April 16, 1957 J. SZCZEPANEK 2,788,748

AIR COMPRESSOR OR PUMP

Filed April 21, 1955 2 Sheets-Sheet 1

FIG. 1.

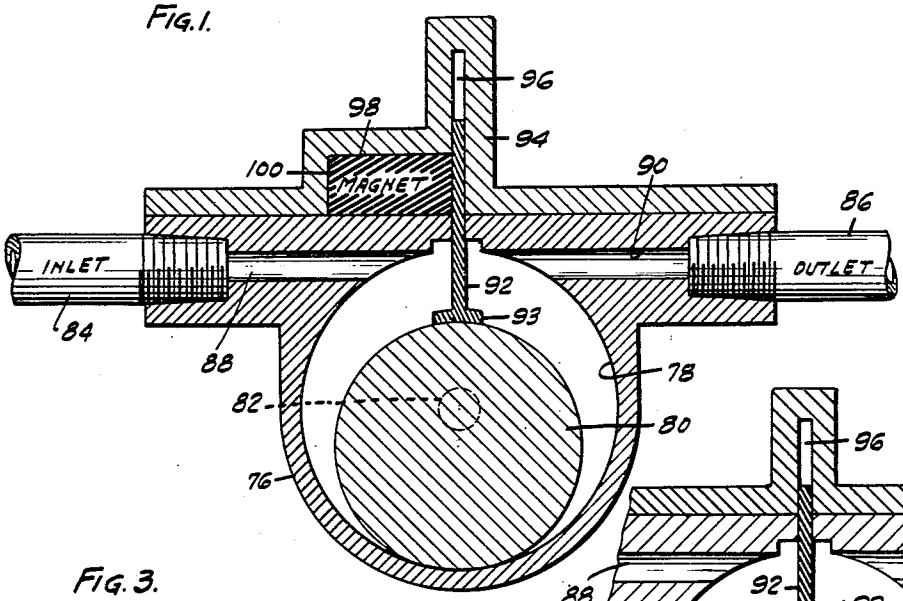
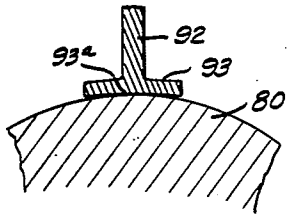


FIG. 3.



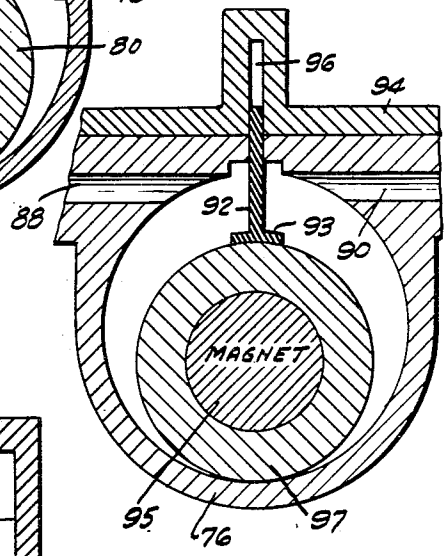


FIG. 4.

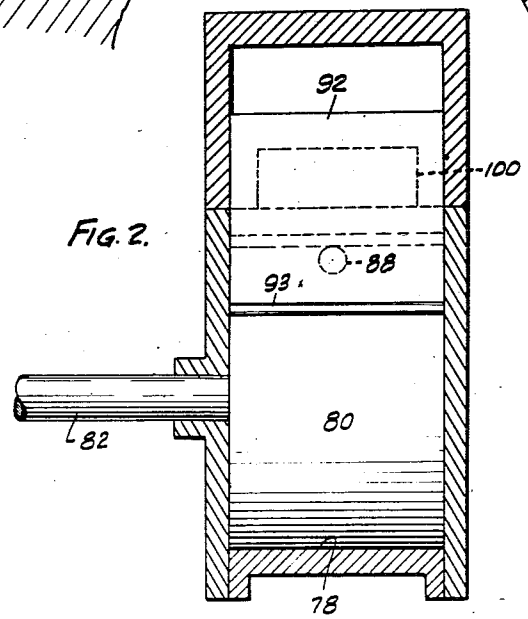


FIG. 2.

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AIR COMPRESSOR OR PUMP

Filed April 21, 1955 2 Sheets-Sheet 2

FIG. 5.

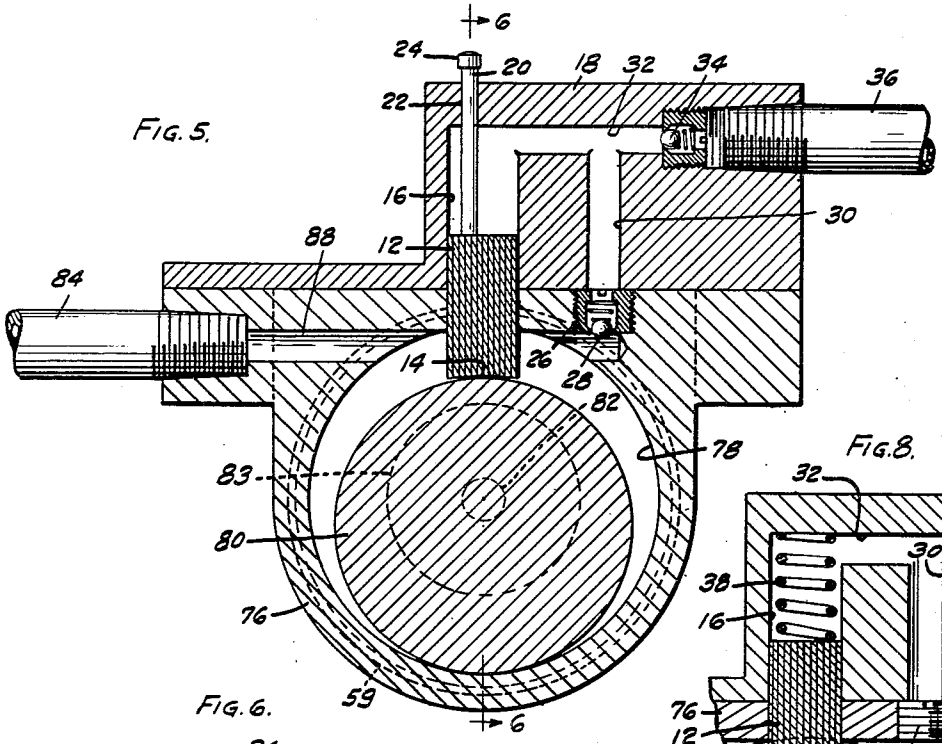


FIG. 8.

FIG. 6.

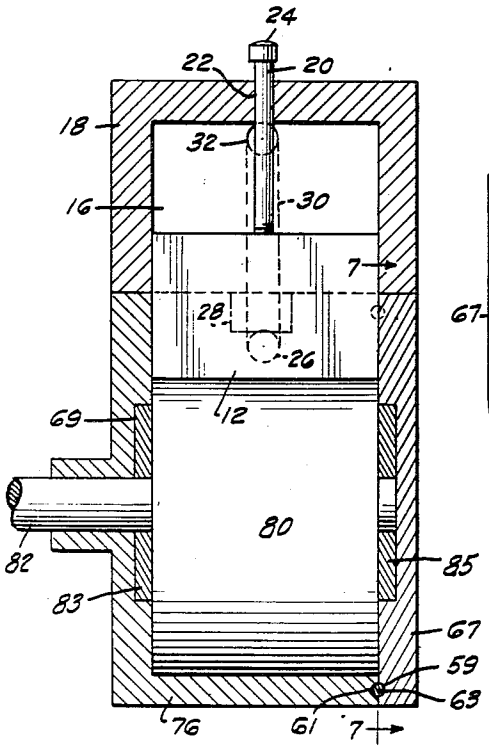
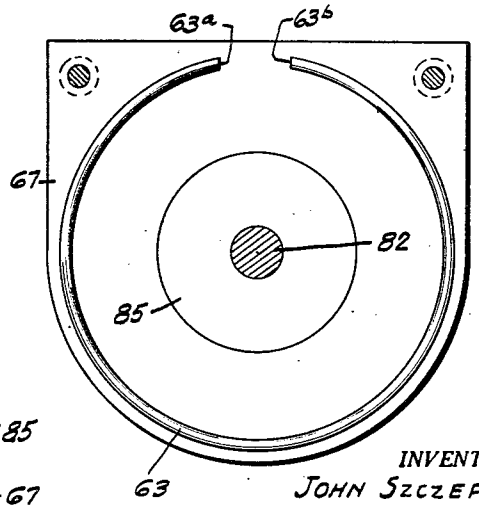


FIG. 7.



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AIR COMPRESSOR OR PUMP

John Szczepanek, Chicago, Ill.

Application April 21, 1955, Serial No. 502,981

4 Claims. (Cl. 103—123)

My invention relates to improvements in air compressors, pumps or similar devices.

This application is a continuation in part of a previous application which resulted in the issuance to me of United States Letters Patent No. 2,699,288 on January 11, 1955.

My invention relates more particularly to improvements in the construction of devices of this type wherein the parts are generally greatly simplified and the efficiency of the simplified construction is very high.

While the construction which will be explained and described is directed particularly to small or portable types of compressors or pumps such as are used for paint spray guns, etc., it will be understood that the invention is not so limited, and the size or capacity of the construction is not restricted to the details of construction which will be shown.

The principal object of the present invention is to provide an improved air compressor or pump construction.

A further object is to provide such construction with a minimum of moving parts, yet which will function in a highly efficient manner for the purpose desired.

A further object of the invention is to provide a compressor or pump of the type described that has an improved valve construction.

A further object of the invention is to provide a compressor or pump of the type described with a novel cooperation of the rotor and the valve mechanism so that no springs need be employed therewith.

A further object is to provide a comparatively frictionless cooperation of rotor and valve in a construction of the type described thereby insuring long life and high efficiency.

A further object of the invention is to provide a compressor or pump of the type described that is easily and cheaply made and one which will give long and hard service without becoming broken or out of order.

A further object of the invention is to provide an improved compressor or pump having a magnetically operated valve member therein.

A further object of the invention is to provide an improved compressor or pump that has a rotor which embodies a magnet that forms the core or center of the same and a valve plate responsive to the attraction of the same so that the face of the plate is always in line contact with the rotor.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying drawings, upon which:

Fig. 1 is a cross-sectional view of a compressor or pump construction showing electro-magnetic means associated with the reciprocating valve member;

Fig. 2 is a sectional view thereof taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary view showing the construction of the shoe of the valve;

Fig. 4 is a fragmentary cross-sectional view of a modified form of the invention;

Fig. 5 is a cross-sectional view of a modified form of

construction wherein an air compressor is employed to assist in operating the valve plate;

Fig. 6 is a transverse cross-sectional view thereof taken on the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary sectional view thereof taken on line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary view showing a modified construction.

In the embodiment of the invention which I have chosen to illustrate and describe the same, I have shown a construction wherein I provide the rotor housing **76** having a chamber **78** within which the offset rotor **80** is mounted, the rotor being driven by a shaft **82** from a desired source of power.

The housing has an inlet conduit **84** and an outlet conduit **86** connected to suitable bores **88** and **90** which connect with the chamber **78** upon opposite sides of a vertically disposed valve plate **92**. The valve plate is mounted for reciprocation in the housing **94** which has a parallel walled slot **96** to receive the same. I provide a pocket **98** in the valve housing in which a permanent magnet **100** is positioned, the pocket having an opening into the slot **96** so that the valve plate **92** is in contact with the magnet **100**.

I have found with this construction, by making the magnet, the valve plate, and the rotor of metallic material and the rotor housing of non-metallic material, that due to the magnetic attraction, as the rotor revolves it will keep the shoe **93** in magnetic contact with the surface of the same. Thus, with this construction, the valve plate will oscillate in line contact with the surface of the rotor due entirely to the magnetic attraction of the magnet, and no weights, springs or other parts are necessary to keep the valve plate in contact with the rotor.

In Fig. 4 I have shown a modified form of this construction wherein I mount the magnet **95** in the interior of the rotor **97**. With this construction the valve plate **92** may be shorter and the valve housing **94** may be simplified, the only requirement being for the slot **96** in which the valve plate oscillates. With both of these constructions, the lower surface **93***a* of the shoe **93** is at a considerably larger radius than the radius of the rotor **80**, so that there will at all times be line contact even when the rotor is at the side location during its movement.

In the embodiment of the invention shown in Figs. 5 to 8 inclusive, I have provided a construction similar to that shown in Fig. 1, including the inlet conduit **84** and passage **88** in the rotor housing **76**. In this construction I also provide a rotor **80** eccentrically mounted in the bore **78** of the housing **76**. The driving shaft **82**, as best shown in Fig. 6, may be provided with thrust or end bearings **83** and **85** located in suitable cavities in side walls **69** and **67** of the housing **76**. The housing **76** may include an end plate **65** fastened thereto by suitable screw members and enclosing a sealing wire **63** located in suitable semi-cylindrical grooves **61** and **59** in the housing **76** and end plate **65** respectively. This construction is preferred where the housing and cover plate are made of comparatively soft aluminum so that an effective seal will be maintained about the chamber **79** by reason of the wire sealing member embedded in its position between the two facing surfaces of these parts. As can be seen in Fig. 7, the sealing wire **63** has its ends **63***a* and **63***b* abutting the sides of the valve plate **12**.

The reciprocating valve which I prefer to employ in this construction is comparatively light, being made of a linen fiber of the type of which gears and other similar parts have been made, the fibers being comparatively tough so that the wearing qualities of this material are very good. Accordingly, I provide the valve plate **12** generally rectangular in shape, having the lower arcuately shaped face **14** which rides upon the periphery of the

rotor 80. The radius of the face 14 is preferably much larger than the radius of the rotor so that at all times a tangential contact at only one point is maintained. The valve plate 12 is adapted to reciprocate in a suitable passageway 16 on the valve plate housing 18, the plate having a pin member 20 extending upwardly therefrom and through a suitable opening 22 in the top of the valve housing. The pin is provided with a head 24 so that the valve 12 may be manually raised and lowered when desired, especially for priming or in starting the compressor or pump.

I have provided a construction wherein air pressure is utilized to force the valve plate in sealing position against the periphery of the rotor 80. This may include the outlet passageway 26 and the ball check valve 28 which normally seals the same. Check valve 28 may be aligned with a vertical passageway 30 in the valve housing 18, the passageway 30 communicating with a passageway 32 at the top of the valve housing which has a port opening into the valve passageway 16, and a spring-pressed check valve 34 closing the other end of the same. An outlet passageway 36 is aligned with the check valve 34.

In the operation of the compressor above described, as the compressor is forcing air under pressure through the passageway 30, pressure will be built up in the valve passageway 16 so that as the rotor 80 rotates to the position shown in Fig. 5, pressure on top of the valve plate will normally tend to hold the same in frictional contact with the rotor. This action is thus obtained without the use of springs or any other direct or other connection between the valve plate and the rotor, the construction serving to function solely due to the pressure that will be built up in the passageways 30, 32 and 16 between the check valves 28 and 34. In view of the fact that there is a possibility that this pressure will diminish during rest periods of the rotor, the priming pin 20 has been provided for starting the operation of the mechanism.

In Fig. 8 I have shown a modified construction wherein I avoid the use of a priming pin 20 in connection with the valve 12, but as a substitute therefor I have provided a coiled spring member 38 at the upper end of the valve plate 12. This spring will thus be effective in starting the operation of the valve plate when the compressor is first started, it being understood that after a period of operation the pressure in the passageways 30 and 32 will be sufficient to operate the valve.

While I have illustrated and described a specific embodiment of the invention and a modification thereof, it will be apparent to those skilled in the art that changes and modifications may be made in the exact details shown, and I do not wish to be limited in any particular; rather what I desire to secure and protect by Letters Patent of the United States is:

1. The combination of a housing having a pair of spaced parallel walls with a cylindrical chamber therein, a cylindrically shaped rotor in said chamber, a drive shaft extending from said rotor through a bearing in one of said side walls, said drive shaft axially mounted in said wall with respect to said chamber, said rotor eccentrically mounted on said drive shaft, a reciprocal plate valve mounted in said housing, an inlet conduit in said housing on one side of said plate, an outlet conduit in said housing on the other side thereof and a permanent magnet in said housing for keeping an edge of said plate against the periphery of said rotor at all times, said magnet rectangular in shape and positioned against a side of said plate valve and in sliding engagement with the same, said plate and rotor being magnetic material and said housing being of non-magnetic material.

2. The combination of a housing having a pair of spaced parallel walls with a cylindrical chamber therein, a cylindrically shaped rotor in said chamber, a drive shaft extending from said rotor through a bearing in one of said side walls, said drive shaft axially mounted in said wall with respect to said chamber, said rotor eccentrically mounted on said drive shaft, a reciprocal plate valve mounted in said housing, an inlet conduit in said housing on one side of said plate, an outlet conduit in said housing on the other side thereof and magnetic means in said housing for keeping an edge of said plate against the periphery of said rotor at all times, said magnetic means including a rectangularly shaped permanent magnet positioned against one side of said plate valve and, in sliding engagement with the same, said plate and rotor being magnetic material and said housing being of non-magnetic material, said permanent magnet positioned in said housing above said inlet conduit.

3. The combination of a housing having a pair of spaced parallel walls with a cylindrical chamber therein, a cylindrically shaped rotor in said chamber, a drive shaft extending from said rotor through a bearing in one of said side walls, said drive shaft axially mounted in said side wall with respect to said chamber said rotor eccentrically mounted on said drive shaft, a reciprocal plate valve mounted in said housing, an inlet conduit in said housing on one side of said plate, an outlet conduit in said housing on the other side thereof and magnetic means in said housing for keeping an edge of said plate against the periphery of said rotor at all times, said magnetic means including a permanent magnet rectangular in shape and positioned against a side of said plate valve and in sliding engagement with the same, said plate valve and rotor being magnetic material and said housing being of non-magnetic material, said permanent magnet positioned in said housing above said inlet conduit, said reciprocating plate valve having a shoe at its lower end, said shoe extending to both sides of said plate valve and having its lower wall formed on an arc the same radius as the radius of said rotor.

4. The combination of a housing having a pair of spaced parallel walls with a cylindrical chamber therein, a cylindrically shaped rotor in said chamber, a drive shaft extending from said rotor through a bearing in one of said side walls, said drive shaft axially mounted in said wall with respect to said chamber, said rotor eccentrically mounted on said drive shaft, a reciprocal plate valve mounted in said housing, an inlet conduit in said housing on one side of said plate, an outlet conduit in said housing on the other side thereof and magnetic means in said housing for keeping an edge of said plate against the periphery of said rotor at all times, said magnetic means including a permanent magnet rectangular in shape and positioned against a side of said plate valve, and in sliding engagement with said plate valve, said plate valve and rotor being magnetic material and said housing being of non-magnetic material, said permanent magnet positioned in said housing above said inlet conduit, said reciprocating plate valve having a shoe at its lower end, said shoe extending to both sides of said plate valve and having its lower wall formed on an arc the same radius as the radius of said rotor, said cylindrical chamber having a rectangularly shaped depression in its upper surface to receive said shoe at the upper end of the stroke of said rotor.

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