

No. 728,157.

PATENTED MAY 12, 1903.

A. BOX.
ROTARY ENGINE.
APPLICATION FILED MAY 7, 1900.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

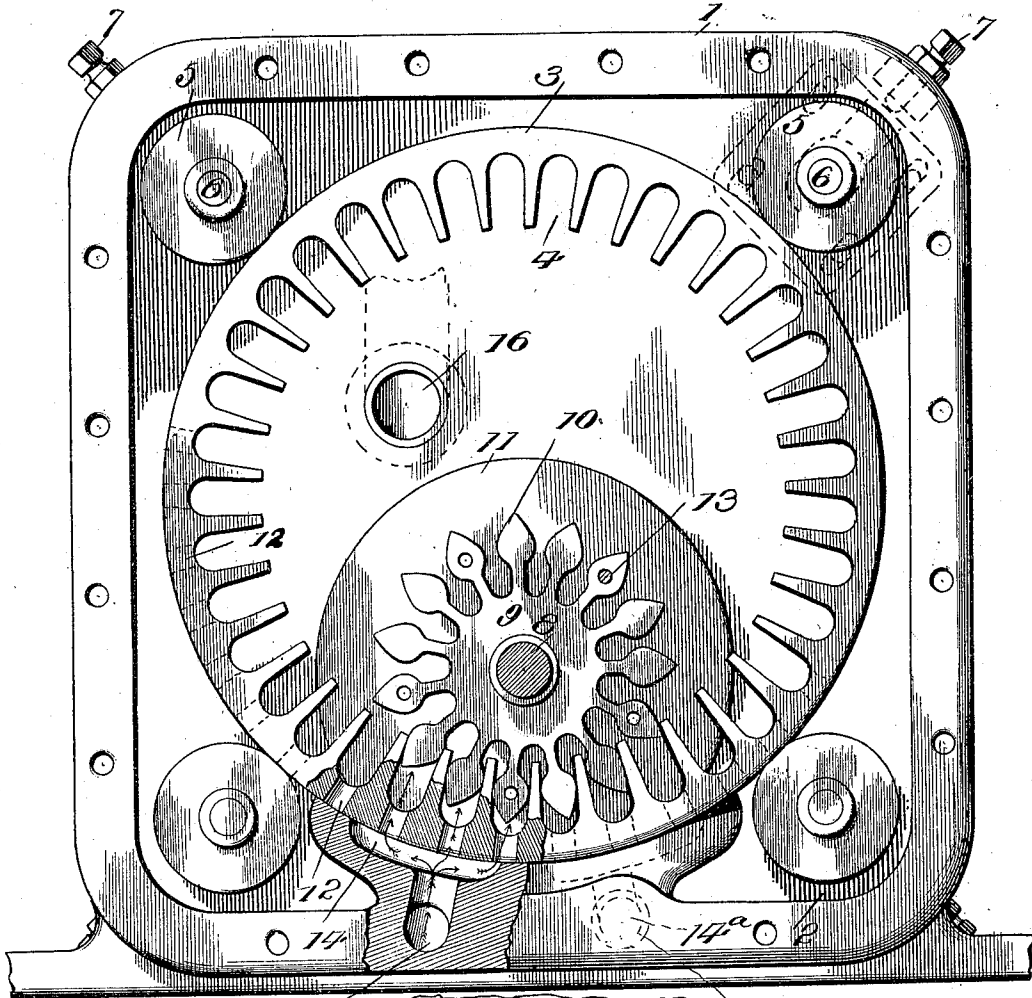
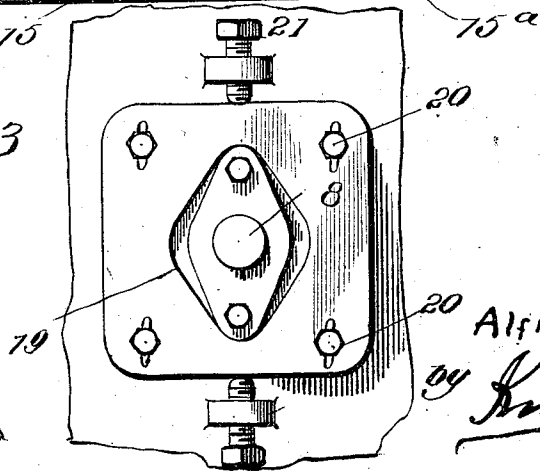


Fig. 3.



Witnesses

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2 SHEETS—SHEET 2.

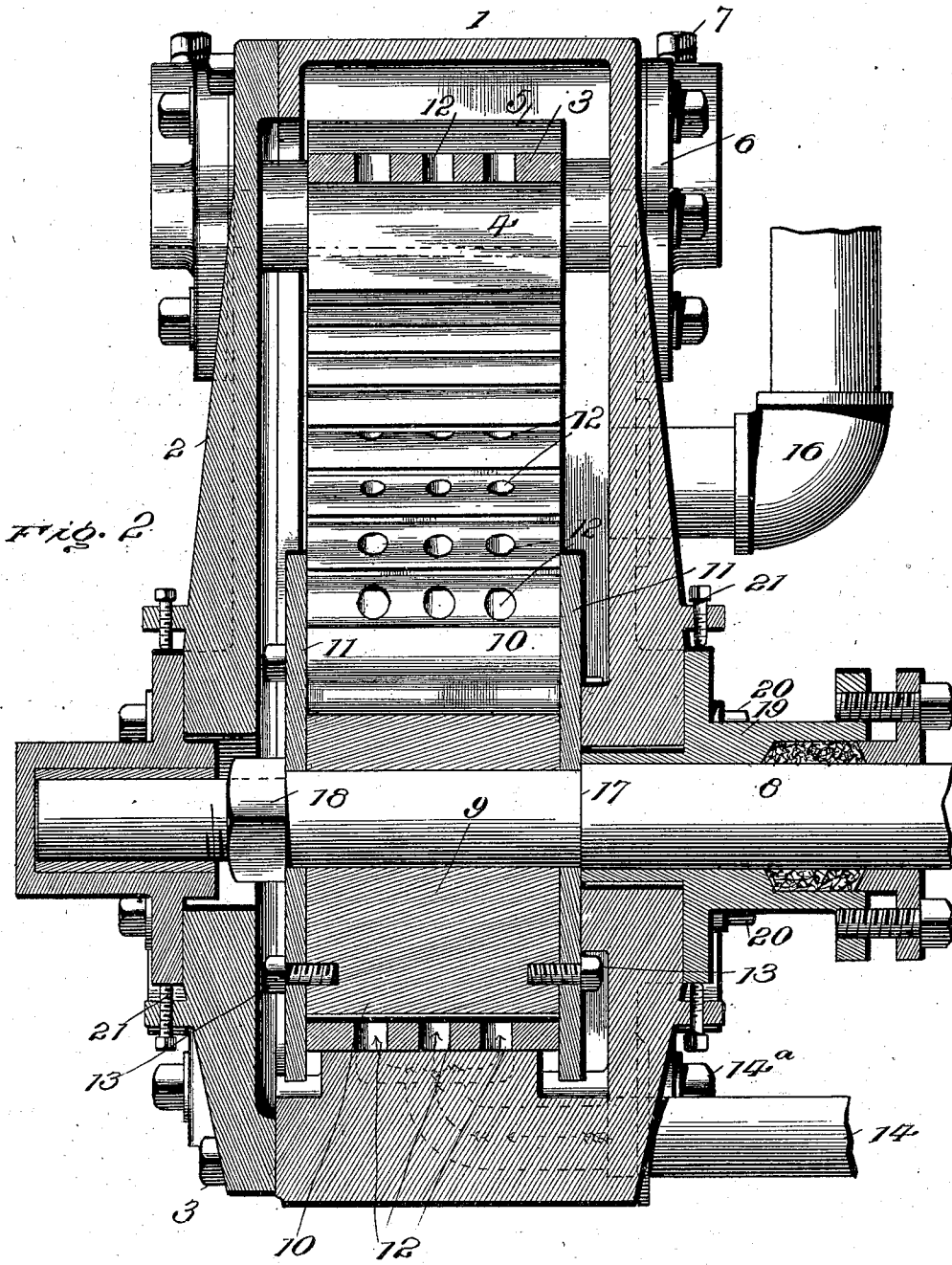


Fig. 2

Witnesses
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UNITED STATES PATENT OFFICE.

ALFRED BOX, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO FREDERICK LANE, OF MALDEN, MASSACHUSETTS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 728,157, dated May 12, 1903.

Application filed May 7, 1900. Serial No. 15,767. (No model.)

To all whom it may concern:

Be it known that I, ALFRED BOX, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to that type of rotary motors in which two parts relatively rotatable are mounted eccentrically and arranged to intermesh and in which relative rotary motion is induced by introducing a suitable pressure medium between them.

The object of my invention is to provide an effective rotary motor of this type of cheap construction which may be run in either direction at will by merely changing the course of the pressure medium.

My invention consists, primarily, of intermeshing internal and external gears, of which the external and internal gears are rotary members, the internal gear being used to transmit the power and is mounted eccentrically within the internal gear, the teeth or projections being made to intermesh and the spaces between the projections on one of the members being utilized as pressure-chambers, while the projections on the other member which fit in said spaces are utilized as pistons. The spaces of the pressure-chambers thus formed are closed at the ends by suitable means—such, for instance, as plates, disks, or the like—which overlap the area of intermeshing between the parts. The internally-gear member receives a rotary motion for the purpose of bringing its parts successively into mesh with the externally-gear member eccentrically mounted within it, and said internally-gear member is preferably utilized for the pressure-chambers and its rotation caused to provide the valve action which opens the pressure-chambers to communication with the pressure medium and exhaust. The direction of rotation of the parts is determined by which side of the radius of intermeshing the pressure is directed to.

My invention will be fully understood upon reference to the accompanying drawings, in which—

Figure 1 is a vertical transverse section of a motor embodying the principles of my invention. Fig. 2 is a vertical axial section of the same, and Fig. 3 is a detail view showing the means for adjusting the main shaft to regulate the pitch-line of the piston member.

1 represents a suitable casing, one end 2 of which is preferably detached.

3 is an internally-gear member, which is rotatably mounted within the casing and which provides an annulus of pressure-chambers 4. The annulus 3 is supported through the medium of peripheral rolls 5, mounted upon axes 6, of which preferably two are adjustable through the medium of set-screws 7.

8 represents the main shaft, which is eccentric to the annulus 3 and which carries an external gear 9, which provides a series of pistons 10, formed to fit accurately in the pressure-chambers 4 and to remain in contact with both walls of the latter as they move into and out of mesh therewith. The members 3 and 9 are commensurate in an axial direction, and in order to close the ends of the pressure-chambers 4 the member 9 is provided with disks 11, which cover the area of intermeshing between the parts and keep the chambers 4 closed at the ends so long as the working relation between the pistons 10 and said chambers is retained.

13 represents bolts by which the disks 11 are secured in member 9.

Each chamber 4 is provided with a radial port 12, through which pressure is admitted externally from a chest 14 or 14^a, located on opposite sides of the radius of intermeshing or the point of tangent between the members 3 and 9, the pressure medium being supplied through passages 15 from any suitable source. The annulus 3 rotates in contact with the chests 14 and 14^a, so that the ports 13 are brought successively into communication therewith. This communication, however, is restricted to the ports of those chambers with which the pistons 10 stand in working relation. If, then, pressure is communicated through either of the pressure-chests 14 14^a, the pistons 10 will be expelled from the chambers 4, and the member 9 will be caused to rotate. At the same time the annulus 3 will be caused to travel by said rotation of the

member 9, and new pistons will constantly be brought into working relation with the chambers. The direction of rotation will obviously depend upon the side of the radius of intermeshing or the point of tangent between the pitch-lines of the intermeshing members on which the pressure is introduced—that is to say, if pressure is introduced through the pressure-chest 14 the member 9 will rotate from left to right, referring to its upper portion, whereas if pressure is introduced through the chest 14^a the rotation will be in the opposite direction. It thus becomes necessary simply to provide any common and well-known means for directing pressure through the channels 15 15^a at will, when the motor may be controlled in the direction of its rotation. The exhaust takes place in the center of the annulus, or said annulus is open at the ends except where overlapped by the disks 11. The exhaust is practically into the housing 1 around all the ports. It may escape from the housing 1 through the port 16, which, however, may be located at any point desired. If the motor is operated by a fluid pressure, as distinguished from a steam or gaseous pressure, it will be desirable to have a three-way valve for controlling the communication of power to the passages 15 15^a, so that when pressure is communicated at the one the other will be in communication with a waste-outlet in order that fluid accumulating in the chambers may escape as the latter come into effective position and not oppose the entry of the pistons. This, however, would not be necessary if the motor were inverted, as the fluid would then gravitate from the chambers.

The member 9 may be advantageously mounted upon the shaft 8 by providing the latter with a shoulder 17, against which the member 9 fits, and with a nut 18 on the opposite side of said member 9. In order that the proper pitch-line of the member 9 may be maintained, its shaft 8 is mounted in movable bearings 19, secured by screws 20 and adjustable through the medium of set-screws 21, as will be better understood upon reference to Figs. 2 and 3.

From the foregoing description it will be observed that I have provided a motor which can be run by any pressure, such as steam, water, or gas. The parts are substantially balanced, so that very high speeds are obtainable, the annulus being guided endwise only by the disks on the piston member, so that said ring is free to follow end play of the shaft. Moreover, the parts may be readily kept tight and wear compensated for.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A rotary motor comprising end plates, an external gear, an annulus having internal gear and radial peripheral ports between the internal gear and means for supplying pressure through the peripheral ports to the pressure-

chambers between the end plates and internal gear.

2. A rotary motor comprising eccentrically-arranged end disks, an external gear eccentrically mounted between the end disks, an annulus having internal gear and radial peripheral ports between the internal gear and means for supplying pressure through the peripheral ports to the pressure-chambers between the end plates and internal gear.

3. The combination of an annulus of inwardly-presented radial pressure-chambers having peripheral ports, a part conforming to the periphery of said annulus and provided with a chamber communicating with said ports as they successively pass said chamber, and means for supplying pressure to said chamber; substantially as set forth.

4. In combination with the annulus of inwardly-presented radial pressure-chambers having peripheral ports, the intermeshing piston member, the valve-piece formed with pressure-chests in its face contiguous to said annulus, whereby the ports are brought successively into communication with said pressure-chests, said chests being located on opposite sides of the radius of intermeshing of the parts, as explained.

5. The combination of the annulus of pressure-chambers, the cooperating piston member eccentrically journaled within said annulus and intermeshing therewith, the valve-piece through which pressure is applied to the chambers of said annulus, the peripheral guiding and supporting rollers by which the annulus is mounted, and means for adjusting the annulus relatively to its valve-piece through the medium of said rollers; substantially as set forth.

6. The combination of an annulus having internal gear, a rotary motor mounted on a solid bearing having external gear within said annulus, the external gear of the motor being adapted to engage the internal gear of the annulus, and means to supply pressure to the chambers between the gear of the annulus.

7. The combination of a casing, an annulus having internal gear journaled therein, a rotary motor mounted on a solid bearing eccentric to the annulus and having a fixed center, a plurality of external gear-teeth thereon arranged to successively engage the internal gear of the annulus and means to supply pressure between the engaging gear-teeth.

8. The combination of a casing, an annulus therein having internal gear, a rotary motor mounted on a solid bearing having gear-teeth eccentric to and within the annulus and whose teeth successively engage the gear of the annulus and means to admit pressure between the engaging gear at one side of the tangent-point of the pitch-lines of the two gears.

9. The combination of a casing, an annulus therein having internal gear, a rotary motor having gear-teeth eccentric to and within the annulus and rotatable to cause its gear to engage the gear of the annulus and means to

admit pressure successively to the space between said internal gear, at either side of the tangent-point of the pitch-lines of said motor and annulus, whereby the motor may be reversed.

to the periphery of said annulus and provided with a chamber communicating with said ports as they successively pass said chamber and means to supply pressure to the chamber.

ALFRED BOX.

Witnesses:

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5 10. The combination of a casing, an annulus therein having internal gear and peripheral ports leading thereto, a part conforming