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ROTARY MOTOR.

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1,019,771. **Patented Mar. 12, 1912.**

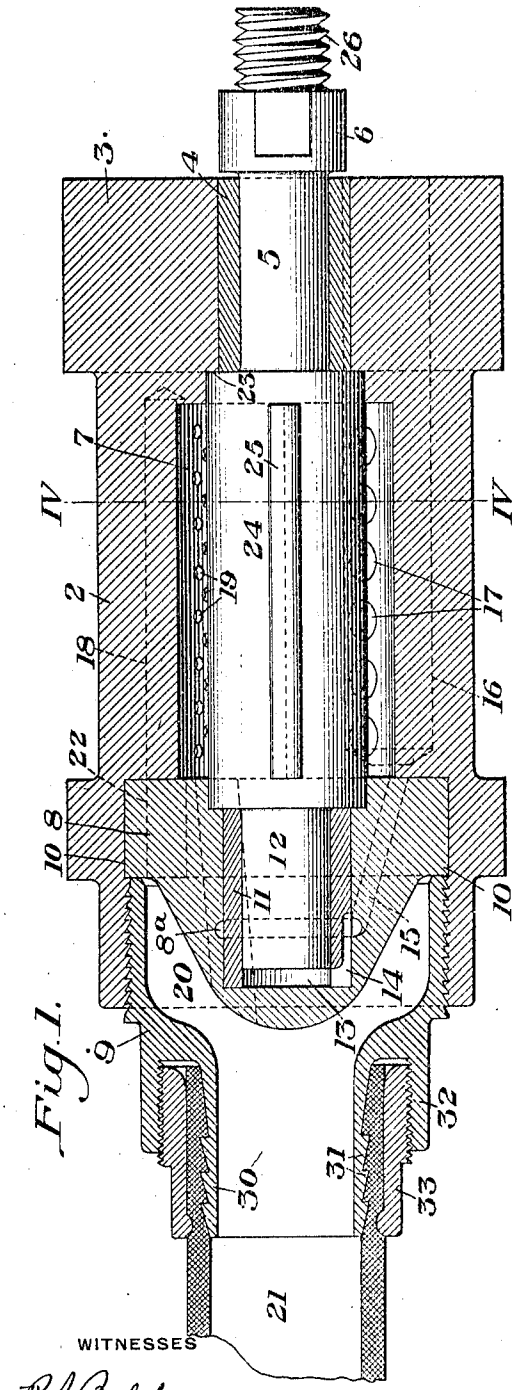

Fig. 1.

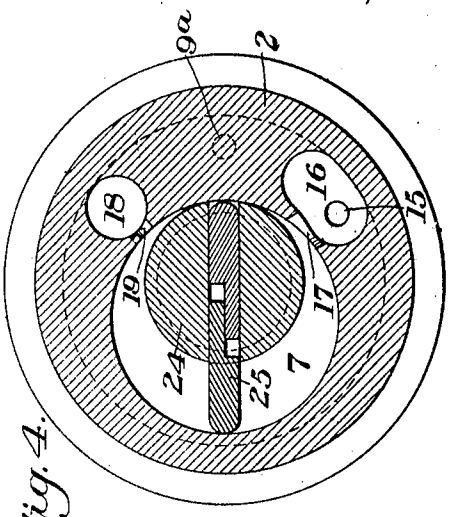

Fig. 4.

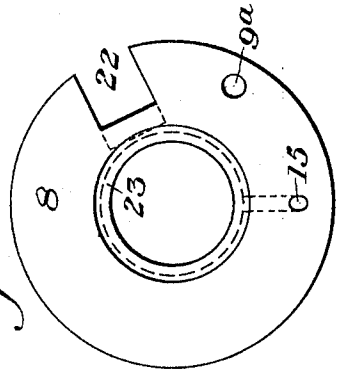

Fig. 3.

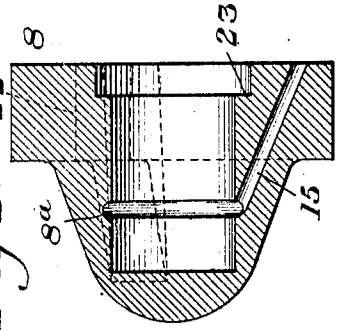

Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

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ROTARY MOTOR.

1,019,771. Specification of Letters Patent. Patented Mar. 12, 1912.

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To all whom it may concern:

Be it known that we, WILLIAM S. ELLIOTT, EDWARD R. MILLS, and HARRIS B. HOLT, all of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Rotary Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which:—

Figure 1 is a longitudinal section of one form of motor embodying our invention; Fig. 2 is a sectional view of the removable rear head; Fig. 3 is an end view of the same; and Fig. 4 is a section on the line IV—IV of Fig. 1.

Our invention has relation to the class of rotary motors, and is designed to provide a simple and efficient motor which can be constructed at a comparatively low cost, and which is adapted for a variety of purposes, being, however, particularly useful for driving boiler tube cleaning tools.

The nature of our invention will be best understood by reference to the drawings, in which we have shown the preferred embodiment thereof, and which will now be described, it being premised, however, that various changes may be made in the details of the construction and arrangement of the parts without departing from the spirit and scope of our invention as defined in the appended claims.

In these drawings, the numeral 2 designates the cylinder of the motor, which is formed with the integral front head 3, preferably of somewhat larger diameter than the body of the cylinder, and which is provided with a seat for a bushing 4, which forms the bearing for the front journal 5 of the piston shaft 6. The piston chamber 7 of the cylinder is formed eccentrically therein, this chamber being open at its rear end. The rear end portion of the cylinder is counterbored or otherwise circumferentially enlarged interiorily to provide a seat for the removable rear head 8, and also for the screw-cap 9. The removable head 8 is seated within this enlarged portion of the cylinder against the front wall or shoulder of the enlargement, and is held against any tendency to rotate by means of a dowel 9^a, or other suitable means, engaging the cylinder. It is secured against endwise movement by means of the screw-cap 9, which has a threaded engagement with the cylinder, and which screws inwardly against the flange 10 of the removable head. This head is formed with a seat for a bushing 11, which forms the bearing for the rear journal 12 of the piston shaft 6. An inclosed space or chamber 13 is provided at the rear end of the journal 12, and the bushing 11 is cut away as indicated at 14 to afford communication between this space and a port 15 which communicates with the exhaust port 16. This exhaust port extends longitudinally in the cylinder wall and outwardly through the front head 3 and communicates with the piston chamber by means of a plurality of cross-ports 17.

18 is an inlet port, which also extends longitudinally of the cylinder wall, the entire length of the piston chamber, and communicates with the latter by means of a plurality of cross-ports 19. These ports 19 are each of smaller area than the cross-ports 17, but are arranged in staggered relation to each other so that a maximum number is provided throughout the length of the cylinder, their combined area being, however, preferably somewhat less than the combined area of the cross-ports 17.

The rear head 8 is shaped so as to form an admission chamber 20 within the cap 9, which chamber is supplied with air from a suitable tube 21, which is slipped over a rearwardly projecting shank 30 from the cap 9, the periphery of which is provided with forwardly projecting annular teeth 31. The cap 9 is also provided with a second rearwardly projecting flange or socket 32 which is internally threaded and of larger diameter and concentric with the shank 30. 33 is an externally threaded sleeve, which is screwed into the threaded tube 32, while the inner surface engages the tube 21, and holds it in engagement with the tube 30 of the cap 9. The chamber 20 communicates with the inlet port 18 by means of a port or passage 22, formed through the base or inner portion of the removable head 8. Both the integral head 3 and the removable head 8 are preferably formed with the shoulders 23, which constitute thrust bearings for the ends of the

piston-carrying portion 24 of the piston shaft, which is of larger diameter than the journals 5 and 12.

25 designates the piston blade, which is slidably seated in a diammetrically extending slot in the piston carrying portion 24. This blade may be of any approved form. As shown, it consists of two sections, having a sliding engagement with each other, with the ends of the sections arranged to maintain constant contact with the walls of the piston chamber at all times.

The end of the piston shaft 6 is threaded as indicated at 26, or is provided with any other suitable means for the attachment thereto of the tool or other device to be driven.

The operation will be readily understood. Air or other motive fluid being admitted to the admission chamber 20, it passes into the piston chamber by means of the longitudinally extending admission port 18 and the plurality of cross-ports 17. The air or other fluid escapes by means of the cross-ports 17 and longitudinally extending exhaust port 16. By arranging the cross-ports 19 in staggered relation, we are enabled to provide for a maximum inlet area equally distributed throughout the length of the piston chamber, so that there will be a uniform admission of the motive fluid to all portions of the chamber. The relatively greater area of the exhaust ports combined with a preferable greater area of the longitudinal exhaust ports 16, enables a free exhaust which shall be substantially uniform throughout the entire length of the piston chamber, and which is of the greatest importance to the successful and high-speed operation of the motor. Lubricant can be introduced into the cylinder with the motive fluid, and sufficient of this lubricant will be carried into the bearings of the piston shaft to maintain the proper lubrication thereof. The provision of the space 13 prevents any such accumulation of pressure at the rear end of the piston shaft as would interfere with the proper operation of the motor, while at the same time it permits a sufficiently free escape of the motive fluid past the rear journal to maintain a proper lubrication thereof at all times. The interior of the head 8 around the bushing 11 may be circumferentially grooved as shown at 8^a, this groove communicating with the port 15 to permit of the escape of any motive fluid which may leak around the exterior of the bushing. This leakage fluid will be delivered by the port 15 into the exhaust port 16.

The construction described is exceedingly simple, and a comparatively inexpensive one, and can be readily removed and readily taken apart for renewal and repairs. We do not, however, limit ourselves to the precise details of construction and arrangement which we have herein shown and described, since various changes may be made in the details thereof. Thus, the movable rear head 8 can be seated and secured in place in other ways than that shown, and the piston blade can be of any desired form or construction.

What we claim is:—

1. In a rotary air motor, a rear head provided with a bearing for a piston shaft, and also provided with a chamber adjacent to and communicating with the bearing, and an escape passage communicating with the said chamber at its rear end, and thence leading through the cylinder wall and opening to the atmosphere at the front end portion of the motor, whereby oil and air escaping from said chamber are discharged forwardly and away from the operator; substantially as described.

2. In a rotary motor, a removable rear head provided with a rear bearing for a piston shaft, said head having an inclosed chamber at the rear end of said shaft, and an exhaust passage leading from said chamber to the exhaust port of the motor; substantially as described.

3. In a rotary motor, a cylinder having a longitudinally extending exhaust port, and a removable rear head, said head having a bearing for a piston shaft, and an inclosed chamber at the rear end of the piston shaft, said chamber communicating with the exhaust port by an exhaust passage; substantially as described.

4. In a rotary motor, a rear bearing for the motor shaft, an inclosed chamber at the end of the motor shaft, and an exhaust port or passage connecting said chamber with the exhaust port of the motor; substantially as described.

5. In a rotary motor, a rear head, a bushing seated therein and forming a bearing for the piston shaft, a groove or space surrounding said bushing, and a port or passage connecting the same with the exhaust port of the motor; substantially as described.

6. In a rotary motor, a rear head, a bushing seated therein and forming a bearing for the piston shaft, a groove or space surrounding said bushing, and a port or passage connecting the same with the exhaust port of the motor, said head also having an inclosed space at the rear end of the piston shaft which also communicates with said exhaust passage; substantially as described.

7. In a rotary motor, a cylinder having front and rear heads, and longitudinally extending admission and exhaust ports, and a piston shaft journaled in said heads, the rear head having a space or chamber therein adjacent to the end of said shaft, said rear head having a port leading therethrough in line with the admission port of the cylin-

der and also having a port or passage connecting the space or chamber therein with the longitudinally extending exhaust port of the cylinder; substantially as described.

8. In a rotary air motor, a rear head provided with a bearing for a piston shaft and also provided with a chamber adjacent to said bearing, the bearing also having a surrounding air space which communicates with the chamber, and a vent passage communicating with the said chamber and leading forwardly therefrom and discharging to the atmosphere; substantially as described.

In testimony whereof, we have hereunto set our hands.

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Witnesses:
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