April 30, 1929. A. W. BRYANT 1,711,013

COMPRESSOR

Filed June 24, 1927

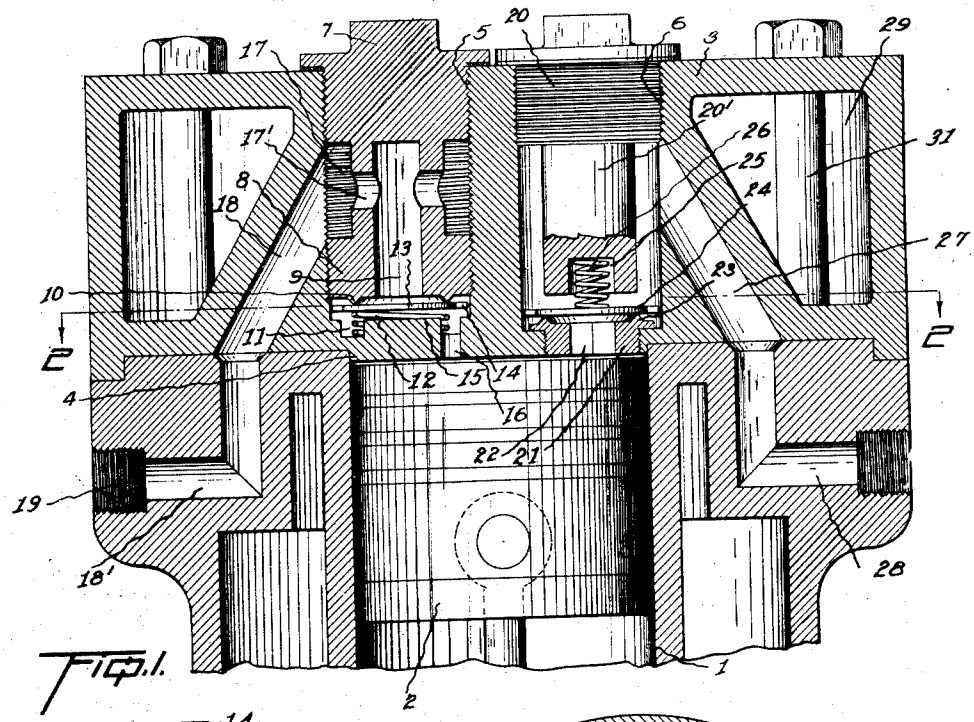


FIG. 1.

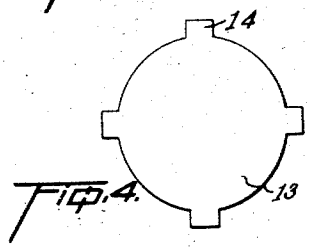


FIG. 4.

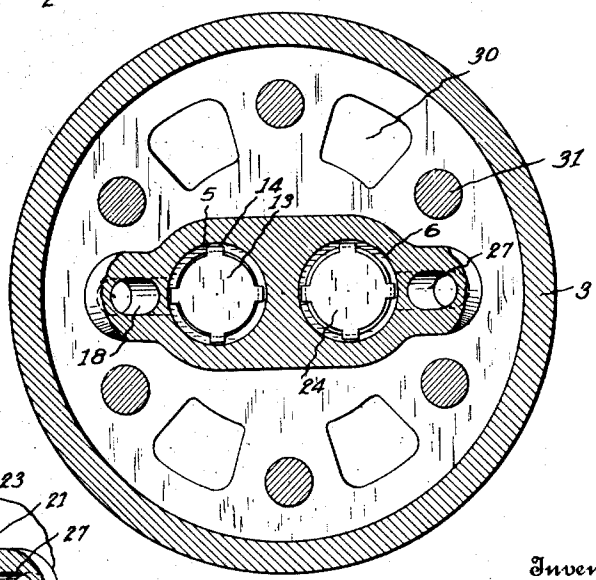


FIG. 2.

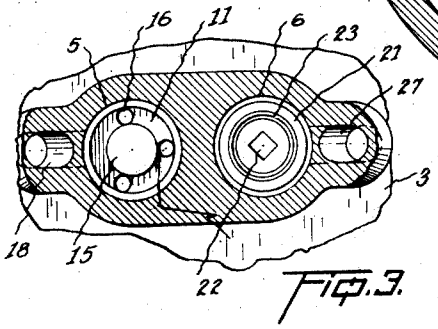


FIG. 3.

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UNITED STATES PATENT OFFICE.

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COMPRESSOR.

Application filed June 24, 1927. Serial No. 201,072.

The present invention pertains to a novel compressor constructed particularly for refrigeration machines, although it will be apparent that the device need not be limited to this particular use since it is suitable for pumping operations in general.

The principal objects of the invention are to provide a device of this character wherein the amount of clearance between the cylinder chamber and the intake and exhaust chambers is reduced to a minimum, and wherein access to the valves is possible without dismantling the machine to any great extent.

In the accomplishment of the first object, a cylinder head is mounted upon the cylinder and is formed with intake and exhaust chambers which are drilled from the top thereof nearly to the lower surface. Further, these chambers are in alignment with the cylinder chamber in order to avoid angular or lateral passages to the cylinder chamber, consequently short straight ports between the cylinder chamber and the valve chambers are sufficient to establish communication between these spaces, and the amount of clearance is therefore very small.

In accordance with the second object of the invention, plugs are threaded into the valve chambers from the upper ends thereof. These plugs close the upper ends of the chambers and form a part of the interior valve structure. They are accessible at all times at the top of the head, and a removal of these plugs exposes the valve chambers so that the various parts therein may readily be removed for repair or replacement.

Still another object of the invention is to reduce the noise occurring in the operation of a compressor. To accomplish this result I use a valve consisting of a floating disk having a small area of contact with its seat, so that it is comparatively silent in engaging the seat to effect closure.

The invention is fully disclosed by way of example in the following description and in the accompanying drawings, in which—

Figure 1 is a longitudinal section of the upper end of a cylinder and the cylinder head constructed according to the invention;

Fig. 2 is a transverse section on the line 2—2 of Figure 1;

Fig. 3 is a similar section with the valve disks removed; and

Fig. 4 is a plan view of one of the disks.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

The compressor includes a cylinder 1 open at its upper end and having a piston 2 slidably mounted therein in the usual manner. On the cylinder is mounted a head 3 having on its lower face a circular abutment 4 entering the upper end of the cylinder chamber. From the top of the head are formed an intake chamber 5 and an exhaust chamber 6 which preferably have their longitudinal axes passing through the cavity of the cylinder 1 if prolonged.

Into the chamber 5 is threaded a plug 7 which partially obstructs and closes the same particularly at the upper end thereof. The lower end 8 also fills the chamber but is formed with a cavity 9 which communicates with the chamber since the plug does not reach the base of the chamber. On the lower end of the plug is formed a circular ridge 10 which functions as a valve seat as will presently be pointed out.

In the cylinder head, at the base of the chamber, is formed a circular groove 11 substantially concentric with the plug and valve seat. In the groove is seated a spring 12, and on the spring is mounted a circular floating valve disk 13 of the type shown in Figure 4. The disk is of sufficient size to cover the seat completely and is formed with marginal lugs 14 which cooperate with the exposed wall of the chamber in preventing the circular part of the valve at all times from shifting laterally away from the seat. The circular groove 11 forms an abutment 15 which permanently centers the spring 12. A series of ports 16 are drilled from the groove 11 to the chamber of the cylinder for the purpose of establishing communication between the latter and the chamber 5. The plug 7 is formed intermediate its ends with a groove 17 in its outer surface, and this groove is brought into communication with the cavity 9 by means of ports 17'. The head 3 is formed with an intake passage 18 extending from the bottom thereof to the chamber 5 at the groove 17, and

another branch 18 of the intake passage extends from the outer surface of the cylinder wall to the base of the passage 18. The exterior end of the branch 18′ is threaded as at 19 for application of a connecting fitting.

The chamber 6 is also fitted with a plug 20 which however closes only the top of the chamber and is formed with a depending stem 20′ spaced from the wall of the chamber. The base of the chamber 6 has a ring 21 threaded therethrough as far as the cylinder chamber, and this ring has a central port 22 which connects the cylinder chamber to the exhaust chamber 6. On the upper face of the ring is formed a ridge 23 surrounding the passage 22 and constituting a valve seat. On the valve seat is mounted a floating valve disk 24 similar to that described in connection with the intake chamber. The lower end of the stem has a recess 25 into which is fitted a spring 26 normally pressing the disk 24 upon its seat 23.

The means of communication between the exhaust chamber 6 and the exterior of the cylinder is similar to that described in connection with the intake chamber. An exhaust passage 27 leads from the chamber 6 to the base of the head and is continued by a branch 28 formed through the top of the cylinder wall.

The cylinder head is hollow exteriorly of the passages 18 and 27 in order to provide a water jacket 29. The top of the head has openings 30 communicating with the water jacket for supplying water thereto. Bolts 31 passed through the head fix the latter to the top of the cylinder.

On the down stroke of the cylinder the valve 13 is moved away from its seat while the valve 24 is drawn firmly upon its seat. Gas is drawn into the cylinder through the intake chamber and ports 16 but cannot escape through the exhaust chamber on this stroke. When the piston moves upwardly, the valve 13 seats against the ridge 10 and closes the intake chamber from the cylinder, while the valve 24 rises from its seat and enables discharge through the exhaust chamber 6 and passages 27 and 28.

The plugs 7 and 20 are always accessible from the top of the cylinder head, whereby access to the valves for the purpose of repair or replacement is always possible by removing the plugs. No other parts of the apparatus need be dismantled. When the plugs are moved, it is a simple matter to replace the valve disks, springs or the ring 21. It will also be noted that the close proximity of the intake and exhaust chambers to the cylinder chamber and the small volume of the connecting ports 16 and 22 reduces the clearance to a minimum.

The valve seats 10 and 23 are preferably hardened and ground, prior to assembling the device, in order better to take the wear. The small area of contact between the valve disks and their respective seats necessarily reduces clattering to a minimum and causes considerably less noise than occurs in other types of valves, such as poppet valves for example.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:—

1. In a head having a valve chamber formed therein, a plug fitted into said chamber and having a cavity in its lower end, a valve seat formed on the lower end of said plug, a spring seated on the base of the chamber beneath said plug, a valve disk mounted on said spring and adapted to cooperate with said seat, the base of said head being ported to establish communication between said chamber and a cylinder, and inlet means for said chamber.

2. In a head having a valve chamber formed therein, a plug fitted into said chamber and having a stem spaced from the wall of said chamber, a seat formed on the base of said chamber and adapted to establish communication between said chamber and a cylinder, a valve disk mounted on said seat, a spring positioned between said seat and the lower end of said stem, and outlet means for said chamber.

3. In a head having a valve chamber formed therein, a plug fitted into said chamber and having a cavity in its lower end, a valve seat formed on the lower end of said plug, said head having an annular groove formed in the base of said chamber and substantially concentric therewith, a spring seated in said groove, a valve disk mounted on said spring and adapted to cooperate with said seat, the base of said head being ported to establish communication between said chamber and a cylinder, and inlet means for said chamber.

4. In a head having a valve chamber formed therein, a plug fitted into said chamber and having a stem spaced from the wall of said chamber, a ring fitted into the base of said chamber and establishing communication between said chamber and a cylinder, a valve seat formed on said ring, a valve disk mounted on said seat, a spring seated in the lower end of said stem and bearing upon said disk, and outlet means for said chamber.

5. In a head having an intake chamber and an exhaust chamber formed therein, and separate means of communication from said chambers to the exterior of said head, a valve system comprising, a plug fitted into said intake chamber and having a cavity in the lower end thereof, said cavity communicating with the means of communication be-

tween the intake chamber and the exterior of the head, a valve seat formed on the lower end of said plug, a spring seated on the base of said chamber beneath said plug, a valve disk mounted on said spring and adapted to cooperate with said seat, said base being ported to establish communication between the intake chamber and a cylinder, another plug fitted into the exhaust chamber and having a stem spaced from the wall of the chamber, a valve seat formed on the base of said exhaust chamber and adapted to establish communication between the exhaust chamber and a cylinder, a valve disk mounted on said last named seat, and a spring inserted between said stem and said last named disk.

In testimony whereof I affix my signature.

ALVAH W. BRYANT.