

No. 632,073.

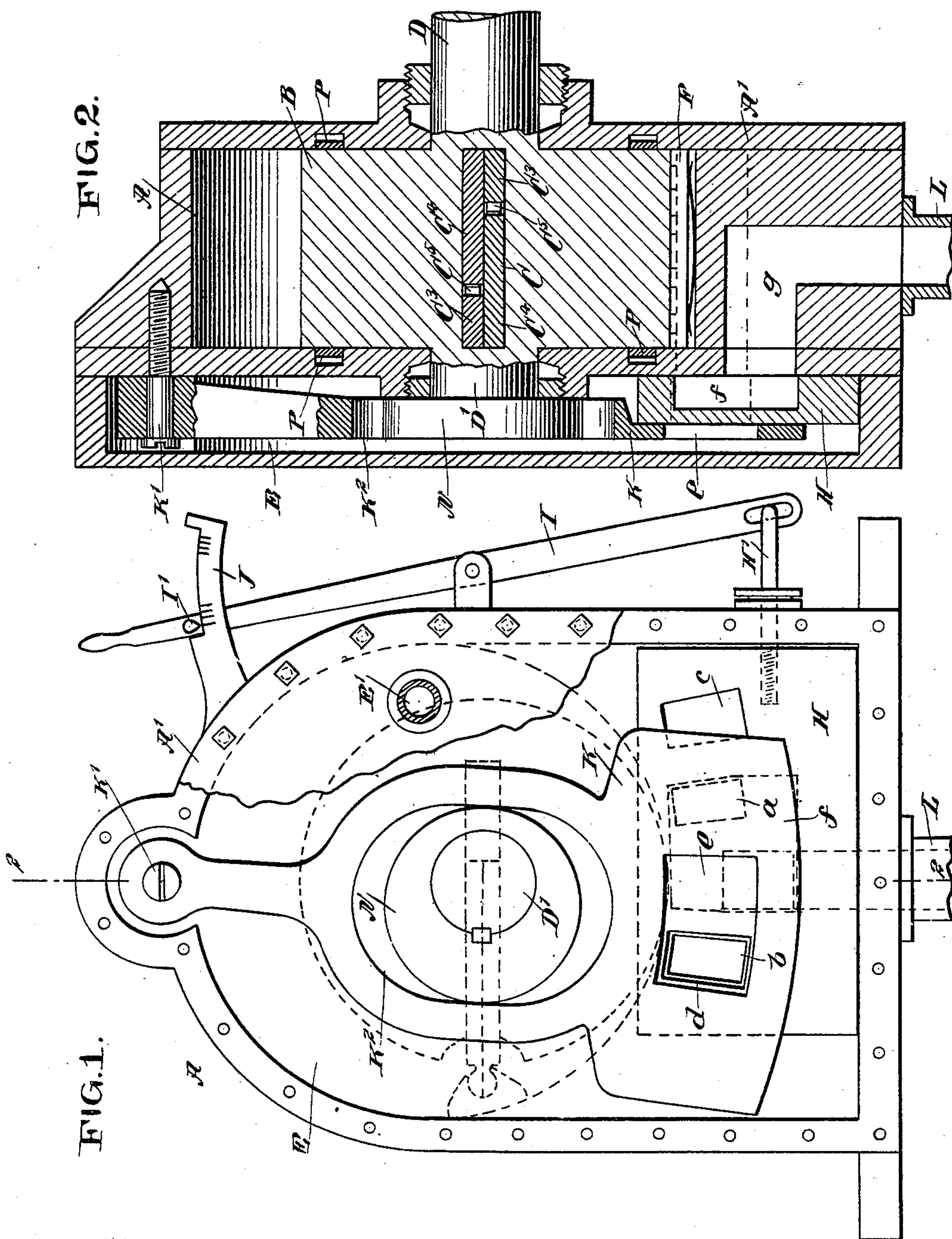
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R. TOENNES.  
ROTARY ENGINE.

(Application filed May 24, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

RICHARD TOENNES, OF BOONVILLE, MISSOURI.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 632,073, dated August 29, 1899.

Application filed May 24, 1899. Serial No. 718,037. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD TOENNES, of Boonville, in the county of Cooper and State of Missouri, have invented a new and improved Rotary Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary engine which is simple and durable in construction, very effective in operation, arranged to utilize the motive agent expansively to the fullest advantage, and to allow of convenient reversing whenever desired.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a rear elevation of the improvement with part of the cover removed. Fig. 2 is a transverse section of the same on the line 2 2 in Fig. 1. Fig. 3 is a sectional front elevation of the same. Fig. 4 is a sectional plan view of the piston on the line 4 4 in Fig. 3. Fig. 5 is an end elevation of the same, and Fig. 6 is a face view of the reversing-valve.

The improved rotary engine is provided with a cylinder A, in which is mounted eccentrically a piston B, provided with a spring-pressed slidable piston-head C and secured on the main or driving shaft D, extending through the front cover A' of the cylinder to be journaled in suitable outside bearings (not shown) and to be connected with the machinery to be driven either by the usual pulley and belt or other connection.

In the rear of the cylinder A is formed a steam-chest E, connected by a pipe E' with a suitable source of motive-agent supply—such as steam, compressed air, or other fluid under pressure—and this steam-chest E is connected by two ports a and b with the inside of the cylinder A at the opposite sides of a spring-pressed packing F, set in the bottom of the cylinder and in contact at all times with the peripheral surface of the piston. The ports a and b are controlled by a reversing

slide-valve H, having two ports c and d, of which the port c is adapted to be moved in register with the port a and the other port d is adapted to register with the port b, as illustrated in Fig. 1, it being understood, however, that when the port d registers with the port b the other port c is out of register with the port a, and vice versa. By shifting the reversing slide-valve H to an intermediate position neither of the ports c or d registers with its corresponding port a or b, and the steam is shut off from the cylinder. The slide-valve H is provided with a stem H', extending through a stuffing-box on one side of the chest E to connect at its outer end with the lower end of a lever I under control of the operator and having a pointer I' indicating on a segment J for holding the said valve H in a closed position—that is, its ports c and d out of register with the ports a and b—or to connect either of said ports c or d with its corresponding port a or b fully, three-fourths, half, or only one-fourth to admit more or less steam, as desired—that is, to allow a sooner or later cut-off of the motive agent for expansion purposes, whether the engine is running forward or in a reverse direction.

On the inner face of the valve H, between the ports c and d, is formed a cavity f for connecting either of the ports a and b with the exhaust-port g, leading to the exhaust-pipe L. When the port c is in register with the port a, then the cavity f connects the port b with the exhaust-port g, and when the port d is in register with the port b the cavity f connects the port a with the exhaust-port g.

On the face of the slide-valve H oscillates a valve K, having a port e adapted to open or close the corresponding port c or d for the admission of steam to the cylinder A, and said oscillating valve K is hung on a stud K', mounted in the top of the cylinder A, and the said valve K is provided with an elongated slot K<sup>2</sup>, in which works an eccentric disk N, to impart a swinging motion to the valve K to bring its port e in or out of register with the port c or d active at the time to admit steam to either side of the cylinder A by either of the ports a or b. The eccentric disk N is secured on the driving-shaft extension D', so that when the machine is in operation and the piston B is revolving the desired motion is



given to the oscillating valve K for the purpose mentioned.

The piston-head C is provided with a shank fitted in a slot B', formed diametrically in the piston B, and this shank is made in sections C' C<sup>2</sup>, each consisting of two plates C<sup>3</sup> C<sup>4</sup>, pressed apart by a spring C<sup>5</sup>, (see Fig. 4,) and the plates of the two shank-sections break joints, as will be readily understood by reference to said Fig. 4. The inner end of the shank rests on a spring C<sup>6</sup>, preferably of compound elliptical leaf form, as indicated in Fig. 4, and the outer end of said shank is formed into a transversely-extending pivot C<sup>7</sup>, on which is mounted to rock a head C<sup>8</sup>, made in sections C<sup>9</sup> C<sup>10</sup>, of which the section C<sup>9</sup> has a tongue C<sup>11</sup> slidably engaging a groove in the other head-section C<sup>10</sup> and pressed apart by springs C<sup>12</sup>, so as to firmly fit on the heads of the cylinder A the same as the plates C<sup>3</sup> C<sup>4</sup>, which are pressed outward by the action of their springs C<sup>5</sup> to bring the outer edges of the shank in firm engagement with the heads of the cylinder and insure proper packing to prevent leakage of steam from one side of the head to the other. Packing-rings P are held in the cylinder-back and in the head A' of the cylinder to engage the faces of the piston B to prevent leakage of steam to the bearings for the shaft D. (See Fig 2.) The outer end of the slot B' is sufficiently enlarged to receive the head C<sup>8</sup> at the time the latter passes the packing F.

The operation is as follows: When the several parts are in the position illustrated in the drawings, then the motive agent in the steam-chest E can pass through the registering ports *e*, *d*, and *b* into the cylinder A at the right-hand side of the abutment to act on the piston-head C and turn the piston B in the direction of the arrow *a'*. (See Fig. 3.) As the shaft D is rotated a rocking motion is given to the valve K, so that the latter finally cuts off the motive agent from the ports *d* and *b* to allow the motive agent in the cylinder to expand to the desired degree. The port *e* again moves in register with the ports *d* and *b*, so that the motive agent is again admitted to the cylinder to give another impulse to the piston in the manner above described. When it is desired to reverse the engine, the operator simply swings the lever I over to the opposite side to move the ports *d* and *b* out of register and the ports *a* and *c* in register. The motive agent from the chest E now passes, by way of the port *e* and the registering ports *a* and *c*, into the cylinder at the left-hand side of the abutment F to rotate the piston B in the inverse direction of the arrow *a'*. The exhaust now takes place through the port *b*, cavity *f*, exhaust-port *g*, and exhaust-pipe L.

From the foregoing it is evident that the engine is very simple and durable in construction, is not liable to get out of order, and permits the operator to quickly reverse the engine whenever desired.

Having thus fully described my invention,

I claim as new and desire to secure by Letters Patent—

1. A rotary engine, comprising a cylinder, a piston mounted eccentrically therein and provided with a spring-pressed piston-head in contact with the inner surface of the cylinder, a steam-chest at one end of the cylinder and connected with a motive-agent supply, and by inlet-ports with said cylinder at opposite sides of the point of contact between the piston and cylinder, a reversing-valve under control of the operator and movable in said steam-chest, and adapted to open or close either or both of said inlet-ports, and a rock-valve driven from the piston-shaft and adapted to alternately register with ports in said reversing-valve, substantially as shown and described.

2. A rotary engine, comprising a cylinder, a piston mounted eccentrically therein and provided with a spring-pressed piston-head in frictional contact with the inner surface of the cylinder, a steam-chest at one end of said cylinder and connected with a motive-agent supply and by inlet-ports with said cylinder, a reversing-valve under control of the operator, and movable in said steam-chest and adapted to open or close either of said inlet-ports, a rock-valve operating over said slide-valve and having a single port adapted to register with the registering ports of the reversing-valve and the cylinder-ports, and means for imparting a rocking motion to said rock-valve, substantially as shown and described.

3. A rotary engine, comprising a cylinder, a piston mounted eccentrically therein and provided with a spring-pressed piston-head in frictional contact with the inner surface of the cylinder, a steam-chest at one end of said cylinder and connected with a motive-agent supply and by inlet-ports with said cylinder, a reversing-valve under control of the operator, and movable in said steam-chest and adapted to open or close either of said inlet-ports and connect the same with the exhaust, a rock-valve operating over said slide-valve and having a single port adapted to register with the registering ports of the reversing-valve and the cylinder-ports, and means for imparting a rocking motion to said rock-valve, substantially as shown and described.

4. A rotary engine, comprising a cylinder, a piston mounted eccentrically therein and provided with a spring-pressed piston-head in frictional contact with the inner surface of the cylinder, a steam-chest at one end of the cylinder and connected with a motive-agent supply, and by inlet-ports with said cylinder at opposite sides of the point of contact between the cylinder and the piston, a reversing-valve under control of the operator and movable in said steam-chest, and adapted to open or close either or both of said inlet-ports and connect the same with the exhaust, a rock-valve driven from the piston-shaft and adapt-



ed to alternately register with ports on said reversing-valve, and means, substantially as described, for shifting the said reversing-valve for reversing or stopping purposes, as set forth.

5 5. A rotary engine, provided with a piston having a slot, a compound leaf-spring in the bottom of said slot, a piston-head in said slot and pressed on by said spring, said piston-head consisting of a shank made in parts or sections breaking joints and formed at its outer end with a pivot, and a head mounted to rock on said pivot and made in sections breaking joints, substantially as shown and described.

10 6. A rotary engine provided with a piston having a slot, a compound leaf-spring in the bottom of said slot, a piston-head in said slot and pressed on by said spring, said piston-head consisting of a shank made in parts or sections breaking joints and formed at its outer end with a pivot, and a head mounted to rock on said pivot and made in sections breaking joints, said shank and head sections being pressed apart by springs, as set forth.

15 20 25 7. A rotary engine having two main ports adapted to be used, one as a supply-port and the other as an exhaust-port, and reversed in function when the engine is reversed, super-

imposed reversing and cut-off valves, the cut-off valve having a pivoting-arm extending across the engine-shaft and provided with a yoke surrounding the said shaft, and an eccentric upon the shaft engaging the sides of the yoke to swing the valve, substantially as described.

8. A rotary engine having two main ports adapted to be used, one as a supply-port, and the other as an exhaust-port, and reversed in function when the engine is reversed, said engine also having an exhaust-port independent of the main ports, a reversing-valve bearing upon the valve-seat and covering said ports, said reversing-valve having two through steam-ports, and an exhaust recess or port on one side adapted, as the valve is shifted, to connect either main port with the exhaust-port, the cut-off valve moving upon the reversing-valve and having a pivoting-arm extending across the engine-shaft and provided with a yoke surrounding said shaft, a fixed pivot for the end of said arm, and an eccentric upon the shaft engaging said yoke to swing the valve, substantially as described.

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Witnesses:

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