No. 742,181. PATENTED OCT. 27, 1903.

F. FUCHS.

ROTARY ENGINE.

APPLICATION FILED AUG. 22, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

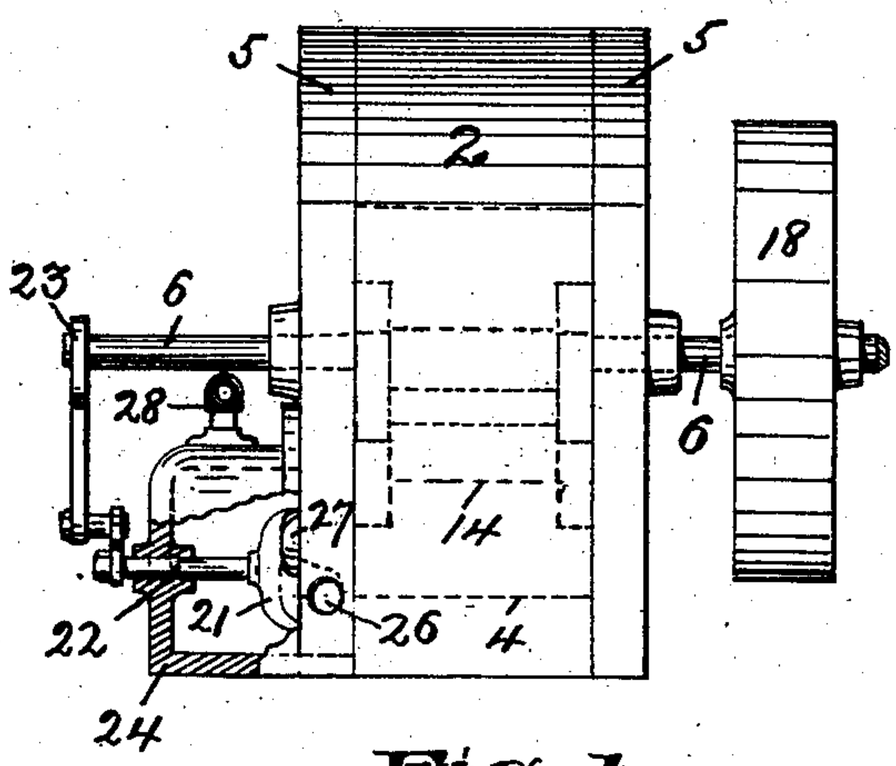


Fig. 1.

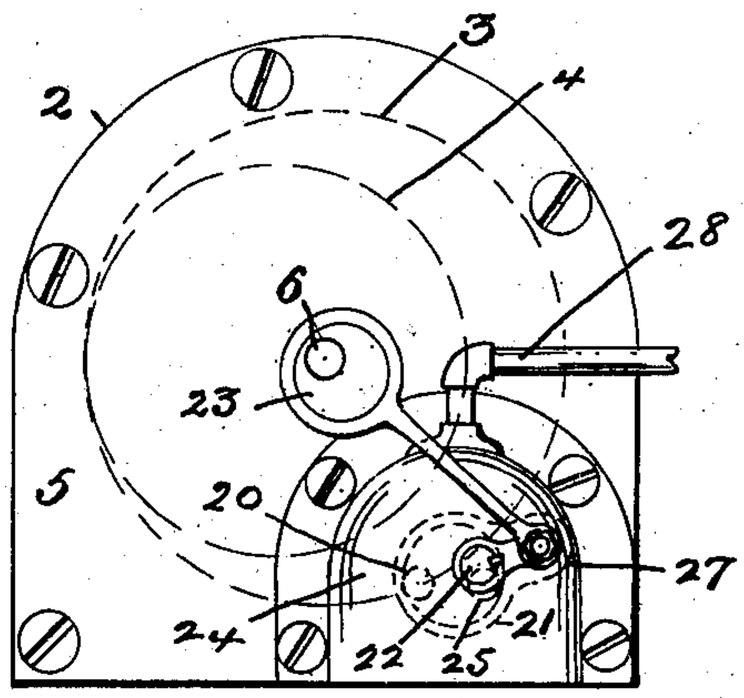


Fig. 2.

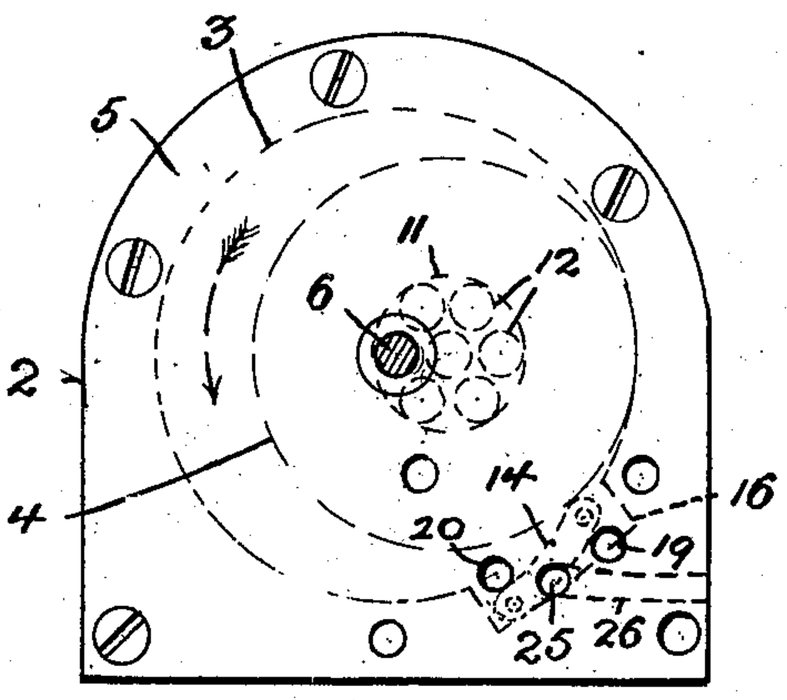
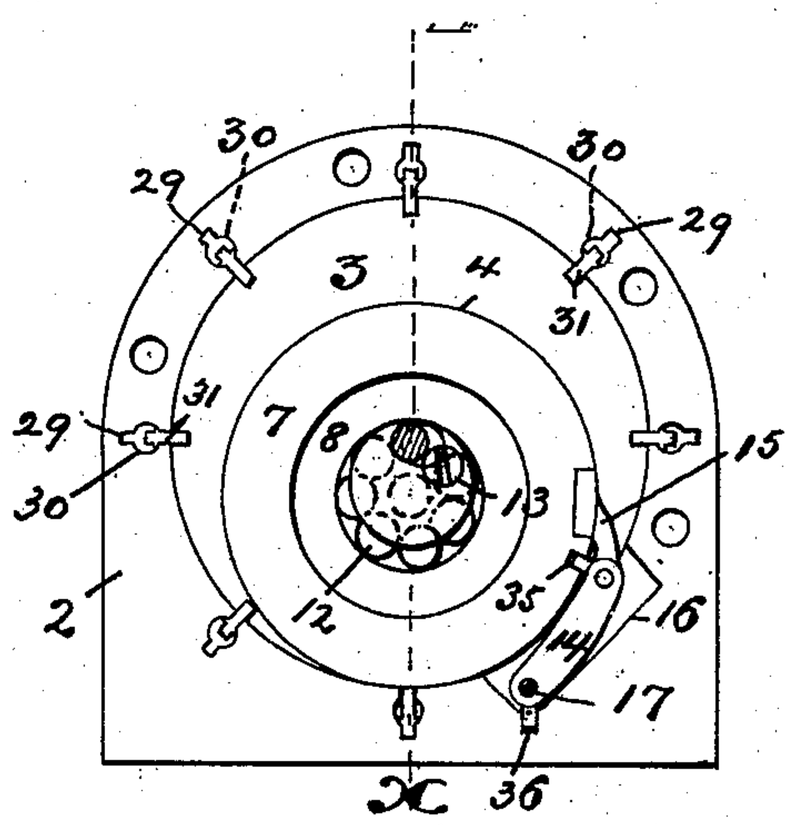


Fig. 3.



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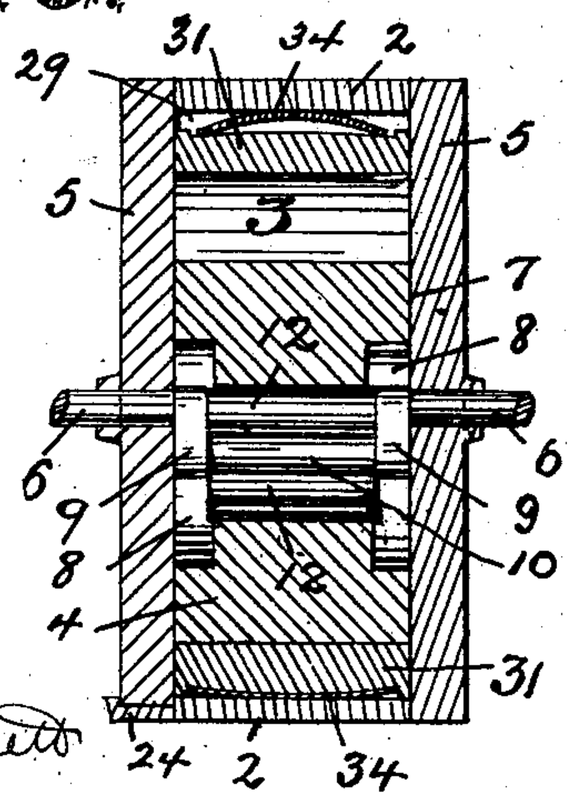

Fig. 5.

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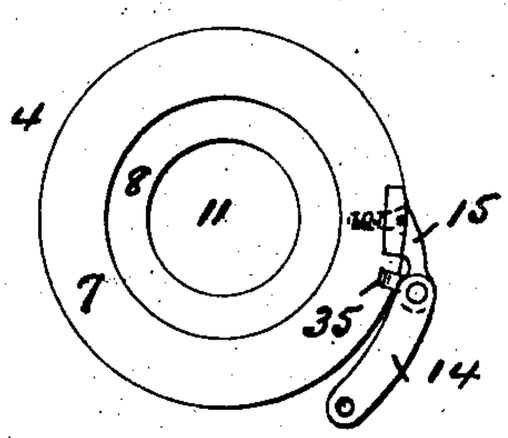
NO MODEL. 2 SHEETS—SHEET 2.



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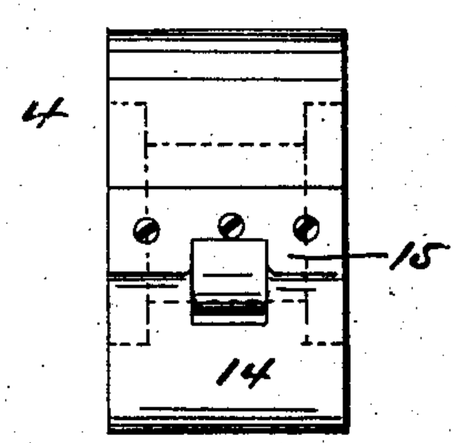

Fig. 9.

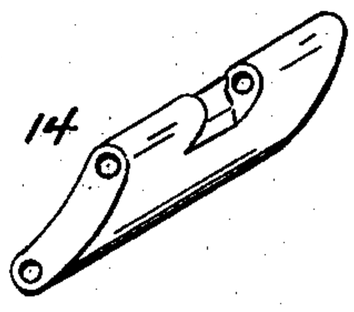

Fig. 10.

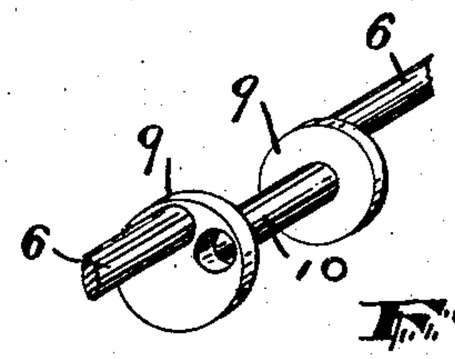

Fig. 11.

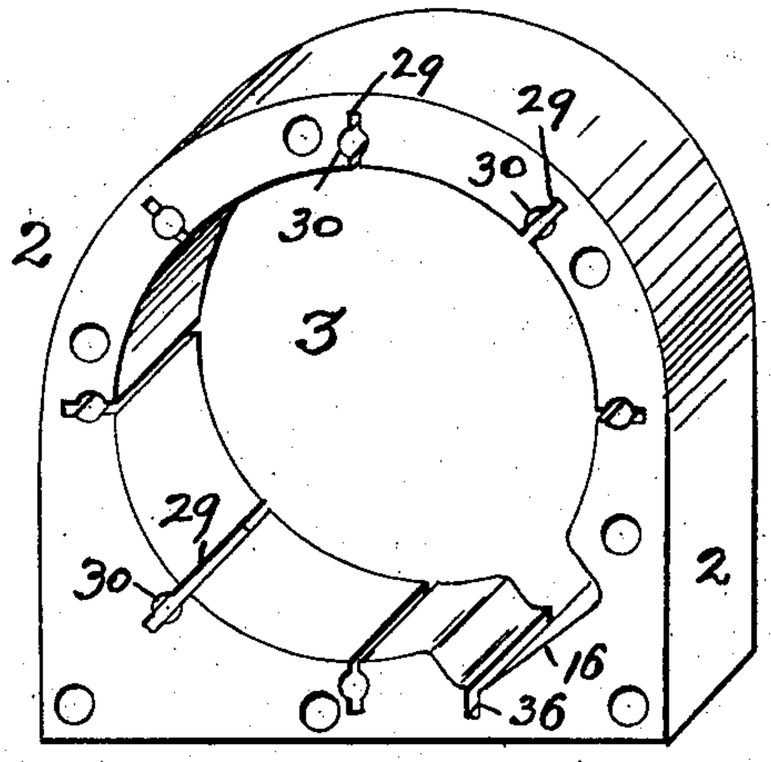

Fig. 6.

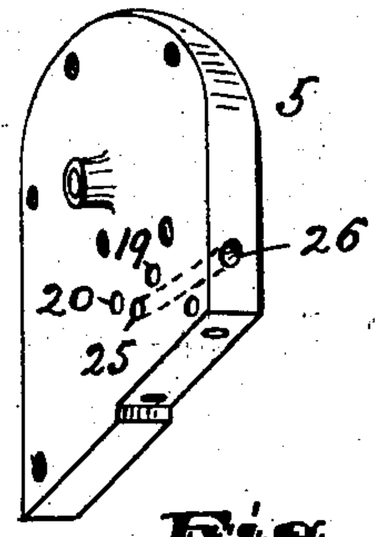

Fig. 7.

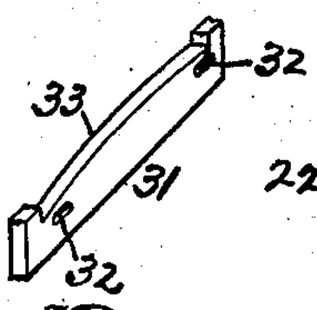

Fig. 12

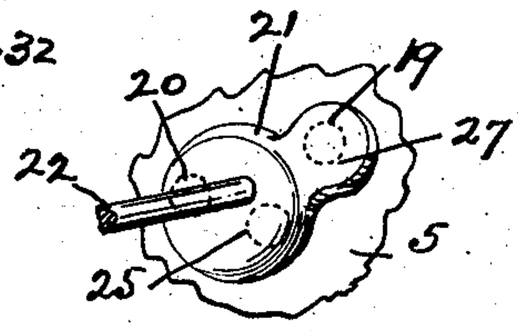

Fig. 13.

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UNITED STATES PATENT OFFICE.

FREDRICH FUCHS, OF ELIZABETH, NEW JERSEY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 742,181, dated October 27, 1903.

Application filed August 22, 1902. Serial No. 120,634. (No model.)

To all whom it may concern:

Be it known that I, FREDRICH FUCHS, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

The objects of this invention are to provide a rotary engine of simple and effective construction, to reduce the number of valves, to enable the engine to be reversed by reversing the direction of the steam, and to obtain other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

The invention consists in the improved rotary engine and in the arrangements and combinations of the parts of the same, all substantially as will be hereinafter described, and finally set forth in the clauses of the claim.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of my improved motor with the steam-chest wall partly broken away to show the valve, and Fig. 2 is an end elevation. Fig. 3 is an end elevation with the steam chest and valve removed to show the ports more clearly. Fig. 4 is an end view with the wall of the cylinder removed. Fig. 5 is a central longitudinal section on line *x*, Fig. 4. Fig. 6 is a detached view of the body portion of an engine in perspective, and Fig. 7 is a similar view of the end plate for said body. Figs. 8 and 9 are end and side views, respectively, of the inner movable member of my engine with its hinge connection attached. Fig. 10 is a detached view of said hinge connection in perspective. Fig. 11 illustrates the crank-like attachment of the rotary shaft to the inner member. Fig. 12 represents one of the packing-strips, and Fig. 13 shows how the controlling-valve is related to the inlet and exhaust ports.

In said drawings, 2 indicates the body portion of my improved engine, which is of substantially annular form to provide a central chamber 3, in which the inner member 4, adapted to be acted upon by the steam, air, water, or other motive fluid, may be disposed. Said chamber is closed at its opposite sides by end plates 5, bolted to the body 2 in any suitable manner, and through said plates extends a shaft 6 concentrically of the chamber 3 and adapted to be given rotary movement by the engine. The said inner member 4 at the peripheral portions 7 of its sides fits nicely against the end plates 5, but at the central portions of its sides is recessed, as at 8, to receive crank-disks 9 9 on the shaft 6. Between said crank-disks extends a portion 10 of the shaft, which is disposed centrally of the crank-disks, and thus is eccentric to the shaft ends 6, all said parts being in fixed relation. This eccentric middle portion 10 of the shaft lies in a perforation 11 at the center of the inner member 4, and the eccentricity is such that as the shaft rotates the inner member is always at one point of its periphery in contact with or tangent to the inner walls of the body portion. Preferably the shaft portion 10 where it passes through the inner member 4 is surrounded with anti-friction-rollers 12, which abut at their ends against the crank-disks 9 and are adapted to be inserted through an aperture 13 in one of said disks, said aperture being later closed by a screw-plug.

At one side of itself the cylindrical inner member 4 is connected by a hinge-valve 14 to the side wall of the chamber. This hinge-valve comprises a metal plate adapted to reach across the width of the chamber and fit smoothly against the inclosing walls 5. In the other direction it is curved to conform to the curvature of the member 4. At one edge said hinge-valve is pivoted to a tongue 15 on the member 4, and at the other edge it is pivoted in one end of a recess 16 in the wall of the body portion and in which recess the entire valve is adapted to lie to permit the moving inner member to pass upon a pin or bolt 17, which preferably enters through one of the end plates 5 and extends into the other. Outside one of said end plates a fly-wheel 18 may be secured upon the projecting shaft,

and at the opposite end, preferably, are ports or openings 19 20 for the entrance and exit of the driving fluid. Said ports open on opposite sides of the hinge-valve 14, and according as one or the other is used for an inlet so the inner member is driven in one direction or the other. Thus my improved engine can be reversed simply by reversing the direction of the motive fluid.

I have shown in the drawings, referring more especially to Fig. 3, the port 20, outside of the hinge-valve 14, employed as an inlet. Through this, as soon as the point of tangency of the inner member with the outer wall of the chamber has passed the said hinge-valve, traveling in the direction of the arrow in Fig. 3, the steam or other fluid enters behind said inner member. The crank-shaped shaft having just passed its dead-center, the fluid-pressure upon the inner member carries said member around, turning the shaft, and the exhaust taking place in front of the traveling inner member through port 20.

Preferably the inlet of the motive fluid is governed by a valve 21, which is pivoted at the outside of the end wall in which the ports are located on a shaft or rod 22, connected at its outer end to an eccentric 23 on the main shaft and by which said valve is oscillated to admit and cut off motive fluid at the proper instant. Said valve is surrounded by a box or casing 24, bolted to the body 2 of the engine and forming an entrance-chamber for the motive fluid, as well as providing bearings for the valve-rod 22. Said valve lies flatwise against the end wall 5, in which the ports are located, and its body portion is recessed at the inner side to cover both the exhaust-port 20 and an outlet 25, opening through the edge of the end plate 5 to the outer air, as at 26. Constant communication between said ports is thus established by the body of the valve. An extension 27 from said body of the valve is adapted to slide upon the surface of the end wall 5 and cover and uncover the inlet-port 19 as the valve oscillates. Steam is thus admitted and cut off as desired, said steam or other motive fluid being supplied to the valve box or casing 24 by any suitable means, as pipe 28.

By shifting the valve-eccentric 23 on the shaft the valve can be readily adjusted in position, so that, instead of as shown, its extension 27 will cover the port 19 and its body portion will overlie the outlet 25 and port 20. By this means the direction of the motive fluid through the engine is reversed and the direction of rotation is accordingly changed.

In order to secure an impervious contact of the inner member 4 with the walls of the chamber 3 as it slides around and at the same time avoid undue friction, I prefer to employ elastic packing-strips. Preferably these strips are arranged on the walls of the chamber, although they might under some conditions be placed on the periphery of the inner member 4. To receive said packing-strips, slots 29 are cut in the walls of the chamber 3 at equidistant points and in planes passed radially through the axial shaft 6, and back or in from their mouths said slots are each widened, as at 30, preferably by boring in from the end of the body 2 of the engine, as illustrated. The strips 31 are then fitted one in each slot, with sufficient looseness to slide in and out freely. Each strip has at its sides lugs 32, which are afforded sufficient play by the enlarged portion 30 of the seat, but which prevent total outward escape of the strips. At its inner edge each strip is recessed or cut away for its middle portion, as at 33, to receive a bowed leaf-spring 34, which normally pushes the strip out into operative engagement with the sliding member as it comes around, all as will be understood. Similar packing-strips are inserted at the pivoted ends of the hinge-valve 14, one, 35, in the inner sliding member 4 and the other, 36, in the body 2 of the engine.

It will be noted that the inner member 4 of my improved engine does not rotate, as generally understood, but merely slides or rolls around the internal walls of the chamber 3. By this means I avoid a great deal of friction and the labor and expense of lubrication are reduced to a minimum.

Having thus described the invention, what I claim as new is—

1. In a rotary engine, the combination with a body portion providing a cylindrical chamber having a recess in its peripheral walls and a rotatable shaft extending into said chamber and having a crank portion therein, of a cylindrical inner member rotatably mounted on said crank portion and being tangent at its periphery to the inner wall of the cylindrical chamber, a link pivoted at one end to the inner member and at the other extremity in one end of the said recess in the chamber-walls and being adapted to lie wholly in said recess, and means for admitting and exhausting motive fluid on opposite sides of said link, respectively.

2. In a rotary engine, the combination with a body portion providing a cylindrical chamber having a recess in its peripheral walls, and a rotatable shaft extending axially into said chamber and having a crank portion therein, of a cylindrical inner member rotatably mounted on said crank portion and being tangent at its periphery to the inner wall of the cylindrical chamber, a link pivoted at one end to the inner member and at the other extremity in one end of the said recess in the chamber-walls and being adapted to lie wholly in said recess, and ducts opening through the end wall of the body-portion chamber into said recess on opposite sides of the said link for admitting and exhausting motive fluid.

3. In a rotary engine, a body portion providing a cylindrical chamber having for a portion of its periphery a recess extended radially outward, a crank-shaft in said chamber

and a cylindrical piston mounted thereon tangent at its periphery to the chamber-wall, a stud or bracket on the periphery of said piston, a link fitting loosely in said recess of the chamber-walls and being pivoted at one end to the body portion and at the other end to the said stud or bracket on the piston, and means for admitting and exhausting motive fluid on opposite sides of said link, respectively.

4. The combination of a body portion providing a cylindrical chamber, a crank-shaft in said chamber, a cylindrical inner member mounted on said crank-shaft tangent at its periphery to the inner wall of the chamber, means flexibly connecting a peripheral point of said inner member to the wall of the chamber whereby rotation of the inner member is prevented and a rolling contact secured, and packing-strips projecting from one of the said tangent parts and engaging the other with an elastic pressure.

5. The combination with a body member providing a cylindrical interior chamber and having in the walls of said chamber slots disposed in planes passed through the axial line of the chamber, said slots being enlarged or widened back or in from their mouths, of a smaller cylindrical inner member within said chamber tangent to the wall thereof, packing-strips arranged in said slots and having lateral extensions lying in the said enlargements thereof, springs between the bottoms of said slots and the strips, a hinge-valve connecting said inner member at one part of its periphery to the walls of the chamber, and means for admitting and exhausting motive fluid.

6. In a rotary engine, the combination with a body providing a cylindrical chamber and having in the walls of said chamber slots disposed in planes passing through the axial line of the chamber, said slots being widened or enlarged back or in from their mouths, of a smaller cylindrical inner member adapted to roll around the inner wall of said chamber, packing-strips inserted in said slots, each having lateral lugs or extensions lying in said enlargements of the slots, and being recessed for the middle portion of its inner edge, and a bowed leaf-spring placed beneath each packing-strip in its said recess.

In testimony that I claim the foregoing I have hereunto set my hand this 21st day of August, 1902.

FREDRICH FUCHS.

Witnesses:
CHARLES H. PELL,
RUSSELL M. EVERETT.