954,832.

C. E. WALDRON.

ROTARY ENGINE.

APPLICATION FILED FEB. 13, 1909.

Patented Apr. 12, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

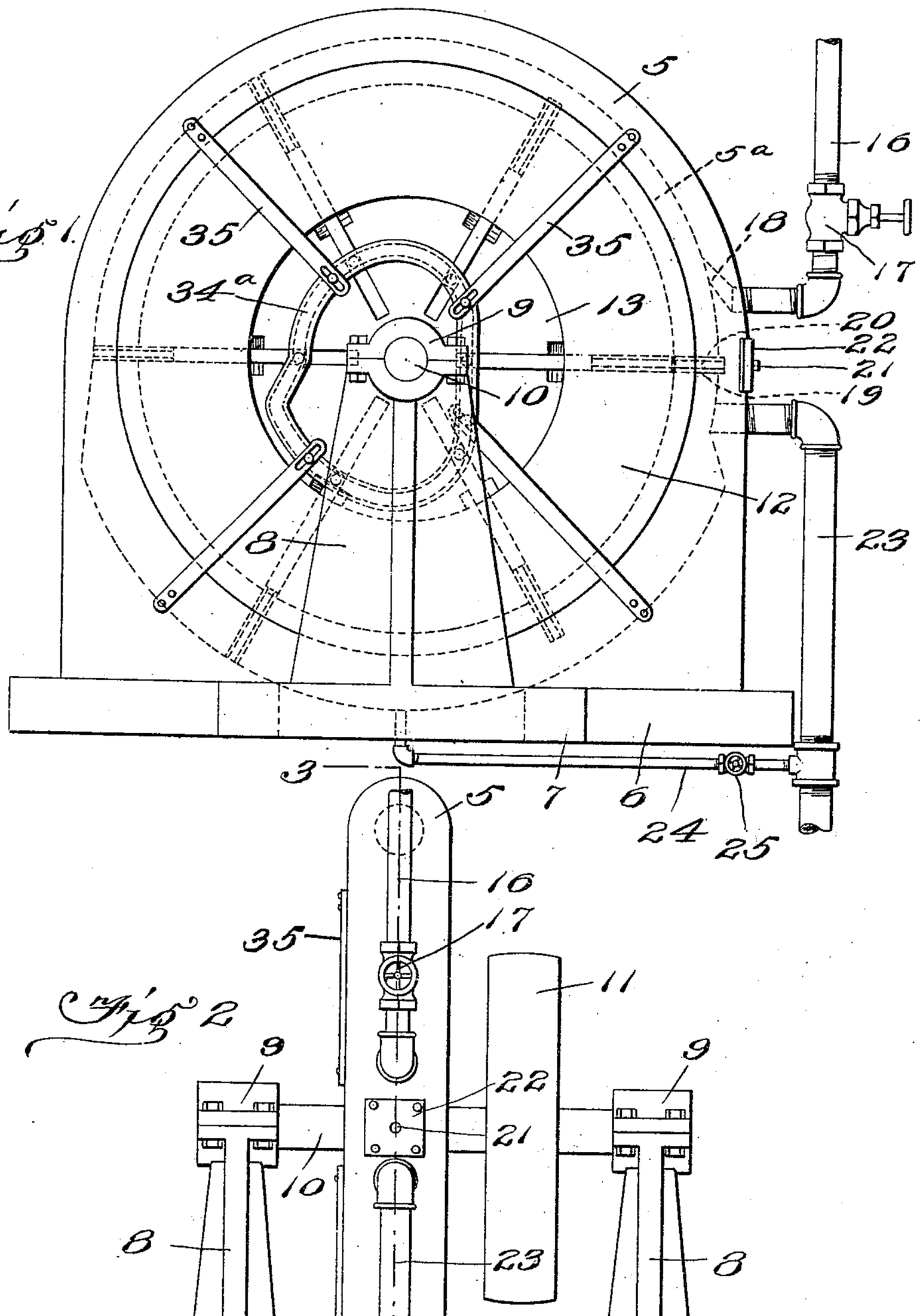


Fig. 2.

Witnesses

Geo. L. Thom

"

Harold C. Megrew

Inventor

C. E. Waldron.

Geo. E. Lew

Attorney

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

C. E. WALDRON.

ROTARY ENGINE.

APPLICATION FILED FEB. 13, 1909.

954,832.

Patented Apr. 12, 1910.

2 SHEETS—SHEET 2.

Fig. 3.

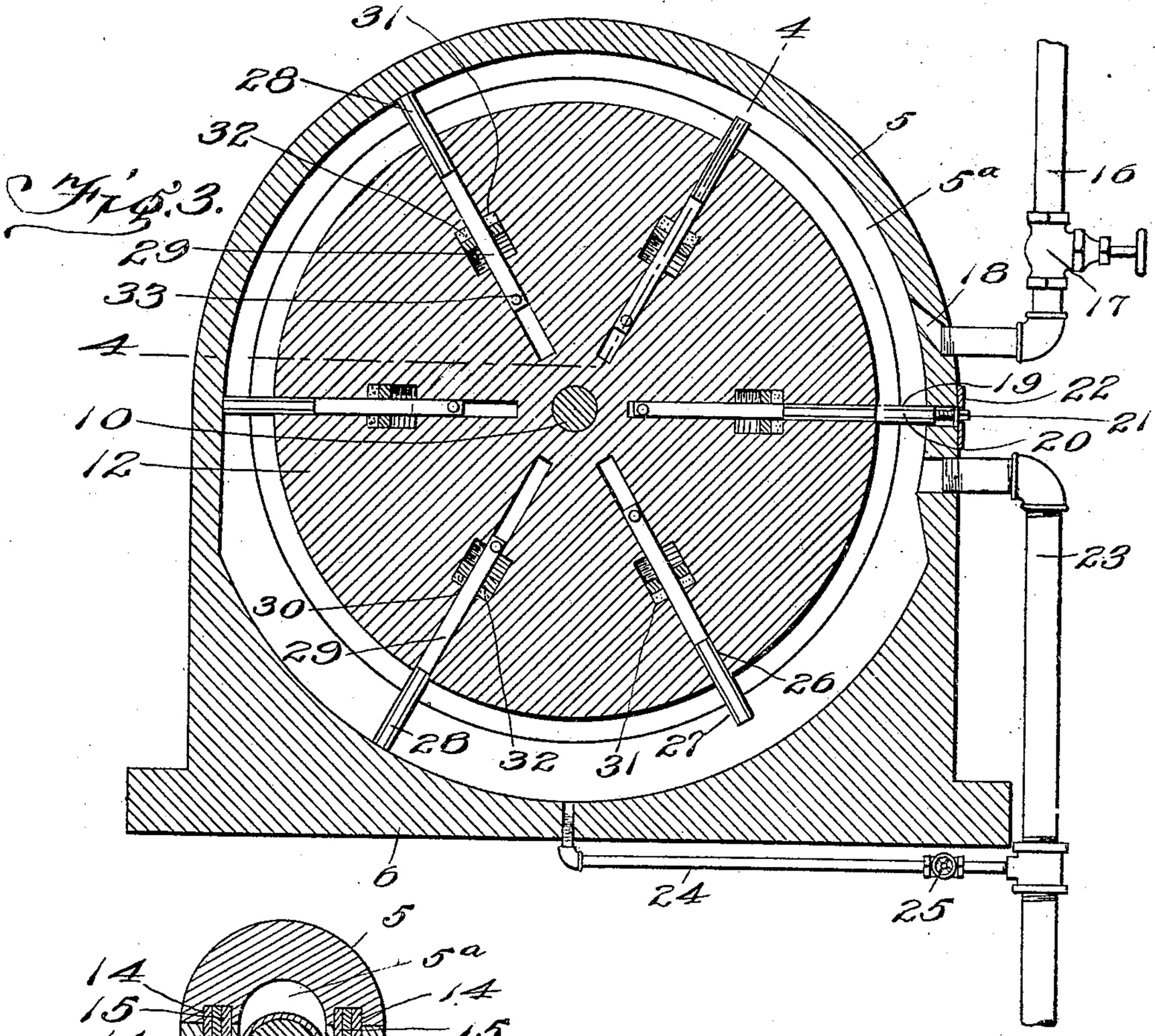


Fig. 4.

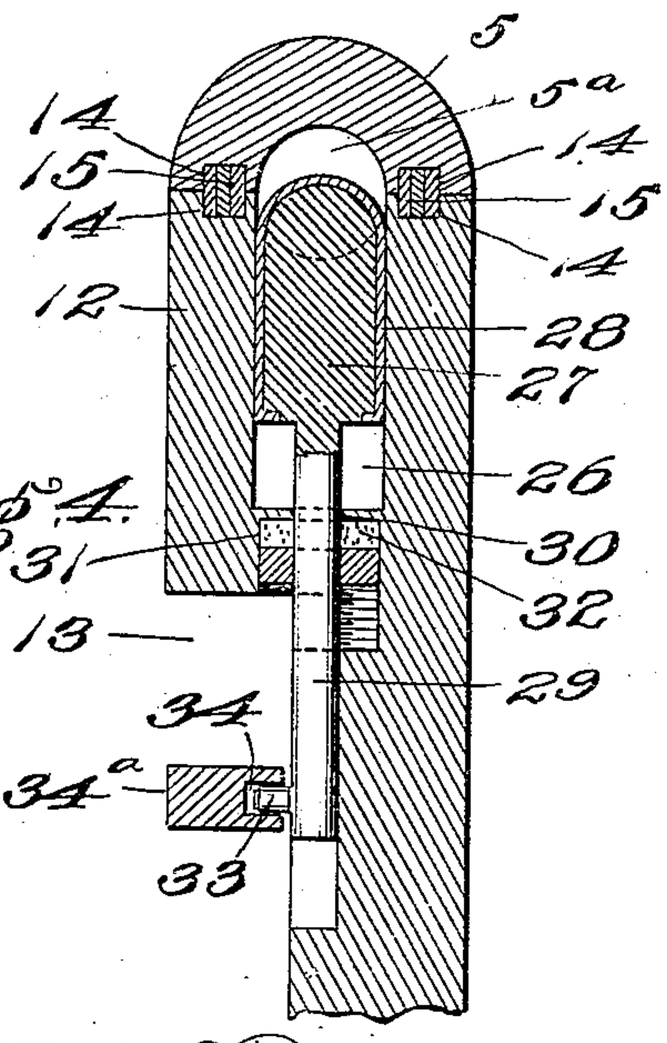
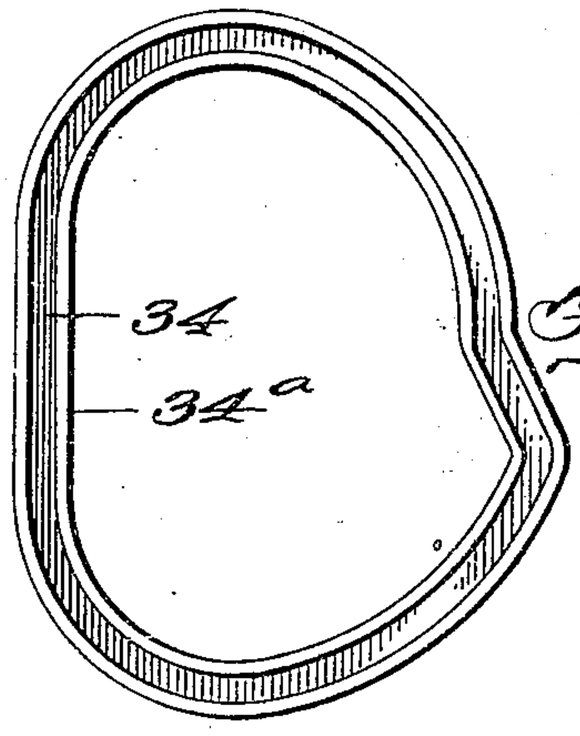


Fig. 5.



Witnesses

Leo L. Thorn

H

Harold C. Mellrew

Inventor

C. E. Waldron.

By Geo. E. Lewis

Attorney

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES E. WALDRON, OF PORTLAND, OREGON, ASSIGNOR OF ONE-HALF TO CHARLES A. CARTER, OF PORTLAND, OREGON.

ROTARY ENGINE.

954,832. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed February 13, 1909. Serial No. 477,746.

To all whom it may concern:

Be it known that I, CHARLES E. WALDRON, citizen of the United States, residing at Portland, formerly Oregon City, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines and to that class utilizing a rotor carrying slidable axial wings or pistons which move in and out of the steam chambers that they may pass, an abutment projecting from the outer fixed rim.

By the particular arrangement of the chambers and wings the full power is derived from the steam, velocity pressure and expansion.

In the drawings Figure 1 is a side elevation of the engine; Fig. 2 is an end elevation; Fig. 3 is a vertical, longitudinal, sectional view on the line 3—3 of Fig. 2; Fig. 4 is a vertical cross sectional view on the line 4—4 of Fig. 3; Fig. 5 is a plan of the cam ring which actuates the wings.

As shown in the drawings, 5 indicates the outer casing or rim, formed with the base 6 having extensions 7 with uprights 8 thereon. The inner face of the casing 5 has a groove or passage therein indicated at 5^a, this groove being shown as semi-circular in cross section, and extending around the rim or casing. The depth of this passage varies in the upper and lower halves, that is, the upper half is semi-circular in cross section while the lower half is U-shaped with parallel sides above the semi-circle.

Mounted in bearings 9 on the uprights 8 is a shaft 10, which carries a belt wheel 11, and a rotor 12. This rotor has an annular recess 13 in one side thereof to be hereinafter more fully described; and an annular semi-circular recess in the outer periphery thereof registering with the groove in the casing 5 and forming therewith an annular chamber substantially circular in cross-section. The rotor revolves within the casing 5, the sides of the semi-circular grooves being in close contact, with sufficient looseness to allow movement with respect to each other. To insure against leak of steam about the edges, grooves 14 receive metal packing rings 15, these rings forming a perfect seal, yet permit the drum 12 to revolve. A steam pipe 16 from the source of supply provided with the usual throttle 17 leads to a nozzle or jet 18 formed in the side of the casing 5. By the arrangement of this jet the impact of the steam against the piston of the rotor 12 tends to revolve the same forwardly, thereby utilizing the velocity of the steam.

Below the jet 18 is an abutment 19 provided with packing bands 20. This abutment is stationary with respect to the revolving drum but is adjustable with respect to the casing 5, so that any wear may be taken care of, thereby keeping a tight connection. The adjustment of the abutment is by a screw 21, working through the removable plate 22, secured to the casing 5.

Below the abutment 19 is an exhaust pipe 23, tapped through the casing 5 into the circular recess therein. The exhaust pipe may lead to condensers or the like, not shown by the drawing to reclaim the water from the condensed steam and produce desirable vacuum. The diameter of the exhaust pipe exceeds that of the supply pipe.

The lowest point of the annular chamber, within the casing 5, may be connected to the exhaust or other drain by a pipe 24, having a globe or other valve 25 therein. This pipe serves to bleed the chamber of any accumulation of water from the condensed steam usually on starting the engine.

The rotor 12 is provided with a plurality of axial slots 26 in which are sliding wings or pistons 27 each of which has packing bands 28. These wings have shanks 29 which extend through holes 30, in the rotor 12, said holes extending from the inner end of the slots 26 to the recess 13.

Stuffing boxes 31 are at the outer ends of the holes 30 and at the inner ends of the slots 26. The boxes 31 are provided with the usual stuffing material 32, through which the shanks 29 of the wings pass, these shanks extending inwardly far enough so that rollers 33 carried by said ends may have radial movement sufficient to advance and retract the wings 27 from their slots. The recess 13 is deep enough to permit the outer side of the shanks 29 to be flush with said inner side of the recess, and the rollers 33, carried by said shanks, extend into the recess 13.

A guide or cam groove 34 which receives the rollers 33 is produced in a ring 34^a held within the recess 13, by any desired means. As shown, by supplemental arms 35 extend-

ing from the casing 5. This guide controls the rollers so that the wings assume three positions, viz., retracted, while passing the fixed abutment, partly extended or advanced, as in the upper chamber, and wholly extended as in the lower chamber.

By reason of the shape of the grooves or semi-circular recesses in the casing 5 and the rotor 12 a circular chamber is formed having a portion with a small diameter and a portion with a larger radial diameter. The small and large parts of this circular chamber coöperating with the wings, produce a respectively high pressure chamber and a low pressure chamber or cylinder. As the rotor 12 revolves carrying therewith the wings 27, the packing bands of the various wings contact with the intended surfaces and seal said points of contacts against the escape of steam. The guide groove is so arranged as to retract the wings, while passing the abutment 19, and to advance the same slowly until about one-third revolution, when the wing contacts with the outer surface of the high pressure chamber and after leaving the high pressure chamber, the wings are advanced farther to contact with the outer surface in the low pressure cylinder, until almost ready to pass the abutment 19, when they are again retracted.

In operation the steam from the jet 18, by the impact against rotor 12, tends to advance same, by pressure against the extended wings in high pressure chamber and the abutment also forces the rotor forward. After leaving the high pressure chamber the steam expands and by difference in diameters of chambers a shoulder is formed which affords surface for expansion of steam to force the wings and consequently the rotor forward.

I claim:

In a rotary engine, the combination of a casing ring stationarily supported and provided with an internal annular groove, a rotor, within said casing, having a peripheral groove registering with said casing groove to form an annular chamber, and having an annular recess in one side thereof, a cam guide ring disposed within said recess, radial arms extending inwardly alongside said rotor and secured at their outer ends to one edge of said casing rings, and having means at their inner ends to adjustably support said guide ring, said rotor having radial slots extending inwardly from its said groove, and having radial bores extending outwardly from its said recess in alinement with said slots, pistons disposed within said slots, and having shanks journaled through the material of the rotor between its said slots and bores, and through the latter and provided with side rollers engaging said guide ring, packing disposed within said bores, and gasket rings surrounding said piston shanks within said bores to press said packing against the end thereof and form a steam-tight joint.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLES E. WALDRON.

Witnesses:

W. D. FREEMAN,

W. T. FREEMAN.