F, on the shaft C. The wheel F′ is twice the diameter of the wheel F, so that the cams *f f f* are rotated at one-half the speed of the piston. The rotation of the cams *f f f* causes their perimeters to act on the studs *e e* on the levers S S′ and thus oscillate said levers at intervals and reciprocate the sliding abutments M M′. The cams are so formed and turned that when the piston is passing across the abutment-casing L both abutments are retracted from the cylinder, as shown in Figs. 4 and 5; but as soon as the piston has crossed said casing one of the abutments is immediately moved to obstruct the cylinder. The obstructing abutment is withdrawn just before the passage of the piston across the casing L, and is immediately replaced by the other abutment, the two abutments being moved in very rapid succession.

Leakage of steam between the disk D and the side 2 2 of the casing is prevented by annular packing-rings G G H H. The rings H are engaged with the disk D by pins 5 5 in the rings entering radial slots 6 6 in the disk, this connection causing the rings H to rotate with the disk and permitting said rings to

expand or adjust themselves radially of the disk. The rings H are beveled on their outer sides, as shown in Fig. 6, the outer perimeter of each being brought to an acute angle against the disk. The rings G G are attached to the casing by screws, and are formed to closely fit the beveled portions of the rings H H, acute angles being thus formed on the rings G, which angles bear against the sides of the disk D. The sides of the casing are grooved to receive the rings G, and said rings are firmly wedged to their seats to prevent contraction, and to prevent leakage between the rings and casing any suitable packing may be employed.

Each ring H is divided at one point, so that it is expansive, the pins 5 and slots 6, above described, permitting the expansion of the rings. As the beveled edges of the rings G G are in contact with the disk D, only the sharp edges of the rings H are subjected to steam-pressure, and the area thus exposed is so small that the expansive power required of the rings H H is not enough to cause much friction on the rings G G and disk D.

I am aware that a rotary engine having an annular cylinder, a piston adapted to move therein and attached to a disk on a shaft concentric with said cylinder, and one or more abutments which are moved crosswise of the cylinder to alternately obstruct and open the same is not new, and I do not therefore claim this combination of devices, broadly.

I claim—

1. In a rotary engine, the combination of the annular cylinder having the ports I I′, the piston adapted to move in the cylinder, the disk D and shaft C, rotated by the piston, the abutment-casing intersecting the cylinder, the two alternately-acting abutments in said casing, and mechanism for reciprocating said abutments, whereby the acting abutment is withdrawn from the cylinder to permit the passage of the piston across the abutment-casing and is immediately replaced by the other abutment after the passage of the piston, as set forth.

2. In a rotary engine, the combination of the annular cylinder having the ports I I′, the piston adapted to move in the cylinder, the disk D and shaft C, rotated by the piston, the abutment-casing intersecting the cylinder between the ports thereof, the two abutments in said casing, the oscillatory levers S S′, connected with said abutments, and the cams rotated by a connection with the shaft C, whereby said levers are oscillated and the abutments reciprocated, as set forth.

3. The combination of the casing having the annular cylinder, the piston, the disk to which the piston is attached, and the packing-rings G H, the former attached to the casing and the latter engaged with the disk, so as to be capable of expanding, said rings being beveled, as shown, so that only a knife-edge of the ring H is exposed to steam-pressure, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of June, 1886.

HENRY T. MORSE.

Witnesses:
ARTHUR W. CROSSLEY,
H. BROWN.