

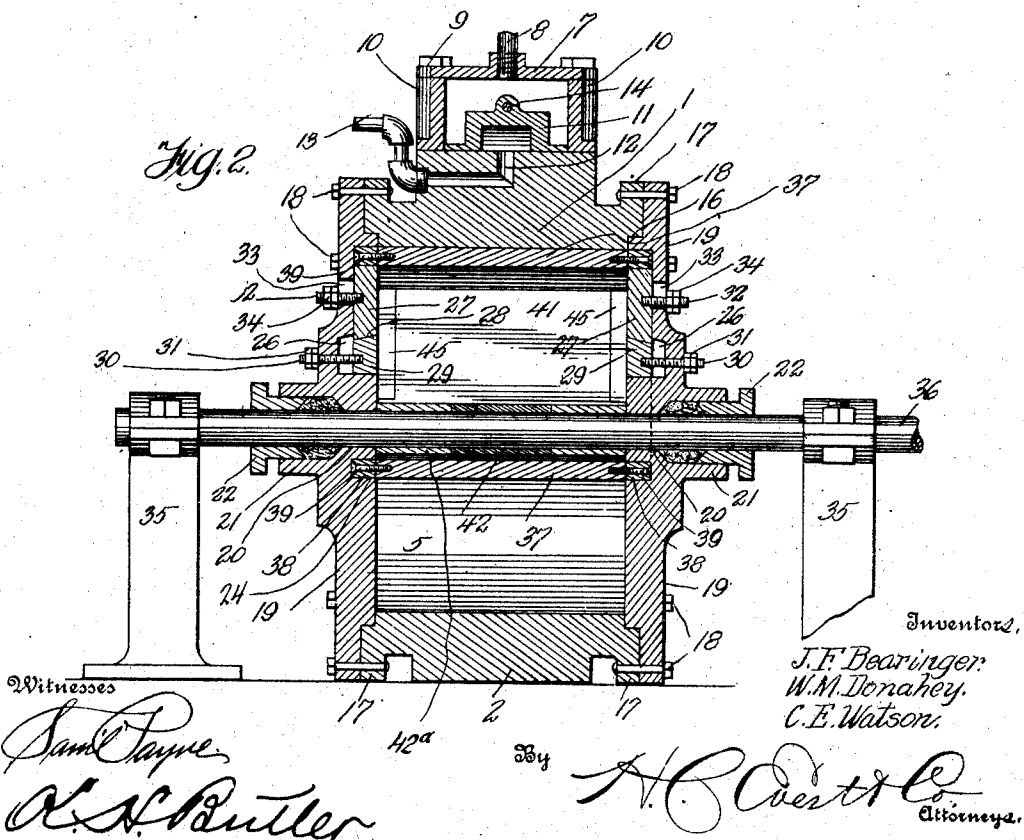
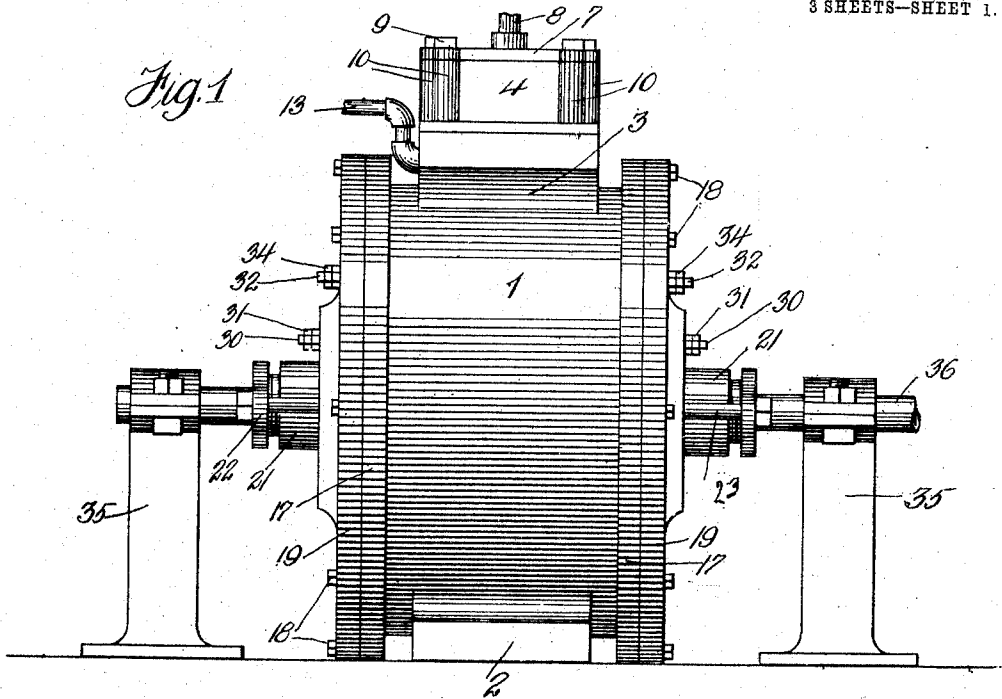
J. F. BEARINGER, W. M. DONAHEY & C. E. WATSON.
 ROTARY ENGINE.

APPLICATION FILED OCT. 5, 1908.

927,929.

Patented July 13, 1909.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

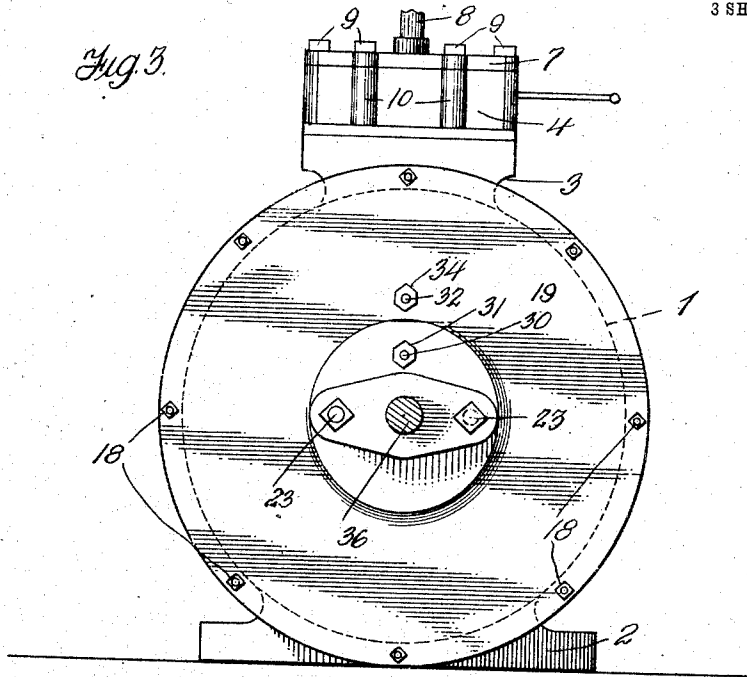
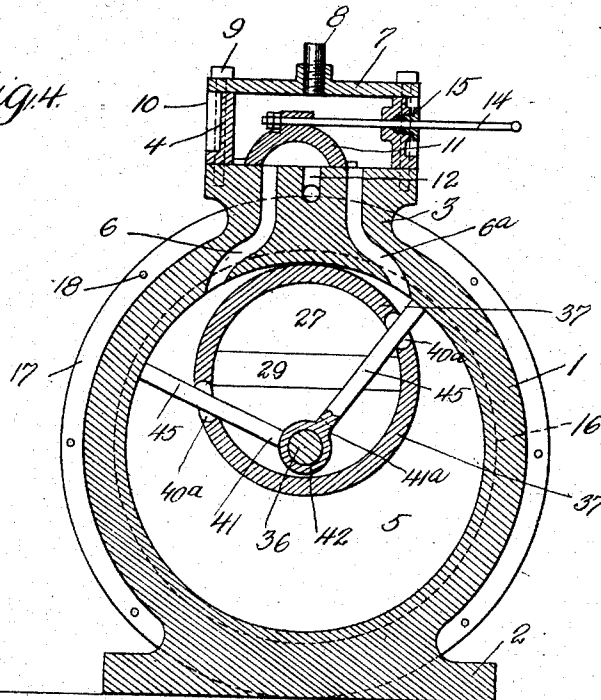


Fig. 4.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 5.

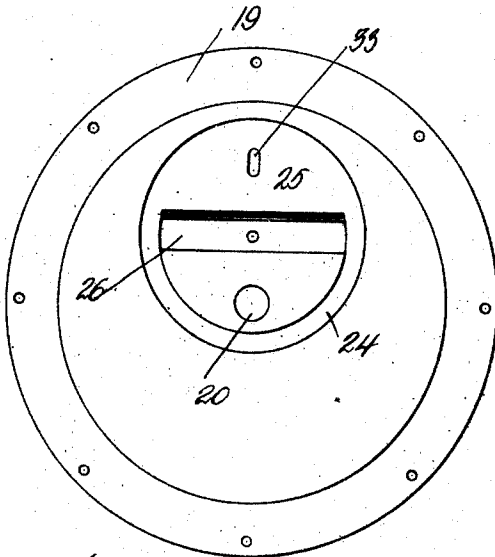


Fig. 6.

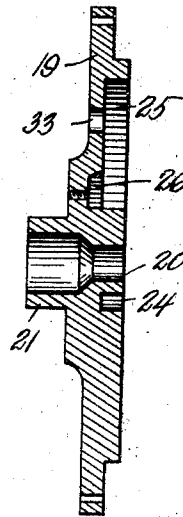


Fig. 7.

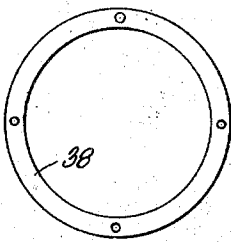


Fig. 8.

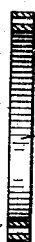


Fig. 9.

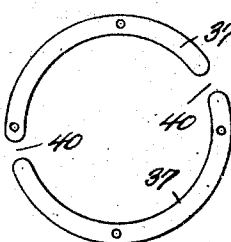


Fig. 10.

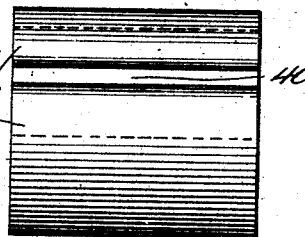


Fig. 11.

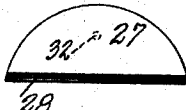


Fig. 12.

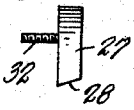


Fig. 13.

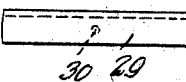


Fig. 14.

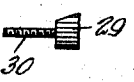
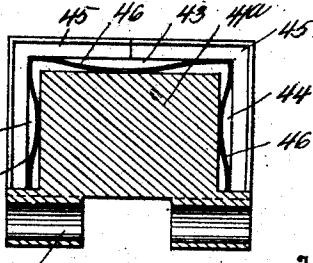
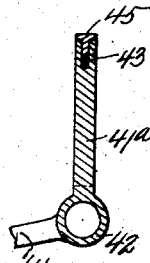


Fig. 15.



Witnesses

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Fig. 17.



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UNITED STATES PATENT OFFICE.

JOHN F. BEARINGER, OF BOSTON, AND WILLIAM M. DONAHEY AND CHARLES E. WATSON, OF McKEESPORT, PENNSYLVANIA; SAID WATSON ASSIGNOR TO SAID BEARINGER AND DONAHEY.

ROTARY ENGINE.

No. 927,929.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed October 5, 1908. Serial No. 456,206.

To all whom it may concern:

Be it known that we, JOHN F. BEARINGER, WILLIAM M. DONAHEY, and CHARLES E. WATSON, citizens of the United States of America, residing at (1) Boston, (2) and (3) McKeesport, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to rotary engines, and the object of our invention is to provide in a manner as hereinafter set forth an engine of such class from which a maximum amount of efficiency can be obtained with a minimum expenditure of fuel.

Another object of this invention is to provide a rotary engine that can be used as a blast engine, pump or air compressor.

Our invention aims to provide in a manner as hereinafter set forth an engine having an eccentrically mounted revoluble head in which is located two radially disposed pistons adapted to be driven by steam or air. In connection with the engine, we provide in a manner as hereinafter set forth positive and reliable means for easily and quickly adjusting the revoluble head to compensate for the wear and tear of the pistons without removing the pistons from the engine, and through the medium of the above features of construction, we are enabled to economically operate the engine and obtain the highest degree of efficiency from an engine of the above type.

Our invention will be hereinafter described in detail and reference will now be had to the drawing forming a part of this specification, wherein,

Figure 1 is a side elevation of our engine, Fig. 2 is a longitudinal sectional view of the same, Fig. 3 is an end view of the engine, Fig. 4 is a cross sectional view of the same, Fig. 5 is an elevation of the inner side of one of the end plates of the engine, Fig. 6 is a vertical sectional view of the same, Fig. 7 is an elevation of the coupling ring used in connection with the revoluble head of the engine, Fig. 8 is a cross sectional view of the same, Fig. 9 is an end view of the revoluble head of the engine, Fig. 10 is a side elevation of the same, Fig. 11 is a front elevation of a bearing block forming part of each of the end plates of the engine, Fig. 12 is a side

elevation of the same, Fig. 13 is a front elevation of a wedge used in connection with the bearing block of each end plate, Fig. 14 is a side elevation of the same, Fig. 15 is a cross sectional view of one of the pistons, and Fig. 16 is a longitudinal sectional view of the same. Fig. 17 is a detail sectional view of the coupling ring illustrating a T-shaped packing that can be used in connection with the same.

In the accompanying drawings, 1 designates a cylindrical casing having a base 2 adapted to be supported upon a suitable foundation. Upon the top of the casing is formed an enlargement 3 for a steam chest 4, said steam chest communicating with the interior of the casing 1 by curved inlet and outlet ports 6 and 6^a, these ports being arranged in the ends of the enlargement 3 and continued through the side walls of the casing 1. The steam chest 4 is closed by a plate 7 having a steam inlet pipe 8, said plate and said chest being held upon the enlargement 3 by bolts 9 extending through said plate, the bosses 10 on the periphery of the steam chest and into said enlargement.

Arranged within the steam chest 4 is a slide valve 11 employed for reversing the engine, this valve being designed to establish communication between either of the ports 6 or 6^a and an annular exhaust port 12 formed in the enlargement 3. The exhaust port has opening thereinto a discharge pipe 13. The valve 11 is connected to a manually or automatically operable shifting rod 14 therefor, said rod 14 extends through a stuffing box 15 carried by the steam chest and projects from one side of the latter.

The ends of the casing 1 are provided with annular seats 16 and with peripheral flanges 17. Adapted to engage in said seats and be secured to the peripheral flange 17 by bolts 18 are circular end plates 19, which are identical in construction. Each end plate is provided with a central opening concentric relative to the edge of the plate, said opening terminating in a stuffing box 21 of a conventional form having a gland 22 secured to said end plate by bolts 23. The inner side of the end plate is provided with an annular groove 24 eccentric with relation to the opening 20, said groove being located in the upper half of said plate. The material protruding on the upper half of the inner circumference of said groove is cut away, as

at 25, and the end plate directly above the opening 20 is provided with a transverse recess 26, the object of which will presently appear.

5 Adjustably mounted in the cut-away portion 25 of the end plate is a segment-shaped bearing block 27 having the lower edge thereof beveled, as at 28. Adapted to engage the beveled edge 28 of the bearing block is
10 an oblong wedge 29 adapted to recede into the recess 26 when the block 27 is adjusted. To adjust the wedge 27, said wedge is provided with a threaded bolt 30 extending through the end plate and provided with
15 nuts 31. After the bearing block 27 is adjusted, it is locked in a fixed position through the medium of a bolt 32 extending through a slot 33 provided therefor in the end plate, said bolt having nuts 34 for holding the
20 bearing block in engagement with the end plate.

At the ends of the engine are arranged bearings 35 for a shaft 36, said shaft extending through the stuffing boxes 21 and the
25 openings 20 of the engine. Surrounding this shaft and extending into the grooves 24 of the end plates is a revoluble head, said head comprising semi-cylindrical members 37 that are held in the form of a cylinder by
30 combined journal and coupling rings 38, these rings being connected to the ends of the members 37 by screws 39. The outer sides of the coupling rings 38 can be provided with coupling rings 38^a T-shaped in
35 cross section, as shown in Fig. 17.

By the coupling rings 38 supporting the members 37, two oppositely disposed longitudinal slots 40 are formed, these slots receiving regularly disposed pistons 41 and
40 41^a, carried by sleeves 42 and 42^a, mounted upon the shaft 36 within the cylindrical casing 1. In the edges of the slots 40 are arranged semi-cylindrical bearings 40^a, these bearings being self adjusting and snugly
45 holding the pistons 41 and 41^a when moving in and out the revoluble head. The pistons 41 and 41^a correspond in width to the inner diameter of the casing 1, and in depth to the members 37 of the revoluble head. Each one
50 of the pistons is provided with a top groove 43 and side grooves 44. Movably mounted in said grooves are inverted L-shaped packing strips 45, these strips being T-shaped in cross-section and extending from the grooves
55 44 into the groove 43. The packing strips 45 are held in engagement with the end plates 19 and the inner sides of the casing 1 by flat springs 46 arranged in the grooves 43 and 44.

It will of course be understood that a fly
60 wheel, belt pulley or gear wheel can be mounted upon the shaft 36 for transmitting power to machinery, or the shaft 36 can be coupled direct to the armature shaft of a motor.

65 Operation: By reference to Fig. 4 of the

drawings it will be observed that the engine is taking steam through the port 6^a and is exhausting through the port 6, slide valve 11 and port 12. As the steam enters port 6^a, the steam impinges piston 41^a and drives the
70 same downwardly and around within the casing 1, this movement of the piston 41^a rotating the cylindrical head in the grooves 24, also the shaft 36. The relative position of the piston 41^a to the piston 41 allows the
75 steam which lies within that portion of the casing extending between the piston 41 and the exhaust port to exhaust through the port 6.

To compensate for the wear of the revoluble head within the grooves 24, we have provided the bearing blocks 27 and the wedges 29, which are easily adjusted and locked, whereby the revoluble head will be retained in engagement with the cylinder
85 between the inlet and exhaust ports 6 and 6^a.

By slight modifications the engine can be made compound and its use broadened as a power producer.

While in the drawings forming a part of
90 this application there is illustrated the preferred embodiments of our invention, it is obvious that the same can be varied or changed as to shape, proportion and manner of assemblage without departing from the
95 spirit of the invention.

Having now described our invention what we claim as new, is:—

1. A rotary engine comprising a cylinder, end plates connected to the cylinder, a shaft
100 journaled in said end plates, each of said end plates having its inner face provided with an annular groove eccentrically arranged with respect to said shaft, a revoluble head surrounding said shaft and arranged within said cylinder, said head comprising two semi-cylindrical spaced members, combined journal and coupling rings secured to the ends of said members for maintaining them in spaced relation with
105 respect to each other to provide two longitudinally extending slots, said rings extending in said grooves, radially disposed pistons mounted upon said shaft and extending through the slots formed between the members of the head, laterally movable wedges mounted in the end plates, vertically adjustable bearings blocks for said rings, said blocks supported and adjusted by said
110 wedges, means carried by the end plates for adjusting said wedges, and means carried by the end plates for locking said blocks in a fixed position.

2. A rotary engine comprising a cylinder, end plates connected to the cylinder, a shaft
125 journaled in said end plates, each of said end plates having its inner face provided with an annular groove eccentrically arranged with respect to said shaft, a revoluble head surrounding said shaft and arranged within
130

said cylinder, said head comprising two semi-cylindrical spaced members, combined journal and coupling rings secured to the ends of said members for maintaining them in spaced relation with respect to each other to provide two longitudinally extending slots, said rings extending in said grooves, radially disposed pistons mounted between the members of the head, laterally movable wedges mounted in the end plates, vertically adjustable bearing blocks for said rings, said blocks supported and adjusted by said wedges, means carried by the end plates for adjusting said wedges, and means carried by the end plates for locking said blocks in a fixed position, each of said members of said head having the longitudinal edges thereof rounded.

3. A rotary engine comprising a cylinder, end plates connected to the cylinder, a shaft journaled in said end plates, each of said end plates having its inner face provided with an annular groove eccentrically arranged with respect to said shaft, a revolvable head surrounding said shaft and arranged within said cylinder, said head comprising two semi-cylindrical spaced members, combined journal and coupling rings secured to the ends of said members for maintaining them in spaced relation with respect to each other to provide two longitudinally extending slots, said rings extending in said grooves, radially disposed pistons mounted upon said shaft and extending through the slots formed between the members of the head, laterally movable wedges mounted in the end plates, vertically adjustable bearing blocks for said rings, said blocks supported and adjusted by said wedges, means carried by the end plates for adjusting said wedges, means carried by the end plates for locking said blocks in a fixed position, and spring-pressed packing strips carried by the edges of said pistons for engaging the inner face of said cylinder and said end plates.

4. A rotary engine comprising a cylinder, end plates connected to the cylinder, a shaft journaled in said end plates, each of said end plates having its inner face provided with an annular groove eccentrically arranged with respect to said shaft, a revolvable head surrounding said shaft and arranged within said cylinder, said head comprising two semi-cylindrical spaced members, combined journal and coupling rings secured to the ends of said members for

maintaining them in spaced relation with respect to each other to provide two longitudinally extending slots, said rings extending in said grooves, radially disposed pistons mounted between the members of the head, laterally movable wedges mounted in the end plates, vertically adjustable bearing blocks for said rings, said blocks supported and adjusted by said wedges, means carried by the end plates for adjusting said wedges, means carried by the end plates for locking said blocks in a fixed position, each of said members of said head having the longitudinal edges thereof rounded, and spring-pressed packing strips carried by the edges of said pistons for engaging the inner face of said cylinder and said end plates.

5. A rotary engine comprising a cylinder having inlet and exhaust ports, a head mounted eccentrically of said cylinder and comprising two semi-cylindrical sections, said sections having the longitudinal edges thereof rounded, combined journal and coupling rings secured to the ends of said sections for coupling them together and for maintaining them in spaced relation with respect to each other to provide a pair of longitudinally extending slots, longitudinally disposed pistons extending through the slots of the head, vertically adjustable bearing means for said rings, and laterally movable means for adjusting and supporting said vertically adjustable bearing means.

6. In a rotary engine, the combination with a cylinder having inlet and exhaust ports, of a head arranged in said cylinder and embodying a pair of semi-cylindrical spaced sections, coupling rings connecting the sections of the head together, and journal in the ends of the cylinder eccentrically with respect to the axis of said ends, a shaft extending through the ends of the cylinder through said head, radially disposed pistons secured to said shaft and extending between the sections of the head and exteriorly of the head, and adjustable bearing means mounted in the ends of the casing for said coupling rings.

In testimony whereof we affix our signatures in the presence of two witnesses.

JOHN F. BEARINGER.
WILLIAM M. DONAHEY.
CHARLES E. WATSON.

Witnesses:

JAMES J. LUNDIE,
THOMAS F. ROBINSON.