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R. C. McCRACKEN

1,861,706

ROTARY MOTOR

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Fig. 1.

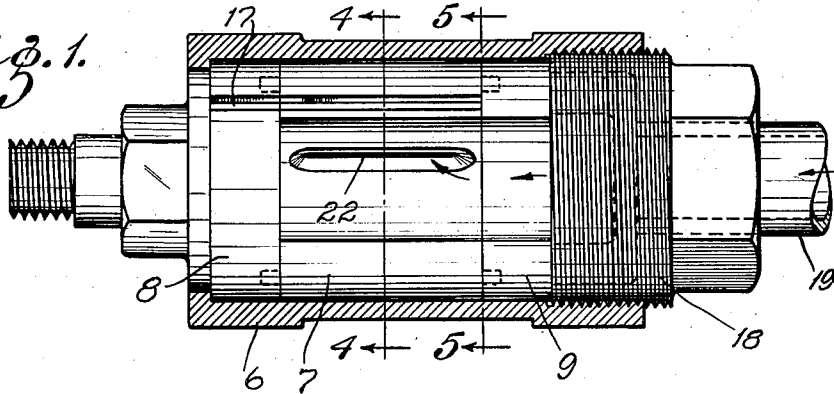


Fig. 2.

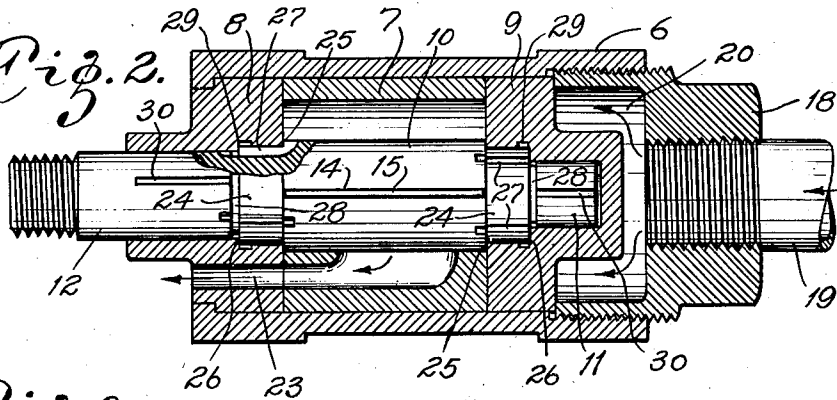


Fig. 3.

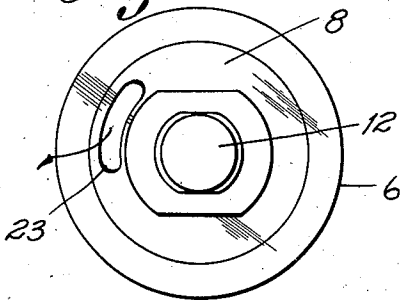


Fig. 4.

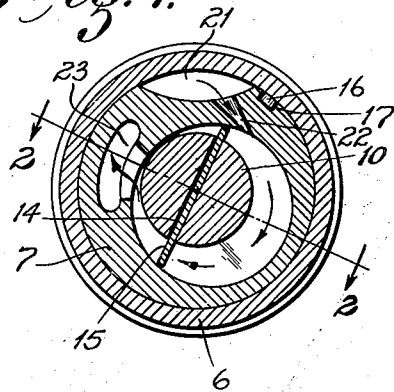
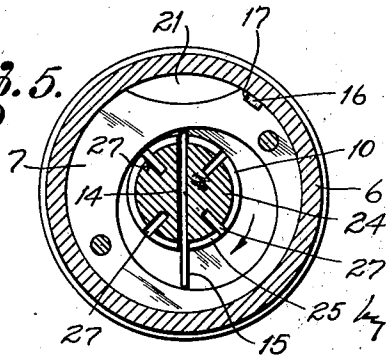


Fig. 5.



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UNITED STATES PATENT OFFICE

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ROTARY MOTOR

Application filed October 3, 1927. Serial No. 224,833.

This invention relates to rotary fluid pressure motors, particularly to those intended for use in operating rotary tube cleaning tools and adapted to be passed through the tube to clean the same. The principal objects of the present invention are to produce a strong, compact, light-weight motor of simple and inexpensive construction which can be easily operated at a high rate of speed with a minimum amount of air; and to provide for the proper lubrication of the bearings of the motor. The invention consists in the construction, combinations and arrangements of parts hereinafter described and claimed.

In the accompanying drawing, which forms part of the specification and wherein like symbols refer to like parts wherever they occur,

Fig. 1 is a side view of a rotary motor embodying my invention, the casing being shown in longitudinal section;

Fig. 2 is a longitudinal section through the motor, the section being taken through the exhaust port on the line 2—2 in Fig. 4;

Fig. 3 is an elevation of the front end of the motor;

Fig. 4 is a transverse cross-section through the motor on line 4—4 in Fig. 1; and

Fig. 5 is a transverse cross-section through the motor on the line 5—5 in Fig. 1.

Referring to the accompanying drawing, my invention is shown in connection with a rotary fluid pressure motor of the kind used for driving rotary tube cleaners. Said motor comprises a cylindrical outside casing 6, within which is removably secured a cylinder 7 having front and rear heads 8 and 9, respectively, which are provided with bearings for rotatably supporting a rotor 10 eccentrically in said cylinder. The rear journal 11 of the rotor 10 is supported in a socket bearing in the rear cylinder head; and the front journal 12 of said rotor extends thru the front cylinder head and is threaded to receive the tube cleaner or other tool that is to be driven. The rotor or piston 10 of the motor is provided with a diametrical slot 14 which extends longitudinally of the rotor from head to head of the cylinder and is adapted to support a vane or blade piston 15 which is slid radially with

relation to the axis of the rotating rotor to maintain the ends of said vane in engagement with the wall of the eccentric chamber of the cylinder. The cylinder is secured against rotation in the casing by means of a pin or dowel 16, which projects from the inner wall of said casing and seats within a longitudinal slot 17 provided therefor in the peripheral surface of the cylinder. The cylinder is removably secured against endwise movement within the casing by means of a screw cap 18 which is threaded into the rear end of the casing and abuts against the rear cylinder head. This screw cap is provided with an axial hole, which is threaded to receive an air supply hose or pipe 19; and the inner end of said cap is provided with central circular recesses to form an air admission chamber 20 which is supplied with air from the air supply pipe. The peripheral surface of the cylinder is provided with a longitudinal groove, forming a longitudinal inlet chamber 21 which communicates at one end with the air admission chamber 20 and at the other end with the eccentric chamber through an inlet port 22 in the cylinder wall. This inlet port extends longitudinally of the cylinder and communicates at its outer end with the air inlet chamber 21, and its inner end with the chamber of the cylinder. As shown in the drawing, said inlet port has a smaller area than the combined area of the chambers 20 and 21; it extends through the cylinder wall substantially tangentially with respect to the inner wall of the cylinder; and it is substantially V-shaped in transverse section; that is, it is widest where it communicates with the longitudinal air inlet chamber 21 and gradually decreases in width to the inner wall thereof. By this arrangement air enters the cylinder with increased velocity and engages the vane at the proper angle.

The cylinder is also provided with an exhaust port 23 which communicates at its inner end with the chamber of the cylinder and extends longitudinally thereof and opens to the atmosphere through the front cylinder head. The exhaust port has a greater area than the inlet port, thereby securing a rapid exhaust of air from the cylinder; and the two ports

are so located with relation to each other that the expanding air will operate on the vane as long as possible before it is permitted to escape through the exhaust port.

The portions 24 of the rotor located between the vane carrying portion thereof and the journals thereof are of smaller diameter than said vane carrying portion and of larger diameter than said journals, thereby forming annular shoulders 25 and 26 in each end of the rotor. The shoulders 25 abut against the two cylinder heads, and the shoulders 26 abut against annular shoulders at the inner ends of the bearings for the rotor journals, which shoulders are formed by enlarging the inner ends of said bearings to accommodate the portions 24 of the rotor. By this arrangement endwise movement of the rotor is prevented.

Lubricant is introduced into the cylinder with the motive fluid and is fed to the bearings for the rotor journals by means of circumferentially spaced longitudinally extending oil grooves 27 in the peripheral surfaces of the portions 25 of the rotor. Each of said grooves communicates at its inner end with the chamber of the cylinder; and its outer end portions intersect a circumferential groove 28 formed in the journal of the rotor adjacent to the shoulder 26. The bearings in the cylinder heads are also provided opposite the longitudinal oil grooves 27 with an annular oil groove 29 adapted to receive oil from the grooves 27. The journals of the rotor are also provided with circumferentially spaced oil grooves 30, which extend longitudinally of the journals and communicate at their inner ends with the circumferential grooves 28 therein. By this arrangement, oil and air are forced from the chamber of the cylinder through the bearings and escape through the outer ends thereof, the oil and air serving to lubricate and cushion the journal bearings and thereby keep them in proper condition.

What I claim is:

1. A rotary motor comprising a cylinder provided with inlet and exhaust ports and axially alined bearings, a rotor journaled in said bearings, and a vane carried by said rotor and engaging the interior wall of said cylinder, the peripheral surfaces of the journal portions of said rotor being provided with circumferentially spaced longitudinally extending grooves which extend inwardly beyond the inner ends of said bearings far enough to communicate directly with the chamber of said cylinder.

2. A rotary motor comprising a cylinder provided with inlet and exhaust ports and axially alined bearings, a rotor journaled in said bearings, and a vane carried by said rotor and engaging the interior wall of said cylinder, the peripheral surface of each of the journals of said rotor being provided with a circumferential groove and a series of circumferentially spaced longitudinally extend-

ing grooves communicating at one end with said circumferential groove and at the other end with the chamber of said cylinder.

3. A rotary motor comprising a cylinder provided with inlet and exhaust ports and axially alined bearings, a rotor journaled in said bearings, and a vane carried by said rotor and engaging the interior wall of said cylinder, the peripheral surface of each of the journals of said rotor being provided with a circumferential groove and a series of circumferentially spaced longitudinally extending grooves extending inwardly from said circumferential groove far enough beyond the inner end of said bearing to communicate directly with the chamber of said cylinder, said journal being provided with a second series of grooves leading outwardly from said circumferential groove toward the outer end of said journal.

4. A rotary motor comprising a cylinder provided with inlet and exhaust ports and axially alined bearings, a rotor journaled in said bearings, and a vane carried by said rotor and engaging the interior wall of said cylinder, each of the journals of said rotor being provided with a circumferential groove and a series of circumferentially spaced longitudinally extending grooves extending inwardly from said circumferential groove far enough beyond the inner end of the bearing to communicate directly with the chamber of said cylinder, said journal being provided with a second series of grooves leading outwardly from said circumferential groove toward the outer end of said journal, the bearing for each of said journals being provided with an annular groove that communicates with the circumferentially spaced longitudinally extending grooves that communicate at their inner ends with said chamber.

5. A rotary motor comprising a cylinder with axially alined cylindrical openings in the ends thereof that have enlarged inner end portions forming annular shoulders in said openings, a rotor mounted in said openings, and a vane carried by said rotor and engaging said cylinder, said rotor being provided at each end with longitudinally spaced shoulders disposed respectively in abutting relation to the adjacent end of said cylinder and the annular shoulder in the rotor receiving opening in said end, said opening and said rotor being each provided adjacent to the annular shoulder in said opening with an annular groove, said rotor being provided with longitudinal grooves that intersect said annular grooves and said annular shoulders and communicate directly with the chamber of said cylinder.

Signed at St. Louis, Missouri, this 1st day of October, 1927.

ROBERT C. McCracken.