G. W. BROWN.

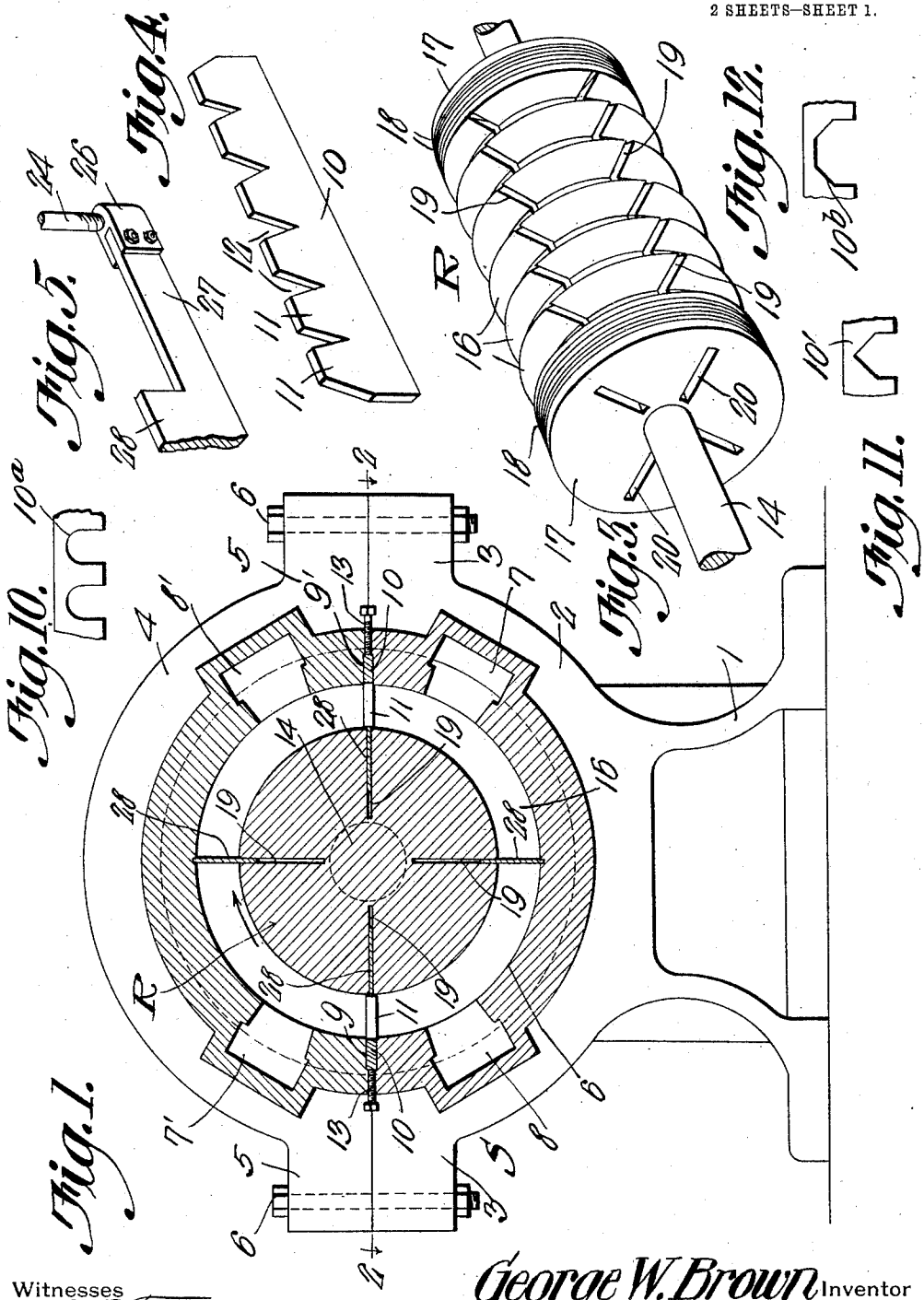
ROTARY ENGINE.

APPLICATION FILED MAR. 15, 1912.

1,040,135.

Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.



Witnesses

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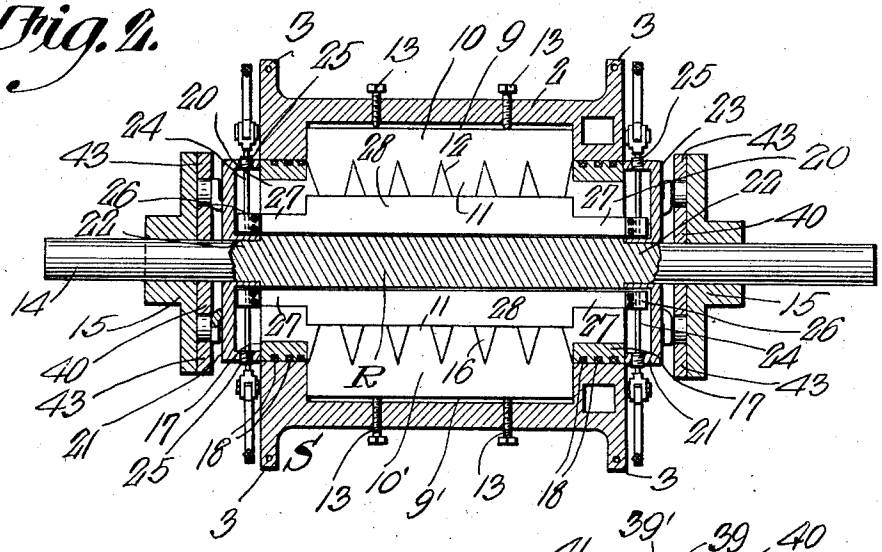
2 SHEETS—SHEET 2.

Fig. 2.



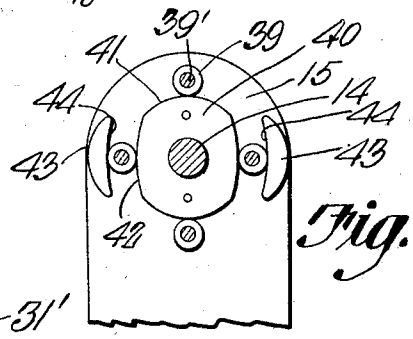


Fig. 9.

Fig. 6.

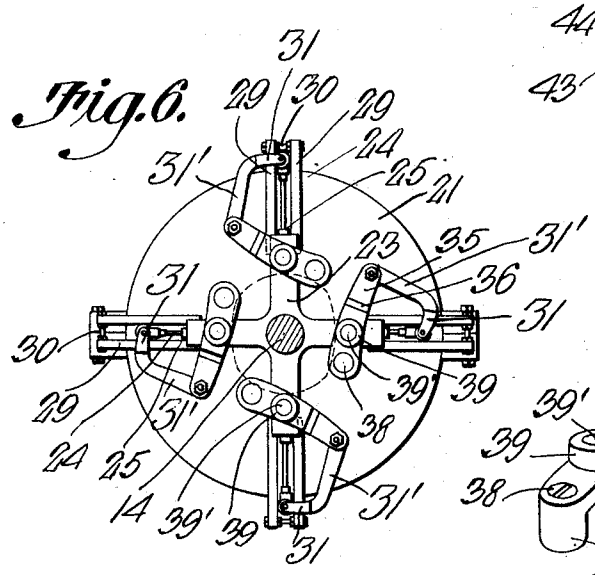


Fig. 7.

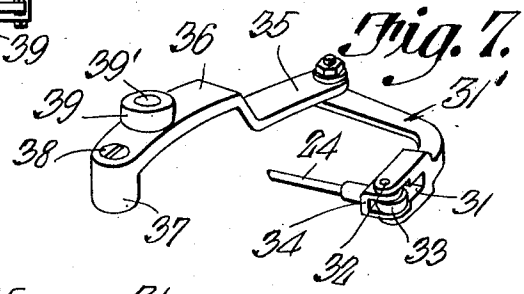
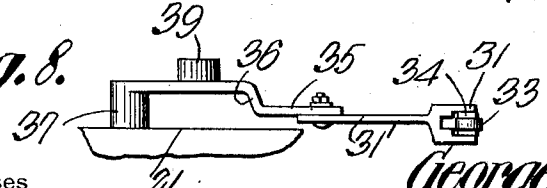


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE WALTER BROWN, OF LEDGEDALE, PENNSYLVANIA.

ROTARY ENGINE.

1,040,135. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed March 15, 1912. Serial No. 683,979.

To all whom it may concern:

Be it known that I, GEORGE WALTER BROWN, a citizen of the United States, residing at Ledgedale, in the county of Wayne and State of Pennsylvania, have invented a new and useful Rotary Engine, of which the following is a specification.

The present invention relates to improvements in rotary engines, the primary object of the invention being the provision of a novel form of rotary engine in which the stator is provided with an open ended cylindrical rotor chamber, the rotor being provided with chamber sealing ends and having circumferential grooves constituting a plurality of pressure fluid guiding channels, while the stator and rotor carry co-acting channel closures to offer sufficient resistance to permit the pressure fluid directed in the channels to propel the rotor.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a transverse vertical sectional view of the complete engine, with two of the pistons in retracted position and the other two extended. Fig. 2 is a longitudinal sectional view of the rotary engine taken on line 2—2 of Fig. 1. Fig. 3 is a perspective view of the rotor minus the pistons. Fig. 4 is a detail perspective view of one of the adjustable partitions. Fig. 5 is a perspective view of one end of one of the pistons and the connecting rod attached thereto. Fig. 6 is an elevation of one of the end disks of the rotor showing the mechanism for actuating the sections of the rotor. Fig. 7 is a perspective view of the cam actuated lever mechanism for each end of the piston. Fig. 8 is an end elevation of the same attached to an adjacent portion of the end of the rotor. Fig. 9 is an elevation of the cams for actuating the pistons. Figs. 10, 11 and 12 are detail views illustrating the different shapes of the steam passages due to the periphery of the rotor, said views being taken especially through the edge of one of the partitions.

Referring to the drawings, the stator S of the engine is supported upon the base 1 and consists primarily of the lower section 2 provided with the diametrically disposed lugs 3 and the upper section 4 provided with the diametrically disposed lugs 5, said lugs 3 and 5 being positioned for engagement so that the bolt 6 may secure the sections of the stator relatively together to produce a compact structure.

Provided in the body of the stator longitudinally thereof are the diametrically disposed steam inlet passages 7 and 7′, and the diametrically disposed exhaust passages 8 and 8′ respectively. By this means the steam is admitted to the rotor chamber at diametrically opposite points and throughout the longitudinal length of the rotor R, so that the pressure will balance upon each side of the respective partitions 10 which are disposed stationarily, yet adjustably, within the diametrically disposed recesses 9 and 9′ formed in the inner peripheral wall of the stator. These partitions are provided with the projections 11 and the recesses 12, the purpose of which will later appear. In order to adjust the respective partitions 10, the set screws 13 are provided and project exteriorly of the cylindrical portion of the stator S so as to be readily accessible to permit of the adjustment of the partitions 10 toward the periphery of the rotor R.

The rotor shaft 14 is journaled in the post or standard 15 and has fast thereto the cylindrical rotor R. This rotor as clearly shown in Fig. 3, is provided with the circumferential grooves 16, which correspond in shape to the projections or teeth 11 of the partitions 10, and as the periphery of the rotor is close to the inner peripheral walls of the rotor chamber of the stator, a plurality of circumferential and parallel channels or passages are provided throughout the active surface of the rotor and chamber.

The grooves 16 may be of any desired shape in cross section, such as is shown in Figs. 10, 11 and 12, at 10′, 10^a and 10^b, respectively.

The rotor R is provided at opposite ends with the cylindrical ends 17 which rotate freely within and seal the open ends of the stator, the same being provided with the cir-

cumferential stuffing rings 18, which provide a steam tight joint between the ends 17 and the stator, so that the steam is prevented from escaping between the peripheral surface of the cylindrical ends 17 and the adjacent portion of the stator. Four radial slots 19 are formed longitudinally of the rotor R between the respective cylindrical ends 17 and each slot terminates in the elongated openings or apertures 20 in the respective cylindrical ends 17, the purpose of which will presently appear.

Adjacent to the outer face of each of the respective cylindrical ends 17 and keyed upon the reduced portion 22 of the shaft 14, are the disks 21, each one of which is provided with the radially disposed casings 23, in which project the slidable rods 24, there being one rod to each casing. The respective radial casings 23 are disposed one to each slot or aperture 20 of the cylindrical ends 17 and the respective rods 24 are slidably mounted in the stuffing boxes 25 so as to prevent the leakage of steam therethrough. The lower ends of the respective rods 24 are adjustably connected to the plates 26 which are secured to the reduced ends of the pistons or blades 28, the reduced ends of the pistons being projected through the slots 19 of the cylindrical ends 17 of the rotor, so that the connecting portions 26 thereof are projected within the casing 23, the enlarged portion of the piston being so constructed as to when extended, to assume the position as shown in Fig. 1 and in engagement with the outer peripheral wall of the stator or be retracted to seat within the periphery of the rotor and out of engagement with the inner ends of the partitions 10.

In order to actuate the respective pistons so as to permit them to be retracted and extended, the casing 23 has connected thereto the spaced plates 29 which are held together at their respective ends by means of the tie rods 30. The upper ends of the respective rods 24 are disposed for reciprocation in the space between the respective plates 29 and each has a yoke 34 which is connected by means of a pin 32 to the yoke 31. The yoke 31 straddles one of the plates 29 while the roller 33 is journaled upon the pin 32 and anti-frictionally engages the opposed faces of the two plates 29 to assist in properly guiding the free ends of the rods 24 between the plates 29.

As clearly shown in Figs. 6, 7 and 8, the arms 31′, carrying the yoke 31, are each pivotally connected to the free end 35 of the lever 36, said lever 36 being provided with the hollow boss 37 which is connected by means of a pin 38 to the disk 21 so as to provide a pivot for the lever, while upon the opposite side to the boss 37 is mounted a roller 39 upon the pin 39′. In order to actuate the respective levers 36 and consequently the rods 24 in pairs so as to properly project and retract the various pistons 28, the main cam 40 is connected to the inner face of each of the respective standards 15 and is provided with the oppositely disposed convex portions 41, which are substantially concentric to the center of the cam, and with the oppositely disposed convex portion 42, the curvature of which is the curve of a greater circle than the cam so as to permit of the proper retraction of the rollers 39 as they pass from one surface 41 upon the surface 42. In order to dispense with the use of springs in imparting the desired movement to the rollers 39, the oppositely disposed cam lugs 43 are provided and have concaved surfaces 44 which correspond in contour to the convex surfaces 42, the respective pistons 28 when the rollers 39 are between the surfaces 42 and 44 being in retracted position or when passing the inner ends of the respective partitions 10.

From the foregoing description, taken in connection with the drawings, it is evident that any wear upon the inner edge of the respective partitions 10 may be readily taken care of by means of the adjusting screws 13, and that therefore a steam tight joint will always be effected between the periphery of the rotor R and the adjacent portion of the respective partitions 10, so that as the steam is admitted simultaneously to the inlet passages 7 and 7′, there will be no perceptible leakage between the abutting portions of the partitions 10 and the periphery of the rotor R, the steam being prevented passage by the partitions 10 to exert pressure against the pistons 28, so that the rotor will be moved in the direction of the arrow Fig. 1, and as two chambers are provided in the stator by the partitions 10, a balanced effect upon the rotor is produced, and by reason of the employment of four pistons 28, there will be no dead center during the rotation of the rotor. Further by providing the peculiar shaped cams, as illustrated in Fig. 9, in combination with the actuating mechanism for the respective pistons 28, the said pistons are retracted in passing the partitions 10 and projected after such passage without any perceptible jar or noise and as before explained without the employment of springs. The action by reason of the rollers 39 and cams 40 and 43 is positive and so timed as to insure the proper projection and retraction of the pistons 28 without any lost motion in the rotor R or leakage of steam when passing the respective partitions 10.

By reason of the adjustable connection at 26 with the rods 24, any wear upon the piston ends where placed in engagement with the inner peripheral wall of the stator chamber, may be taken care of and as the said rods project exteriorly between the respec-

tive plates 29, such adjustment may be effected at the connection of the yoke 34 to the outer end of the rods 24 without the removal of any parts of the rotor or stator. It will also be noted that with this form of engine, that the stator chamber is open at both ends, being sealed by the respective cylindrical ends 17 of the rotor and that by reason of the various mechanisms for actuating the pistons 28 and for controlling the partitions 10, being disposed exteriorly of the stator or rotor, any part of the engine may be readily accessible without interfering with the main assemblage.

What is claimed is:

1. A rotary engine, including a stator having a cylindrical open ended headless chamber provided with two diametrically disposed steam inlet passages and two diametrically disposed exhaust passages, a rotor having cylindrical ends insertible within and having its ends forming the heads of the stator chamber and with an intermediate portion having a plurality of circumferential grooves to provide with the adjacent portion of the chamber a plurality of circumferentially disposed steam passages therearound, a plurality of pistons slidably disposed in the body of the rotor for movement into and out of contact with the wall of the chamber, two partitions of the same length as the grooved portion of the rotor carried by the stator and disposed between an inlet and an exhaust passage to divide the chamber into two compartments, the inner edge of the partition conforming to the contour and in contact with the grooved portion of the rotor, and means for retracting and projecting the pistons as they pass and have passed the partitions.

2. A rotary engine, including a stator, provided with a cylindrical open ended headless rotor chamber, said chamber having two diametrically disposed steam inlet passages and two diametrically disposed exhaust passages, two partitions, one disposed between each inlet and each exhaust passage and projecting into the chamber to divide said chamber at diametrical points into two steam compartments, a rotor provided with cylindrical ends fitted within the chamber of the stator, said cylindrical ends sealing the ends of and forming the heads for the stator chamber, the intermediate portion of said rotor and of substantially the same length of the partitions being provided with circumferential grooves to form circumferentially parallel steam passages, the inner edge of each partition being formed to correspond with the contour of the grooved portion of the rotor and in contact therewith, a plurality of radial blades slidably mounted in the body of the rotor and provided with reduced ends projecting beyond the cylindrical ends of the rotor, the outer edges of said blades being disposed to engage the inner peripheral wall of the rotor chamber, a disk connected to the respective ends of the rotor and into which the reduced ends of the pistons project, a slidable rod to each reduced end of the piston, mounted within said disk and projecting exteriorly thereof, and means operably connected to the outer ends of said rods for actuating the rods to retract and project the pistons when passing and after having passed the partitions.

3. A rotary engine, including a stator provided with an open ended headless cylindrical rotor chamber, said chamber having two diametrically disposed steam inlet passages and two diametrically disposed exhaust passages, a cylindrical rotor insertible in either end of the chamber and having ends fitting and forming rotatable heads for the chamber and provided with an intermediate portion having a plurality of circumferential grooves, a plurality of pistons radially slidable in the body of the rotor for movement into and out of contact with the peripheral wall of the chamber, two partitions of substantially the same length as the grooved portion of the rotor, disposed at diametrically opposite points in the wall of the stator, adjusting means connected to said partitions for retaining the free ends of the partitions relatively to the grooved portion of the rotor, the inner edge of each partition conforming to and in contact with the grooved portion of the rotor, and means for retracting and projecting the pistons as they pass and have passed the partitions.

4. A rotary engine, including a stator provided with an open ended headless cylindrical rotor chamber, said chamber having two diametrically disposed steam inlet passages and two diametrically disposed exhaust passages, a cylindrical rotor insertible in either end of the chamber and having ends fitting and forming rotatable heads for the chamber and having a plurality of circumferential grooves co-acting with the wall of the chamber to provide a plurality of pressure fluid channels, a plurality of radially slidable pistons mounted in the body of the rotor for movement into and out of contact with the peripheral wall of the chamber and within the apices of the grooves of the rotor when retracted, two partitions disposed at diametrically opposite points in the wall of the stator, adjusting means connected to said partitions for retaining the same relatively to the grooved portion of the rotor, the inner edge of each partition conforming to and in contact with the grooved portion of the rotor to divide each channel into two pressure fluid compartments, said pistons having the opposite ends thereof extended beyond the ends of the rotor, and means connected to the ex

tended ends of the pistons for retracting and projecting the pistons within the chamber.

5. A rotary engine, having a stator whose chamber is cylindrical throughout its full length and open at both ends, a cylindrical rotor disposed the full length thereof and having its ends forming rotatable sealing heads for the chamber, said rotor being insertible in the chamber from either end, the intermediate portion of the rotor having a plurality of circumferential grooves and a plurality of radial slots longitudinally of the grooved portion, a blade slidably mounted in each slot to be projected into contact with the wall of the chamber and retracted within the surface of the rotor and the apices of the grooves, partitions mounted in the stator and projected into the chamber, the inner edges thereof being in contact with and conforming to the grooved portion of the rotor, means for adjusting said pistons disposed exteriorly of the stator, and means for operating the blades to retract them in passing the partitions and to project them after passing the partitions.

6. A rotary engine, having a stator whose chamber is cylindrical throughout its full length and open at both ends, a cylindrical rotor insertible therein from either end and having its ends forming rotatable sealing heads for the chamber, the intermediate portion of the rotor having a plurality of circumferential grooves and a plurality of radial slots longitudinally of the grooved portion, a blade slidably mounted in each slot to be projected into contact with the wall of the chamber and to be retracted within the surface of the rotor and beyond the apices of the grooves, partitions mounted in the stator and projected into the chamber, said partitions being substantially the same length as the grooved portion of the rotor and the inner edges thereof being in contact with and conforming to the grooved portion of the rotor, means for adjusting said partitions disposed exteriorly of the stator, the opposite ends of said blades being reduced and projected beyond the respective ends of the rotor, a disk connected to the respective ends of the rotor, a plurality of rods slidably mounted in said disk and adjustably connected to the reduced ends of the respective blades, and means operably connected to said sliding rods for retracting and projecting the blades.

7. A rotary engine, having a stator whose chamber is cylindrical and of the same diameter throughout its length, said chamber being open at both ends, a cylindrical rotor insertible therein from either end and having its ends forming rotatable sealing heads for the chamber, the intermediate portion of the rotor having a plurality of circumferential grooves and a plurality of radial slots longitudinally of the grooved portion, a blade slidably mounted in each slot to be projected into contact with the wall of the chamber and retracted within the surface of the rotor and beyond the apices of the grooves, two partitions mounted in the stator and projected into the chamber, the inner edges thereof being in contact with and conforming to the grooved portion of the rotor, said partitions dividing the chamber into a plurality of two-compartment chambers, means for adjusting said partitions disposed exteriorily of the stator, the opposite ends of said blades being reduced and projected beyond the respective ends of the rotor, a disk connected to the respective ends of the rotor, a plurality of rods slidably mounted in said disk and adjustably connected to the reduced ends of the respective blades, a shaft concentric of the rotor, two standards supporting the rotor shaft, a cam carried upon the inner face of each standard and disposed adjacent to each disk of the rotor, and a plurality of levers fulcrumed to each disk and operably connected to the rods, said levers being in engagement with the cam, whereby the rotation of the rotor will actuate the levers to retract and project the blades.

8. A rotary engine, having a stator whose chamber is cylindrical and of the same diameter throughout its length and is provided with open ends, said chamber being provided with steam inlet and outlet passages, a cylindrical rotor insertible through either end of the chamber and having its ends forming rotatable sealing heads for the open ends of the chamber, said rotor being provided with a plurality of circumferential grooves intermediate of the ends to co-act with the inner peripheral wall of the chamber to provide a series of circumferentially parallel steam passages, a plurality of radially slidable blades mounted in the body of the rotor, said blades when projected bridging the grooves to provide an abutment in each steam passage, a partition connected to the stator and projecting into engagement with the grooved portion of the stator to act as an abutment for the steam in entering the passages, and means for retracting and projecting the blades as they pass and have passed the partition.

9. A rotary engine, having a stator whose chamber is cylindrical and of the same diameter throughout its length, said chamber being open at both ends, said chamber being provided with two longitudinally disposed steam inlets and two exhaust passages, a cylindrical rotor mounted in said chamber and insertible at either end thereof, the ends of the rotor forming rotatable heads for the ends of the rotor chamber, while the intermediate portion is circumferentially grooved to provide a plurality of

circumferential and parallel steam passages, two partitions carried by the stator and having their inner ends in contact with and conforming to the grooved portion of the rotor, a plurality of radially disposed blades mounted longitudinally of the rotor and disposed to be projected and have the outer edges thereof engage the peripheral wall of the rotor chamber, and means for retracting and projecting said blades when passing and having passed the inner ends of the partitions.

10. A rotary engine, having a cylindrical rotor, the steam pressure surface being intermediate of the ends and provided with a plurality of circumferential embedded grooves and a stator having a cylindrical rotor chamber of the same diameter throughout its length and surrounding the rotor and co-acting with the grooves of the rotor to provide a plurality of parallel steam passages, longitudinally of the rotor and stator, said rotor being insertible in and removable from either end of the rotor chamber.

11. A rotary engine, including a stator having an open ended headless cylindrical rotor chamber, and a cylindrical rotor of substantially the same diameter and length as the chamber and insertible from either end of the chamber, and the intermediate surfaces of the rotor having a plurality of parallel circumferential grooves forming the active surface of the rotor, the ends of the rotor forming the heads for the chamber.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

GEORGE WALTER BROWN.

Witnesses:
SELINA WILLSON,
W. H. C. CLARKE.