T. G. McGONIGLE.

ROTARY ENGINE.

APPLICATION FILED DEC. 22, 1910.

995,076.

Patented June 13, 1911.

2 SHEETS—SHEET 1.

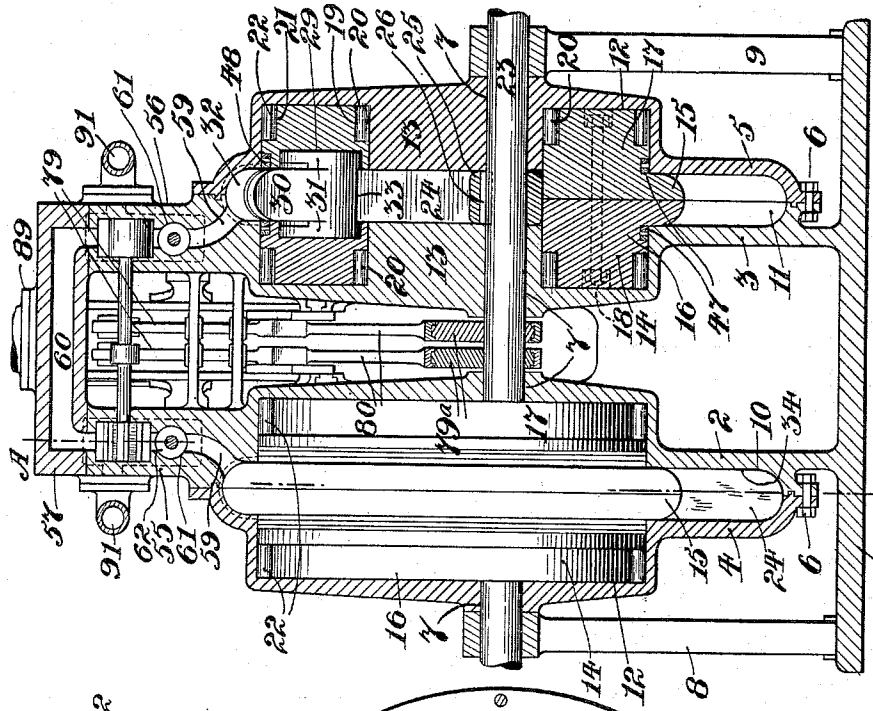

Fig. 2.

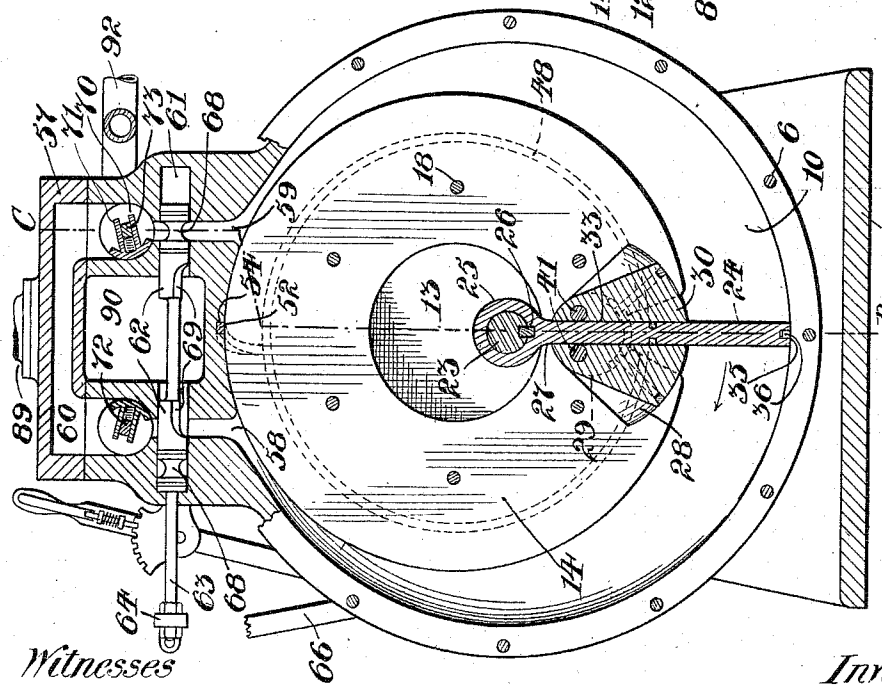

Fig. 1.

Witnesses

L. Duck

C. Heron

Inventor

T. G. McGonigle

by E. Fetherstonhaugh

Atty

THE NORRIS PETERS CO., WASHINGTON, D. C.

T. G. McGONIGLE.

ROTARY ENGINE.

APPLICATION FILED DEC. 22, 1910.

995,076.

Patented June 13, 1911.

2 SHEETS—SHEET 2.

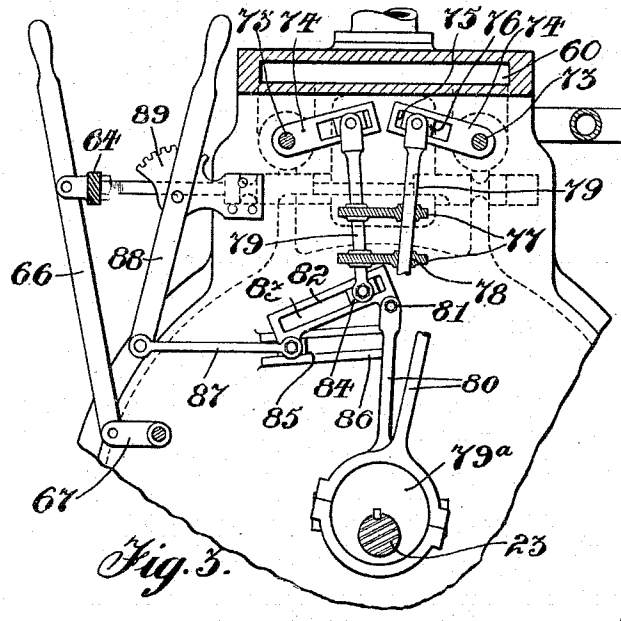

Fig. 3.

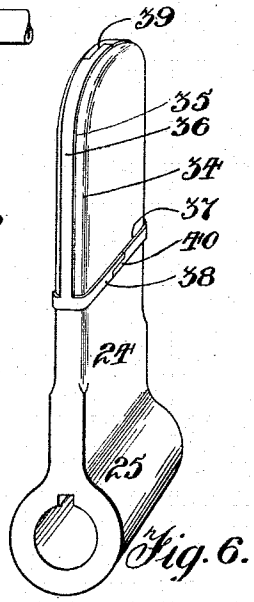

Fig. 6.

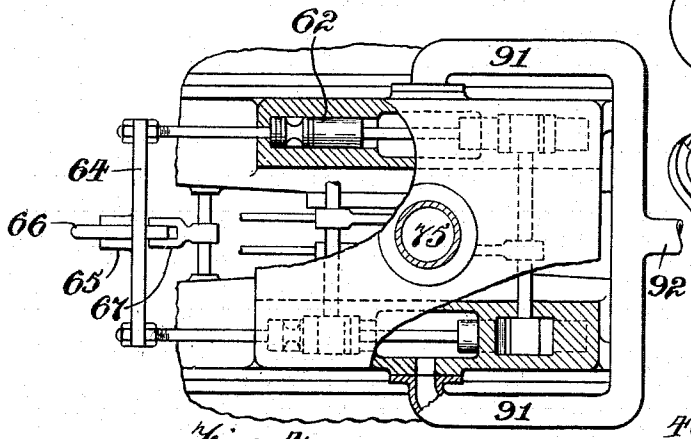

Fig. 4.

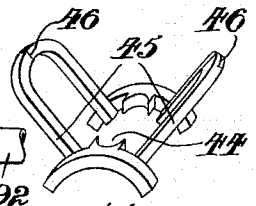

Fig. 8.

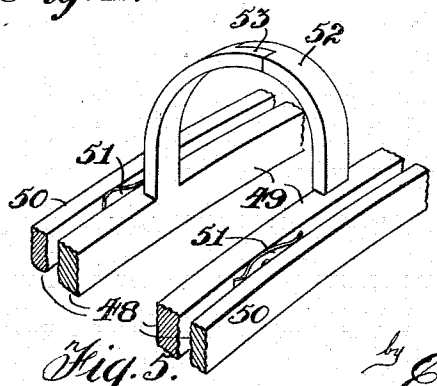

Fig. 5.

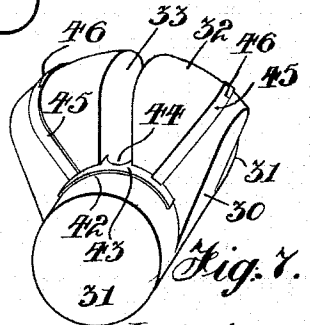

Fig. 7.

Witnesses

B. Tuck

C. Heron

Inventor

T. G. McGonigle

by E. J. Fetherstonhaugh

Atty.

UNITED STATES PATENT OFFICE.

THOMAS GEORGE McGONIGLE, OF LAMBTON MILLS, ONTARIO, CANADA.

ROTARY ENGINE.

995,076. Specification of Letters Patent. Patented June 13, 1911.

Application filed December 22, 1910. Serial No. 598,726.

To all whom it may concern:

Be it known that I, THOMAS GEORGE McGONIGLE, a subject of the King of Great Britain, and resident of Lambton Mills, in the county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

The invention relates to improvements in rotary steam engines, as described in the following specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially in the novel construction and arrangement of parts, whereby a rotating member is eccentrically journaled in a circular casing in conjunction with a concentric piston in a special manner and operates in conjunction with certain valve mechanism as more particularly described hereinafter.

The object of the invention is, to provide a steam engine which will be free from vibration and economical in its operation.

Figure 1 of the drawings is a vertical section through the line A—B Fig. 2. Fig. 2 is a vertical longitudinal section through the line C—D Fig. 1. Fig. 3 is a vertical section between the two operating chambers. Fig. 4 is a plan view of the steam box partly broken away. Fig. 5 is a perspective view of a portion of the main packing rings. Fig. 6 is a perspective detail view of the piston. Fig. 7 is a perspective view of the oscillating member. Fig. 8 is a perspective view of the packing rings for the oscillating member.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 is the base.

2 and 3 are halves of circular casings forming the expansion chambers and integral with the base 1. 4 and 5 are the other halves of said casings securely bolted to the halves 2 and 3 by the bolts 6 and forming covers.

7 are journal bearings in each of the members 2, 3, 4 and 5.

8 and 9 are journal standards having their bearings in alinement with the bearings 7.

10 and 11 are circular chambers in the casings 2 and 3 and arranged concentrically with the journal bearings 7, the circular chambers 10 and 11 each having a widened circular portion 12, the center of which is above the journal bearing 7.

13 are inwardly extending bosses from the casings 2 and 3 and covers 4 and 5 concentric with the wide circular passage 12 and extending thereinto but do not meet.

14 are the rotors which occupy the widened chambers 12 each having the annular projection 15 extending in to the passages 10 and 11. The rotors 14 are each made in halves 16 and 17 held together by suitable bolts 18.

19 are annular grooves cut in the rotor 14 to accommodate the roller bearings 20 which support the rotors 14 on the bosses 13. 21 are similar grooves cut on the outer periphery of the rotors 14 to accommodate the roller bearings 22 which travel on the inside of the casings 2, 3, 4 and 5. It will thus be seen that the rotors 14 may be freely revolved and as they are mounted eccentrically to the chambers 10 and 11, the lower part of these chambers will remain open.

23 is a shaft journaled in the standards 8 and 9 and passing through the journal bearings 7 in the frame.

24 are pistons traveling in the crescent-shaped passages 10 and 11 and having the hub 25 mounted on the shaft 23 and secured thereto by a suitable key 26. The pistons 24 extend through a slot 27 formed part in each half of the rotors 14. This slot is widened out to form a semi-circular chamber 28 having concentric circular recesses 29 at each side.

30 is the oscillator having the shafts 31 journaled in the recesses 29 and an extension 32 adapted to extend into the semi-circular chamber 28.

33 is a slot through the center of the oscillator 30 through which the piston 24 extends. The piston 24 is formed with a rounded edge 34 and the slot 35 around its edge adapted to hold the packing member 36.

37 is a groove around the piston 24 intermediate of its length adapted to hold the

packing member 38 which forms part of the packing member 36.

The packing members 36 and 38 are lap-joined at 39 and 40 so that they may at all times exert an outer pressure against the passage in which they are traveling. The packing member 36 prevents steam working between the piston 24 and the walls of the passages 10 and 11 while the packing member 38 prevents the steam leaking through the oscillator 30 from the chambers 10 and 11.

41 are roller bearings journaled in the oscillator 30 to facilitate the sliding of the piston 24 in the slot 33.

It will thus be seen that as the rotor 14 revolves the piston 24 will revolve with it and as its angular relation to the outer periphery of the rotor 14 varies the oscillator 30 will oscillate to accommodate itself to the motion of the piston and that it will be impossible for steam on either side of the said piston to leak past to the other side.

42 are grooves in the circular portion 31 of the oscillator 30 adapted to receive the packing members 43 which have a semi-circular extension 44 to extend into the slot 33 and fit the rounded edges 34 of the piston.

45 are U-shaped packing members extending from one packing member 43 over the extension 32 to the packing member on the other side. These latter packing members are split and lap-joined together at 46 so that they may press against the inner walls of the recess 28 and as the member 30 oscillates therein no steam can leak past into said chamber 28 from the chambers 10 and 11.

47 is a groove cut in the members 16 and 17 to each side of the circular extension 15. The grooves 47 contain the packing rings 48, each of which are split into two parts 49 and 50 held apart by the springs 51.

52 is an arched bridge forming a packing member extending between the inner parts 49 and so arranged that its points of junction are slightly offset as shown in Fig. 5. The said bridge is also divided and has the lap-joined joints 53 at its top. The bridge 52 extends into the grooves 54 in the casings 2 and 3 and prevents leakage of the steam across the top of the circular passages 10 and 11.

55 and 56 are upward extensions from the casings 2 and 3 respectively and 57 is a hollow member forming a steam chest secured to and joining the extensions 55 and 56.

58 and 59 are steam ports arranged to each side of the packing rings 54 and communicating with the passages 10 and 11 and with the steam chest 60.

61 are cylindrical valve chambers formed in each of the upward extensions 55 and 56 and intercepting the ports 58 and 59.

62 are cylindrical valves operating in the valve chambers 61 in pairs, each pair having their stems 63 connected by the bar 64.

65 are jaws concentrically arranged in the bars 64 and adapted to hold the lever 66 which is fulcrumed in the links 67 between the casings 2 and 3.

68 are annular recesses formed in the valves 62, and 69 are recesses in the lower side of said valves. The recesses 68 and 69 are so arranged that when the recess 68 in one of the valves 62 is in line with the port 59 the recess 69 in the other valve 62 will be in communication with the port 58, so that the port 59 is in communication with the steam box 60, while the steam port 58 is in communication with the exhaust chamber 90.

70 are circular valve chambers arranged above the cylindrical chambers 61 and having therein the Corliss valves 71 mounted on the shafts 72 and 73. The shafts 72 and 73 extend through suitable openings in the extensions 55 and 56 of the frame and each carries an arm 74 having a slot 75 carrying a sliding block 76.

77 are brackets extending between the extensions 55 and 56 and having orifices 78 therethrough in which the rods 79 slide. The rods 79 have upper jaw-shaped ends in which the blocks 76 are journaled.

79[a] are a pair of eccentrics mounted on the shaft 23 and carrying the eccentric rods 80. The upper end of each rod 80 is pivoted at 81 to a link 82 having the slot 83 in which the blocks 84 slide. The lower ends of the rods 79 are pivoted to the blocks 84. The other end of the link 82 is pivoted to a block 85 carried in a horizontal slide-way 86 formed on the casings 2 and 3. The block 85 may be adjusted back and forth in the slide-way 86 by means of the rod 87 which is connected to a lever 88 mounted on a bracket 89 secured to the frame of the engine and having a suitable quadrant locking gear.

It will be seen that as the shaft 23 and the eccentric 79 revolve the links 82 will be reciprocated by the rods 80, consequently the rods 79 will also be reciprocated and impart an oscillatory movement to the shafts 72 and 73, the extent of this oscillation may be governed by moving the link 82 out or in by means of the lever 88. The extent of oscillation of the shafts 72 and 73 governs the extent of oscillation of the Corliss valves 71 and consequently the time of admission of steam from the steam chest 60 to the ports 58 and 59 and chambers 10 and 11 is regulated. Steam is admitted to the steam chest 60 by the steam pipe 89 while the exhaust

steam is carried from the exhaust chamber 90 by the pipes 91 which communicate at the exhaust pipe 92.

In the operation of this device, steam is admitted to the steam chest 60 and passes into the circular valve chambers 70 from whence it passes to the ports 58 and 59 according to the position of the reverse valve 62. Steam now gains access to the chambers 10 and 11 and exerts its pressure against the piston 24, consequently revolving them and imparting power to the shaft 23. The exhaust steam is driven out through one of the passages 58 and 59 into the exhaust chamber 90 from whence it escapes through the exhaust pipe 77. When the piston arrives at or near the upper part of its travel the admission valve is closed until the piston has passed over the top and again passes the steam port. It will be seen that the exhaust side of the piston is always in communication with the exhaust chamber. The proximity of the ports 58 and 59 makes it possible to apply steam to the piston 24 for nearly the whole of its circular passage if desired.

The direction of travel of the piston 24 may be reversed by moving the valves 62 to the other end of the passage 61 by means of the lever 66 while in the intermediate position of the lever 66 both passages 58 and 59 will be closed and consequently the engine will stop.

A particular feature of this invention is the care which has been taken to provide ample means for preventing the leakage of steam past the piston 24, past the oscillator 30 and from the port 58 to the port 59 or vice versa. The diagonal arrangement of the bridge 52 enables the piston 24 and ring 36 to pass it without undue friction because the packing members 36 and 38 will pass each other with a shearing movement instead of abutting against each other.

The pistons 24 in the two chambers 10 and 11 are arranged diametrically opposite each other so that the steam pressure has a continuous application.

What I claim as my invention is:

1. In a rotary engine, a casing having a circular interior chamber formed with parallel side faces and its inner peripheral surface semi-circular in cross section, said casing having circular recesses extending outwardly therefrom and arranged eccentrically, journal bearings concentrically arranged in said casing, a shaft journaled in said bearings and extending through said casing, a rotor journaled in said eccentric recesses, and a radial piston secured to said shaft and extending through said rotor into said circular chamber and having a semi-circular outer end adapted to contact with the correspondingly shaped inner peripheral surface.

2. In a rotary engine, a casing having a circular interior chamber formed with parallel side faces and its inner peripheral surface semi-circular in cross section, said casing having circular recesses extending outwardly therefrom and arranged eccentrically, journal bearings concentrically arranged in said casing, a shaft journaled in said bearings and extending through said casing, a rotor journaled in said eccentric recesses, a radial piston secured to said shaft and extending through said rotor into said circular chamber and having a semi-circular outer end adapted to contact with the correspondingly shaped inner peripheral surface, said piston having a groove formed in its edge surface and a spring packing member fitting into said groove and expanding outwardly against the inner peripheral surface of said circular chamber.

3. In a rotary engine, a casing having a circular interior chamber formed with parallel side faces and its inner peripheral surface semi-circular in cross section, said casing having circular recesses extending outwardly therefrom and arranged eccentrically, journal bearings concentrically arranged in said casing, a shaft journaled in said bearings and extending through said casing, a rotor journaled in said eccentric recesses, a radial piston secured to said shaft and extending through said rotor into said circular chamber and having a semi-circular outer end adapted to contact with the correspondingly shaped inner peripheral surface, said piston having a groove in its edge surface, a groove encircling the sides and edges and communicating with said edge groove and a packing member of spring material formed in sections and fitting into said grooves and adapted to form a steam tight joint with the casing.

4. In a rotary engine, a circular casing, a shaft suitably journaled and extending centrally through the sides of said casing, a rotor eccentrically journaled within said casing having a recess therein opening to the periphery of said rotor, said recess having journal bearings formed in its side walls, an oscillatory member arranged in said recess and having journals extending into said bearings and a piston fixedly mounted on the said central shaft at one end and extending through said oscillatory member to the wall of the casing.

5. In a rotary engine, a circular casing, a shaft suitably journaled and extending centrally through the sides of said casing, a rotor eccentrically journaled within said casing and having a segmental recess therein opening to the periphery of said rotor,

said recess having journal bearings formed in its side walls, an oscillatory member of sector shape arranged in said recess and having journals extending into said bearings and a radial piston slot therethrough, and a piston extending through said piston slot in the oscillatory member to the inner peripheral wall of said casing.

6. In a rotary engine, a circular casing, a shaft suitably journaled and extending centrally through the sides of said casing, a rotor eccentrically journaled within said casing and having a segmental recess therein opening to the periphery of said rotor, and having an arc-shaped wall semi-circular in cross section, journal recesses formed in the flat side walls of said recess, an oscillatory member of sector shape arranged in said recess and formed with its arc-shaped face semi-circular in cross section and fitting the inner corresponding wall of the recess, said oscillatory member also having journals projecting outwardly into said journal recesses and a piston slot extending radially therethrough, spring packing members recessed into said oscillatory member at each side of said piston slot and extending around the semi-circular periphery, and a piston extending through said piston slot in said oscillatory member to the inner peripheral wall of said casing.

7. In a rotary engine, a circular casing having eccentric circular projections from each side thereof and circular bosses projecting inwardly from the sides of said eccentric portions, journal bearings in the walls of said casing concentric with the main portion thereof, a main shaft journaled in said bearings, a ring rotor formed of two circular halves, said halves being securely bolted together and journaled on said bosses, roller bearings introduced between said bosses and the walls of said casing, and a piston fixedly mounted on said shaft and extending between said bosses and through said rotor to the casing wall and carrying said rotor with it in rotation.

8. In a rotary engine, a circular casing having its inner peripheral wall arc-shaped in cross section, said casing having eccentrically arranged circular projections from the sides, a main shaft journaled centrally of said casing, a ring rotor rotating in said eccentric projections and extending across said casing and having a centrally arranged annular extension arc-shaped in cross section and of corresponding shape to the arc-shaped peripheral wall of said casing, and a piston fixedly mounted on said shaft and extending through said rotor to the arc-shaped peripheral wall of said casing and engaging the side walls thereof.

9. In a rotary engine, a cylindrical casing having circular portions eccentrically arranged and projecting from the sides thereof and a pair of steam passages at the top communicating with the central portion of said casing and with an exhaust passage, a rotor journaled in said extension, a shaft concentrically journaled in said casing, a radial piston secured to said shaft and extending through said rotor and engaging the side and inner peripheral walls of said casing, a steam chest, a valve chamber having steam passages communicating with the steam passages in said casing and steam chest, a pair of reciprocatory valves rigidly connected together and operating in said valve chamber and adapted to open either one of the steam passages in the main casing to the steam chest and coincidently close the other passage to the steam chest and open it to the exhaust, a pair of rotary valves arranged in the passages between the steam chest and the aforesaid valves, means for rotating said rotary valves, and means for operating said reciprocatory valves.

10. In a rotary engine, a cylindrical casing having circular portions eccentrically arranged and projecting from the sides thereof and a pair of steam passages at the top communicating with the central portion of said casing and with an exhaust passage, a rotor journaled in said extension, a shaft concentrically journaled in said casing, a radial piston secured to said shaft and extending through said rotor and engaging the side and inner peripheral walls of said casing, a steam chest, a valve chamber having steam passages communicating with the steam passages in said casing, cylindrical valves reciprocating in said valve chamber having annular recesses forming inlet passages and longitudinal slots forming outlet passages communicating with the exhaust passage, a pair of rotary inlet valves in said valve chamber, eccentrics mounted on said main shaft having eccentric straps and rods extending therefrom, links adjustably secured to said casing and pivotally connected to said connecting rods, blocks sliding in said links, slotted arms secured to the stems of said inlet valves, blocks sliding in said slotted arms, rods connecting the blocks in said arms with the blocks in said links, means for adjusting said links, and means for operating said cylindrical valves.

11. In a rotary engine, a circular casing having its inner peripheral wall arc-shaped in cross-section and eccentrically arranged projections from the side walls, a main shaft centrally journaled in said casing, rotor bearings centrally arranged in said eccentric portions of the casing, a ring rotor journaled on said bearings and having an annular extension arc-shaped in cross section project-

ing into the main portion of the chamber and circumferential grooves in its periphery arranged on each side of said annular extension, a pair of spring packing rings in each of said grooves spring-held apart and to the sides of said grooves, a bridge extending diagonally around the arc-shaped surface of the said annular projection and connecting the inner pair of rings to the wall of the casing, and a piston fixedly mounted on said shaft and extending through said rotor to the inner peripheral surface of the casing.

Signed at the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, this 5th day of December 1910.

THOMAS GEORGE McGONIGLE.

Witnesses:
E. HERON,
B. TUCK.