(No Model.) 2 Sheets—Sheet 1.

S. W. BARR.

ROTARY ENGINE.

No. 599,071. Patented Feb. 15, 1898.

Fig. 1.

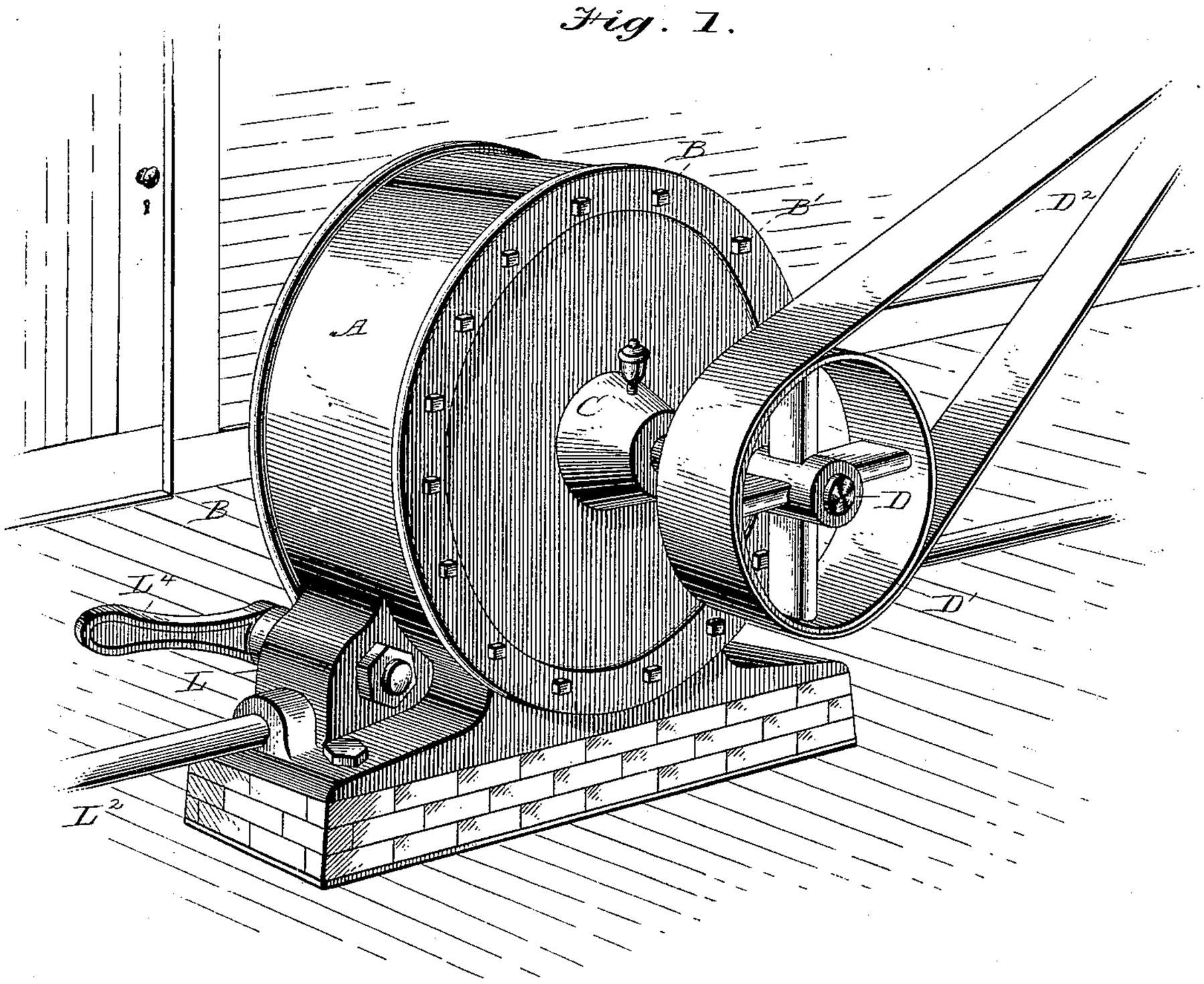


Fig. 2.

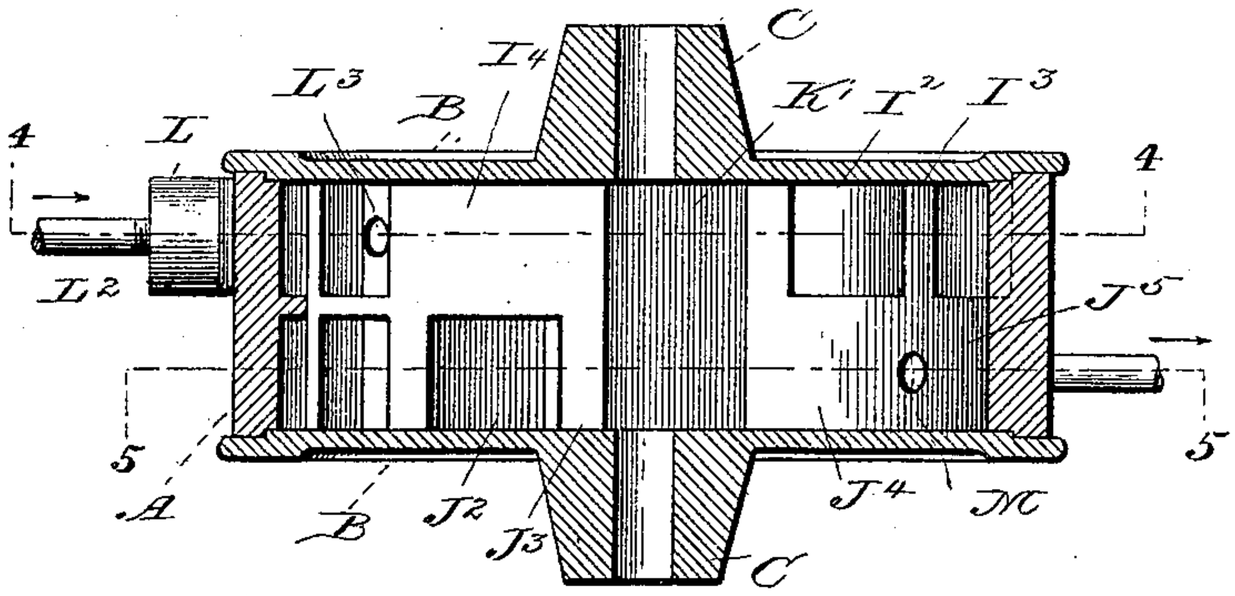


Fig. 3.

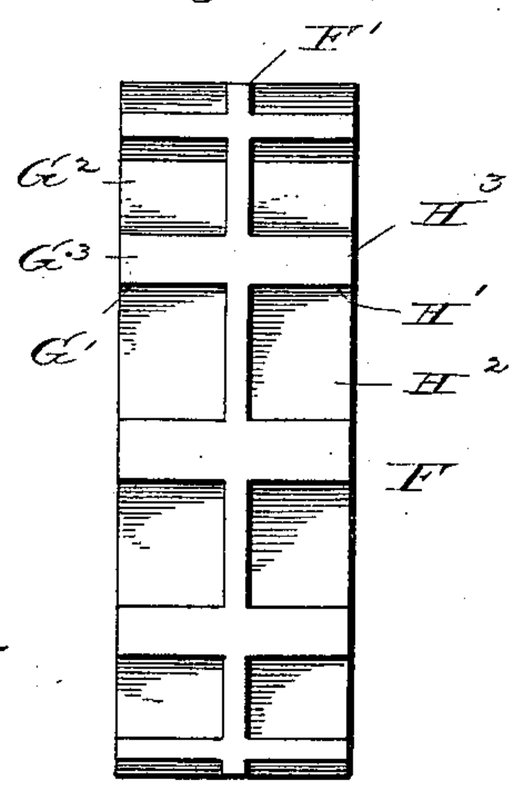
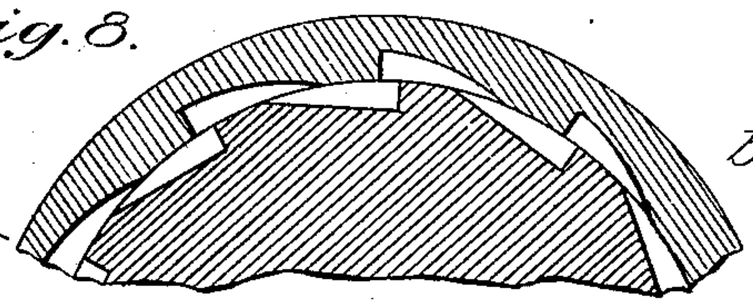


Fig. 8.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

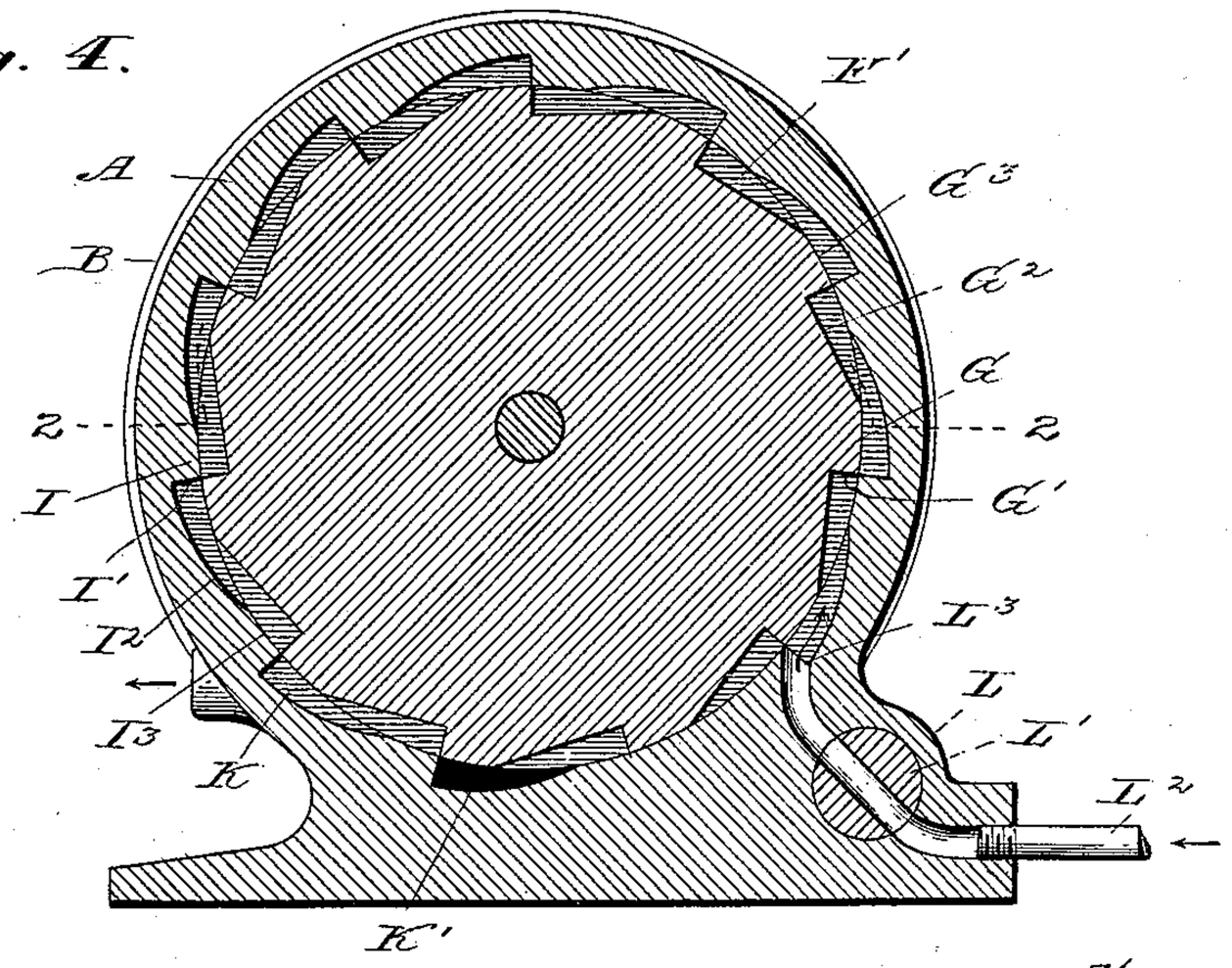

Fig. 5.

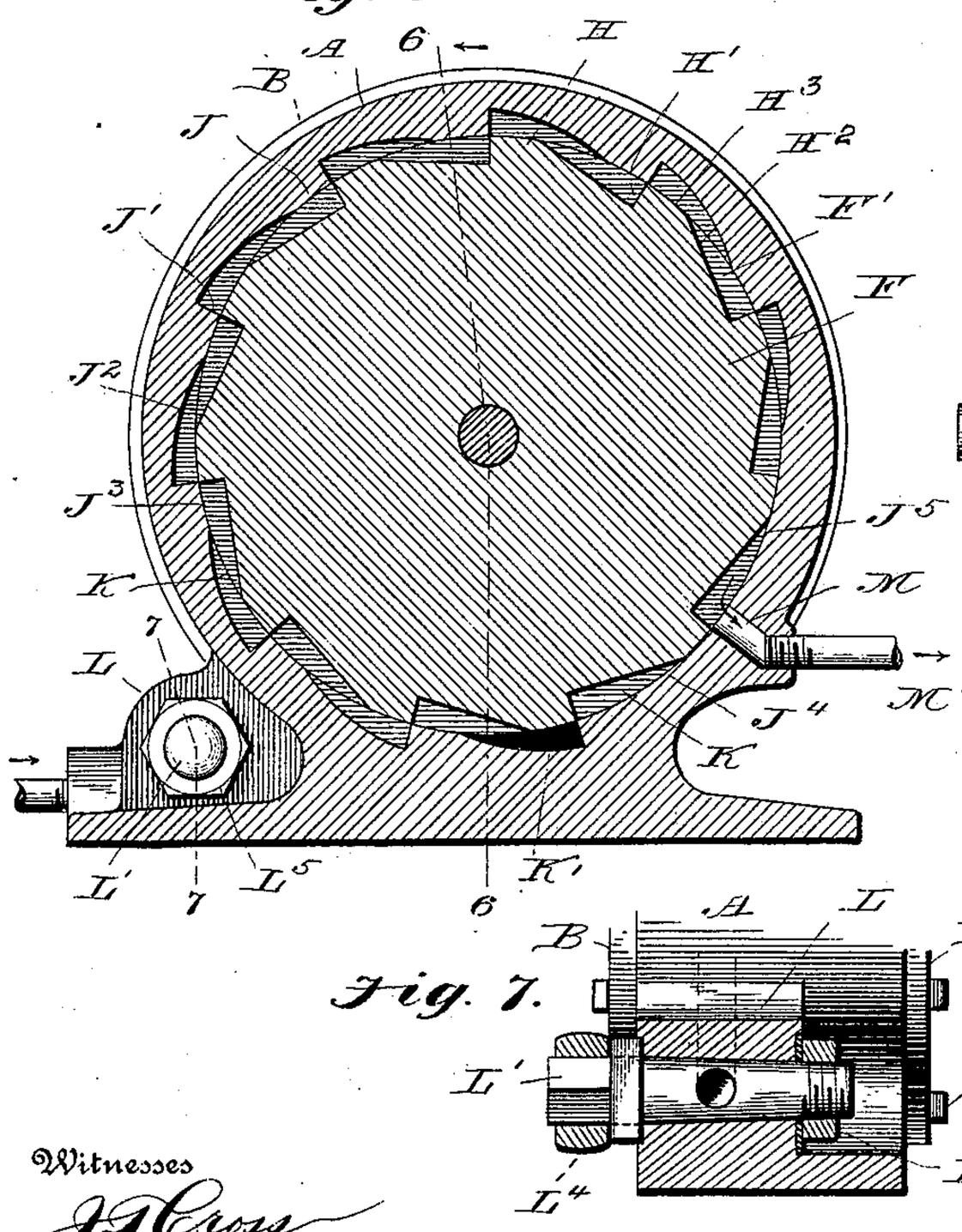

Fig. 6.

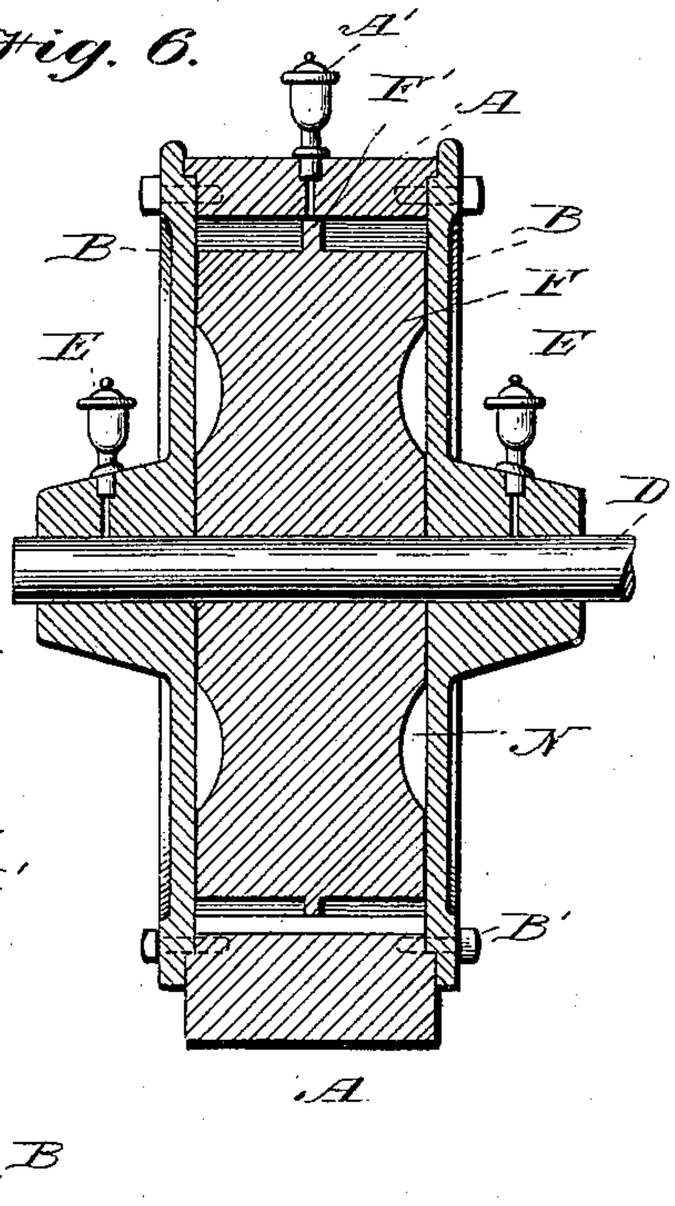

Fig. 7.

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UNITED STATES PATENT OFFICE.

SAMUEL W. BARR, OF MANSFIELD, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 599,071, dated February 15, 1898.

Application filed June 2, 1897. Serial No. 639,129. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. BARR, residing at Mansfield, in the county of Richland and State of Ohio, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention is in the nature of a rotary engine, and has for its object to provide an engine of this class simple in form, efficient in power, and economical in the use of steam.

With this object in view my invention consists in the improved construction, arrangement, and combination of parts hereinafter fully described, and afterward specifically pointed out in the appended claim.

In order that others skilled in the art to which my invention most nearly appertains may be enabled to make and use the same, I will now proceed to describe it, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a rotary engine constructed in accordance with my invention set up in position for practical operation. Fig. 2 is a central horizontal section through the engine on the broken line 2 2 of Fig. 4 looking downward. Fig. 3 is a view of the piston-head in side elevation removed from the engine. Fig. 4 is a vertical longitudinal section through the engine on the plane indicated by the line 4 4 of Fig. 2 looking inward toward the center of the engine. Fig. 5 is a similar view on the plane indicated by the line 5 5 of Fig. 2 looking inward toward the center of the engine. Fig. 6 is a vertical section on the plane indicated by the line 6 6 of Fig. 5. Fig. 7 is a detail sectional view on the line 7 7 of Fig. 5; and Fig. 8 is a detail sectional view, to be referred to hereinafter.

Like letters of reference mark the same parts wherever they occur in the various figures of the drawings.

Referring to the drawings by letter, A is the main body of the casing or cylinder, to which heads or ends are properly secured by means of bolts B′, the junction between the parts A and B being rendered steam-tight in any well-known manner. These heads B B are formed with projecting hubs C C to form bearings for the main shaft D of the machine, said hubs being provided with suitable oil-cups E. The cylinder is provided with an oil-cup A′ in the duct leading to its interior, and this oil-cup, as well as the oil-cup E, is provided with screw-caps to render them steam-tight.

Within the cylinder and rigidly secured to the main shaft D is a piston-head F, which is provided on its periphery with a centrally-located circumferential rib F′, which has its bearing against the interior surface of the cylinder, said rib separating the periphery of the piston-head into two equal parts, which are constructed alike and which are illustrated in section, the one in Fig. 4 and the other in Fig. 5. That portion illustrated in Fig. 4, which is the rear side as the machine stands in Fig. 1, is provided with a series of teeth G, said teeth all pointing in the same direction and each provided with a radial face G′, an inclined front face G^2, and a curved outer end or surface G^3, the latter extending completely from side to side of the piston-head and forming part of the annular rib F′, before described. The other side, (illustrated in Fig. 5,) being in the front, as illustrated in Fig. 1, is provided, as before stated, with exactly the same construction of teeth H, pointed in the same direction and provided with radial faces H′, inclined faces H^2, and curved outer surfaces H^3, said teeth G and H being located exactly opposite each other and their curved outer surfaces G^3 and H^3 being in line with and flush with each other and disappearing in the face of the circumferential rib F′, as before stated and as most clearly shown in Fig. 3. The interior of the cylinder is also divided into two portions to correspond with the two parts of the piston-head, that part illustrated in Fig. 4 being provided with inwardly-projecting teeth I, having radial faces I′, curved inclined faces I^2, and curved inside front faces I^3, all of said front faces being curved on the same arc as the curved faces of the teeth G of the piston-head with which they engage in the rotation of the piston-head. The other side of the interior of the casing or cylinder is provided with a number of similarly-formed teeth J, with radial faces J′, inclined faces J^2, and curved front faces J^3 on the same curve or arc as the outer faces of the teeth H, before described, with which they coöperate in the operation of the engine. These two sections of the interior of the cyl-

inder are separated from each other for the greater part of their circumference by means of an inner circumferential rib K, with which the rib F′ of the piston-head F engages during the rotation of the piston-head in the cylinder. This inclined projecting rib K is continuous except at a point between two adjacent teeth at K′, which is cut away entirely across the cylinder, as clearly shown in Fig. 2, forming a communication between the two sides of the interior of the cylinder.

In a projection L from the cylinder-casing A is seated the plug L′ of a throttle or inlet valve adapted to open or close the steam-passage from the steam-pipe L^2 to the induction-port L^3, said steam-passage ending in the radial face of one of the teeth I on the inside of the cylinder in that section illustrated in Fig. 4. On the opposite side of the casing is provided an eduction-port M, through which the exhaust-steam passes, as clearly shown in Figs. 2 and 4, this port being connected with the section of the cylinder and piston-head on the opposite side of the circumferential ribs from that with which the steam-inlet connects.

The valve-plug L′ and its opening are correspondingly tapered to make a tight joint, the valve being operated to open or close the induction-port by means of a lever L^4 and the plug being held to its seat by means of a nut L^5, as clearly shown in Fig. 7.

Circular grooves N are made in the sides of the piston-head to reduce its weight and bearing-surface and the shaft D is provided with a suitable pulley D′, around which engages a belt D^2 to connect with any desired machinery.

The operation of my invention may be described as follows: Steam being admitted to the steam-pipe L^2 through the valve L and induction-port L^3, its force will be exerted against the radial faces of the teeth of the piston-head, (which teeth I shall denominate "pistons,") causing the piston-head to be turned and the pistons to pass consecutively by the induction-port to receive the impact of the steam entering therethrough. As the pistons pass the interior faces of the cylinder with which they are in contact, there will be periodically a clear passage for the steam between the faces of this section of the piston-head and the corresponding section of the cylinder, as shown in Fig. 8, which will permit the free passage and expansion of the steam around this section until it reaches the cross-groove K′, which will be almost a complete revolution from the induction-port. The steam will then pass to the opposite side of the piston-head and continue to expand and act upon the pistons of that section of the piston-head until it passes almost completely around it again and reaches the eduction-port M, where it will be exhausted. To prevent the steam in passing around the first section of the cylinder from the induction-port from again reaching the induction-port, a curved inner surface is provided at I^4, on the same arc as the outer faces of the pistons and the inner faces of the cylinder-teeth, of a sufficient extent to permit two of the pistons to be in contact with it at once, which effectually cuts off the passage of the steam at this point and forces it to pass through the opening K′ to the other side of the cylinder. Having passed through this cross-opening K′ the steam will be allowed to further expand and exert its force against the radial faces of the pistons J in that section of the cylinder until it reaches almost to the exhaust or eduction port, where another extended curved surface is provided, (marked J^5 in Fig. 5,) which is of sufficient extent to permit of two pistons engaging it at the same time, the operation of which is to prevent there being at any time a continuous passage for the steam in the cylinder to the exhaust-pipe, whereby the steam would be wasted. A similar extended curved surface is provided also on the other side of the eduction-port, (marked J^4 in Fig. 5,) which is also of sufficient extent to engage two pistons at the same time, which acts in the same manner as the other extended surfaces as a cut-off to compel the steam to take the proper direction around the cylinder when going through the opening K′ and prevent its being "short-circuited," as it were, to the eduction-port. This steam passes nearly twice around the cylinder before it reaches the exhaust-port, and therefore the pressure against the piston-head and the axis of rotation is equal at all points and there is no tendency to wear in any one direction more than another. This fact is very important in a rotary engine, and although my engine is not reversible it will from this feature be very valuable for such purposes as require only direct motion.

The cylinder or piston can be grooved for the reception of packing whenever and wherever it is deemed necessary and desirable, such packing forming no part of my present invention.

While I have illustrated and described what I now believe to be the best means for carrying out my invention, I desire it to be understood that I do not limit myself to the exact constructions shown, but claim that any slight changes or variations which might suggest themselves to the ordinary mechanic will properly fall within the limit and scope of my invention.

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

A rotary engine comprising a piston-head the circumference of which is formed with depressions or pockets, the walls of which form two parallel series of teeth for the impact of the steam, said pockets being separated by transverse ribs and an annular separating-rib, the transverse and annular separating ribs having their outer surfaces formed for contact with the interior of the cylinder in which the piston is rotatable, the

cylinder being provided with an induction-port opening into one series of pockets, and an eduction or exhaust port opening from the other series, the inner surface of the cylinder being formed with pockets in two parallel series to act in conjunction with the pockets of the piston-head, one of the pockets of both series in the cylinder being cut through the separating-rib and forming a pocket extending entirely across the cylinder, and two pockets of one series of cylinder-pockets being omitted, forming an extended curved surface in advance of and beyond the eduction or exhaust port, and one of the pockets of the other series being omitted forming an extended curved surface in advance of the induction-port, substantially as and for the purposes set forth.

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Witnesses:
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