

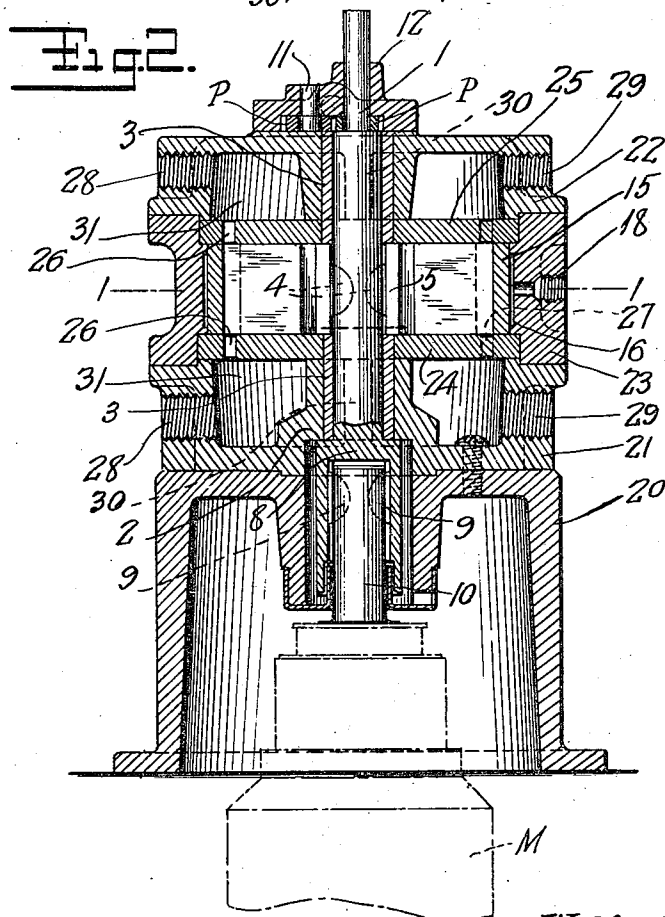
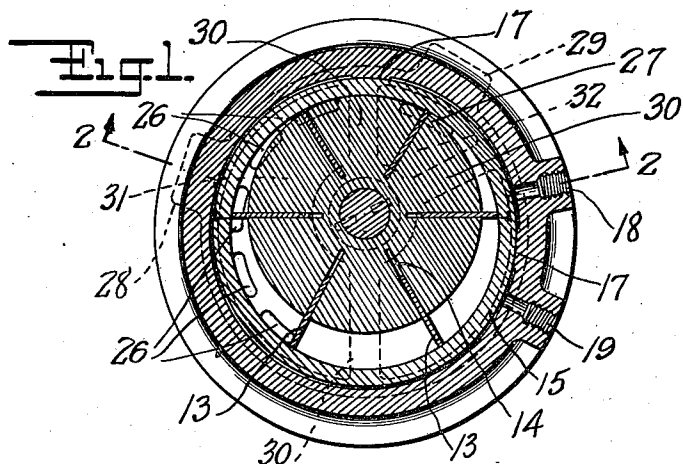
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W. J. HAWKINS

ROTARY COMPRESSOR, EXPANDER, MOTOR, AND PUMP

Filed Sept. 16, 1921



Inventor

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ROTARY COMPRESSOR, EXPANDER, MOTOR, AND PUMP.

Application filed September 16, 1921. Serial No. 501,073.

To all whom it may concern:

Be it known that I, WILFORD J. HAWKINS, a citizen of the United States, and a resident of Montclair, Essex County, and State of New Jersey, have invented certain new and useful Improvements in Rotary Compressors, Expanders, Motors, and Pumps, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in rotary compressors, expanders, motors and pumps in which a rotor arranged eccentrically of a casing has a blade or vane or a plurality of blades or vanes radially movable and arranged to exert their thrust against a racer ring which itself rotates.

An object of this invention is to provide a compact, efficient device of this class in which the friction due to vane thrust is reduced to a minimum.

A further object of the invention is to provide a device of this class in which very high speeds of the rotor may be obtained.

Another object of the invention is to provide a simply constructed device of this class, of low manufacturing cost, capable of a wide range of usefulness, of a long operating life and in which accessibility and ease of repair are a feature.

My invention resides in the combination and arrangement of parts and in the details of construction described in the specification and particularly pointed out in the appended claims. It is to be understood that I do not limit myself to the precise embodiment of the invention shown herewith as various changes may be made within the scope of what is claimed without departing from the spirit of the invention. I intend no limitations other than those imposed by the claims.

Referring to the drawings:

Figure 1 is a sectional plan-view through the rotor on the line 1—1 of Fig. 2 of a rotary vane pump embodying the principles of my invention.

Figure 2 is a sectional elevation on the line 2—2 of Fig. 1.

Similar reference characters refer to similar parts throughout the views.

Turning to Fig. 2, M designates a power source, such as an electric motor, having a shaft 10 keyed as at 9, 9 to a hollow portion 8 of a rotor shaft 7, which in turn, is keyed to a rotor 5 as at 4, 4. The rotor shaft 7

revolves in bearings 3, 3 the upward thrust of the shaft being taken by a shoulder 2. On a reduced portion 1 of the shaft 7 is a gear *p* of an oil pump of a well known type, another intermeshing gear *p* being rotatably mounted on a stud 11 in an end casing bearing plate 12.

A plurality of blades or vanes 13, 13 in this embodiment six in number, extend between the top and bottom of the chamber and are slidably mounted in radial slots 14 in the rotor 5 and exert their thrust against a racer ring 15 extending the height of said chamber but which does not contact with the interior periphery of the rotor chamber except at the top and bottom edges and is spaced therefrom by an oil balance groove 16, being positioned by spacer ridges 17, 17 located as to take the thrust of the ring due to the pressure of the fluid in the rotor chamber.

Oil is forced into the balance groove at an inlet opening 18 and comes out at an outlet opening 19.

The frame or casing comprises a base 20, a lower casing member 21, an upper casing member 22, and a distance ring member 23, the latter forming a rotor chamber.

Between the members 21 and 23 is a floor plate 24. Between the members 22 and 23 is a ceiling plate 25. In each of these two plates are intake ports 26, 26 for the rotor and outlet ports 27, 27.

In each of the casing members 21, 22 are inlet connections 28, 28, and outlet connections 29, 29.

Each of the casing members is divided by radial partitions 30, 30, to give intake chambers 31, 31 and outlet chambers 32, 32.

In operation, the shaft 7 is driven by the motor shaft 10. The rotor 5 revolves at high speed, centrifugal action forcing the vanes 13, 13 against the racer ring 15 which itself is dragged by reason of the vane thrust, and rotates against the film of oil in the oil balance groove 16. The peripheral speed of the blade ends relative to the racer ring against which they exert their thrust is thus measurably decreased and the friction developed by that thrust and rotation at high speeds, is likewise materially decreased. The friction of the racer ring is at a minimum as it is sensibly floating on an oil film bearing surface, the oil of which may be under any desired pressure.

The action of the rotor vanes may be

readily understood by reference to the drawing. A fluid supply enters at both intake connections 28, 28 and passes to the rotor chambers through ports 26, 26. Because of the eccentric location of the rotor the space between adjacent vanes increases until the vanes are in the position of the lowermost vanes of Fig. 1. On further rotation of the rotor the vanes are forced in by the racer ring inner surface and the fluid space between adjacent vanes is gradually decreased until the outlet ports 27, 27 are uncovered and the fluid discharged at the corresponding pressure.

It is apparent to those skilled in the art that by forcing fluid under pressure into the rotor chamber through the ports 27 and discharging it at the ports 26, the device illustrated may be operable as a fluid motor. It is further apparent that by the location of intake ports as at 27, 27 and outlet ports adjacent the point where the fluid chamber has the greatest cross section, the device illustrated may be operable as a fluid expander.

What I claim is:

1. In a device of the character described, a rotor casing, an upper casing member, a lower casing member, a plate between said upper casing member and said rotor casing, a plate between said lower casing member and said rotor casing, intake ports and out-

let ports in each of said plates, intake connections and outlet connections on each of said casing members, and a base member.

2. In a device of the character described, a rotor casing, a rotor chamber therein, upper and lower casing members, a ceiling plate and a floor plate for said rotor casing chamber, a base, a rotor shaft and bearings for said shaft in said casing members and said plates.

3. In a device of the character described, a rotor casing, a racer ring therein and spaced from said casing, means on the inner periphery of said casing to support the thrust of said ring, a substantially annular oil balance groove between said ring and said casing, and means to supply oil to said groove, said groove being uninterrupted throughout the major portion of the circumference thereof.

4. In a device of the character described, a rotor casing, a racer ring therein, a rotor assembly eccentrically mounted within said ring comprising a plurality of vanes contacting with said ring whereby portions of fluid of varying pressures are adjacent different portions of said ring, and supporting ridges for said ring located only adjacent the points of greatest fluid pressures.

In witness whereof, I hereunto set my hand this 14th day of September, 1921.

WILFORD J. HAWKINS.