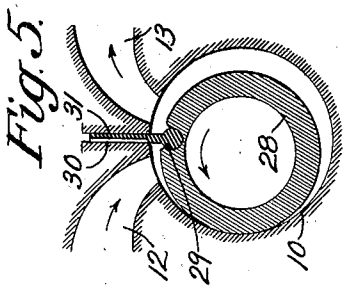
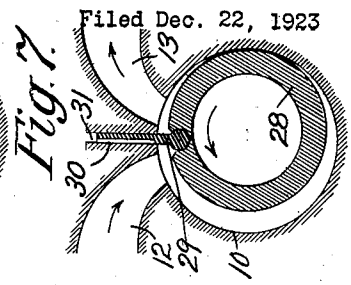
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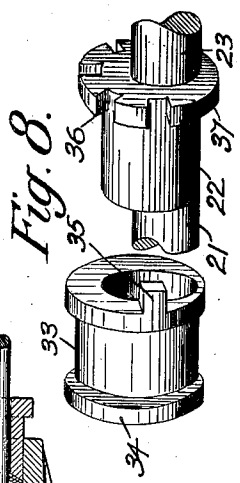
C. E. ANDERSON

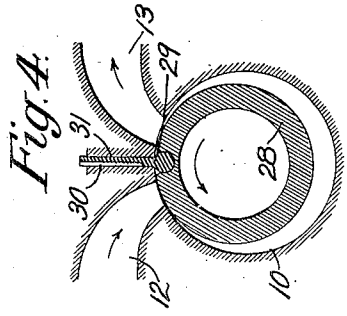
VACUUM PUMP

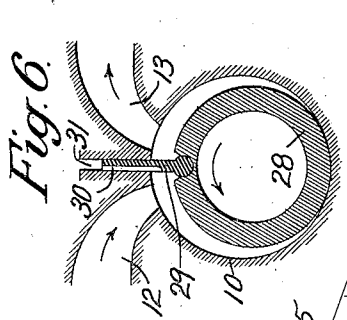
Filed Dec. 22, 1923

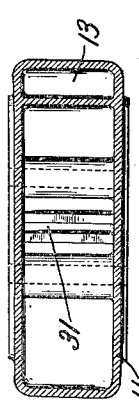


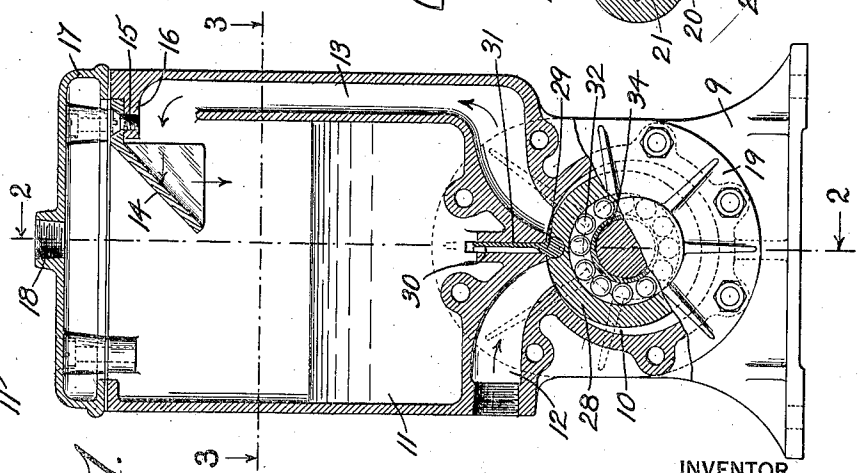












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UNITED STATES PATENT OFFICE.

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VACUUM PUMP.

Application filed December 22, 1923. Serial No. 682,135.

To all whom it may concern:

Be it known that I, CARL E. ANDERSON, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Vacuum Pumps, of which the following is a specification.

This invention relates to a vacuum pump, and it has for its main object the production of a simple pump of this type which is thoroughly lubricated and sealed by means of oil circulating therethrough and readily adjusted for wear and capable of operation at high speed, which is that of the commercial electric motor used to drive the pump. With this and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations which will be hereinafter fully described and then specifically set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification and in which like characters of reference indicate the same or like parts, Fig. 1 is a front elevation, partly in section, of a pump constructed in accordance with the invention; Fig. 2 is a side elevation, partly in section, taken on the line 2—2 in Fig. 1; Fig. 3 is a cross section taken on the line 3—3 in Fig. 1; Figs. 4, 5, 6 and 7 are diagrammatic views illustrating the operation of the pump; and Fig. 8 is a perspective view of the device used in the structure shown in Fig. 1 for adjustment purposes.

In carrying the invention into effect, there is provided a cylinder, a piston working therein, a reservoir containing oil surmounting said cylinder, and means articulated with and actuated by the piston for controlling circulation of oil through said reservoir and said cylinder to lubricate the device and to seal the piston in the cylinder to prevent air leakage by the same. In the best constructions the circulation controlling means includes a device which alternately establishes and disestablishes communication between the reservoir and the cylinder, and operating to feed to the cylinder a very small quantity of oil once during each cycle of operations. The parts above mentioned may be widely varied in construction within the scope of the claims, for the particular device selected to illustrate the invention is but one of many possible concrete embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

Referring to the drawings, 9 indicates a casting supporting the pump and in which is formed a cylinder 10 and an oil reservoir 11 surmounting said cylinder. Leading to the cylinder 10 is an air intake 12 cored in the casting, and leading from the cylinder 10 is a passage 13, leading upwardly and opening into the upper part of the reservoir 11 opposite an inclined baffle plate 14 supported by means of a screw 15 on a shelf 16 cast on one of the reservoir walls. The top of the reservoir 11 is closed by means of a cover 17 provided with an air vent 18.

One end of the cylinder 10 is closed by means of a cylinder head 19 in which is formed a bearing 20 for one end 21 of a shaft 21—22—23, the parts 21 and 23 of said shaft being coaxial, while the part 22, lying within the cylinder 10, is eccentric thereto. The end 23 of the shaft runs in a bearing 24 formed in a cylinder head 25 bolted to the main casting 9 and to the cylinder head 19 by means of a series of through bolts. The shaft 23 is packed by means of a packing ring 26 and gland 27 of well known construction and operation.

Working within the cylinder 10 is an annular piston 28 to which is pivoted a vane 29 provided with grooves 30 on one of its faces. This vane slides in a suitable channel 31 open from the oil reservoir 11 to the interior of the cylinder 10. The piston 28 rests on a series of anti-friction rollers 32 which run on the inner periphery of the piston and upon the base of an annular channel 33 formed on an eccentric sleeve 34 which surrounds the eccentric part 22 of the shaft before referred to. The channel 33 prevents the rollers 32 from becoming displaced endwise.

For the purpose of adjusting the piston 28 with respect to the inner periphery of the cylinder 10 when wear occurs, the eccentric sleeve 34 is turned upon the eccentric 22 and to hold it in adjusted position the sleeve is provided with a lug 35 adapted to engage in one of a series of notches 36 cut in the flange 37 formed on the eccentric part 22 of the shaft. To effect such adjustment, the cylinder head 19 is removed and the eccentric sleeve 34 is withdrawn until the lug 35 clears the flange 37; whereupon it is rotated and then pushed back into inter-

locked engagement with the eccentric sleeve 37; and the cylinder head is then replaced.

The piston rotates within the cylinder in the direction shown by the arrow in Figs. 4 to 7 inclusive. When the parts are in the position shown in Fig. 4, direct communication between the oil reservoir and the cylinder is cut off or disestablished by the complete closure of the channel 31 in which the vane 29 works. When the parts reach the position shown in Fig. 5, the vane has been lowered until its grooves 30 are about to be opened to the interior of the cylinder 10 so that oil can flow therethrough into the cylinder. When the parts reach the position shown in Fig. 6, that is, at lower dead center, communication between the oil reservoir and the cylinder is completely established by the opening of the grooves 30 to the cylinder and oil is flowing into the cylinder on the left side of the piston. When the parts reach the position shown in Fig. 7, the flow of oil is stopped, and communication between the oil reservoir and the cylinder is again disestablished by the upward movement of the vane 29.

The amount of oil which finds its way through the grooves 30 to the cylinder once during each shaft revolution, is small, but it is sufficient to produce a film covering the piston and forming an effectual seal between the same and the inner periphery of the cylinder. Some of the oil finds its way past the ends of the piston to the roller bearing of the piston and to the plain bearing of the shaft. The excess oil is carried by the air pumped through the cylinder up through the passage 13 into the upper part of the reservoir 11. The oil entrained in the air strikes the baffle 14 and drops to the body of oil below while the air escapes through the vent 18.

It has been found that by thus sealing with oil the piston within the cylinder and by keeping the piston properly adjusted by means of the eccentric sleeve 34, and by operating the device at the high speed of the commercial electric motor used to drive it, a vacuum of twenty-nine and one-half inches can be maintained; and that by throttling the intake 12, the vacuum produced can be varied at will and maintained.

What is claimed is:

1. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means articulated with and actuated by said piston for controlling circulation of oil through said reservoir and said cylinder.

2. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means articulated with and actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, said means including a device alternately establishing and disestablishing communication between said reservoir and said cylinder.

3. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means articulated with and actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, said means including a device having oil grooves alternately establishing and disestablishing communication between said reservoir and said cylinder.

4. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, said means including a vane pivoted to said piston and having oil grooves always open to said reservoir and intermittently open to said cylinder.

5. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, and a baffle within said reservoir and in the path of the circulating oil.

6. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, and means for relatively adjusting said cylinder and said piston.

7. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, and means for relatively adjusting said cylinder and said piston including an eccentric and an eccentric sleeve mounted thereon.

8. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and means actuated by said piston for controlling circulation of oil through said reservoir and said cylinder, and means for relatively adjusting said cylinder and said piston including an eccentric and an eccentric sleeve mounted thereon, said eccentric and sleeve being interlocked in adjusted position.

9. In a vacuum pump, the combination with a drive shaft, of an eccentric carried by said shaft, an eccentric sleeve surrounding said eccentric, and means for interlocking said eccentric and said sleeve in different adjusted positions.

10. In a vacuum pump, the combination with a drive shaft, of an eccentric formed on said shaft and having a flange provided with

a series of notches, and an eccentric sleeve surrounding said eccentric and provided with a lug adapted for selective engagement with said notches.

11. In a vacuum pump, the combination with a drive shaft, of an eccentric formed on said shaft and having a flange provided with a series of notches, an eccentric sleeve surrounding said eccentric and provided with a lug adapted for selective engagement with said notches and also provided with an annular channel, a piston surrounding said sleeve, and a series of anti-friction devices between said sleeve and said piston and guided by said channel.

12. In a vacuum pump, the combination with a cylinder, of a piston working therein, a reservoir surmounting said cylinder, and a vane actuated by said piston and having a groove always open to said reservoir and intermittently open to said cylinder for controlling circulation of oil through said reservoir and cylinder.

In testimony whereof, I have signed my name to this specification.

CARL E. ANDERSON.