

Nov. 20, 1928.

1,692,473

W. J. SMITH
AIR COMPRESSOR

Filed Jan. 4, 1928

2 Sheets-Sheet 1

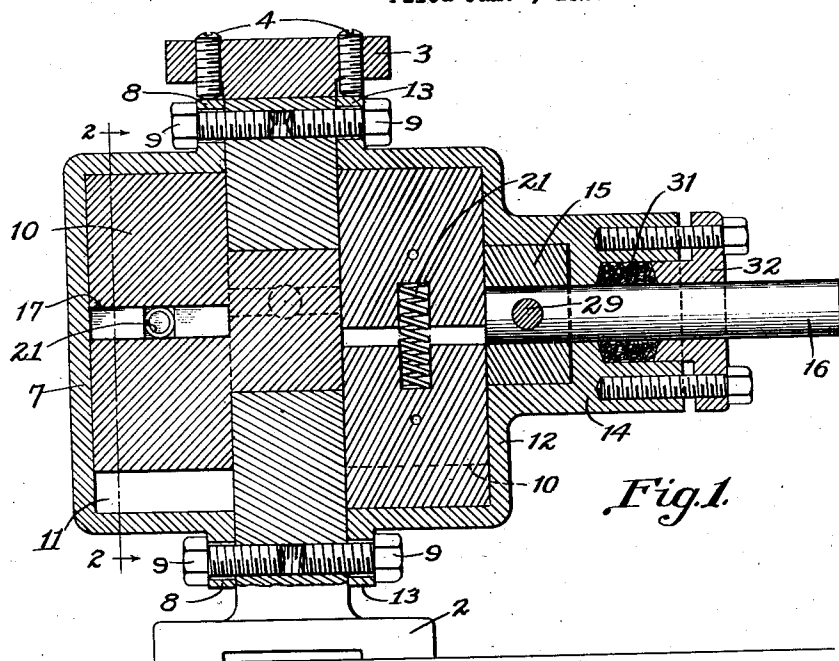


Fig. 1.

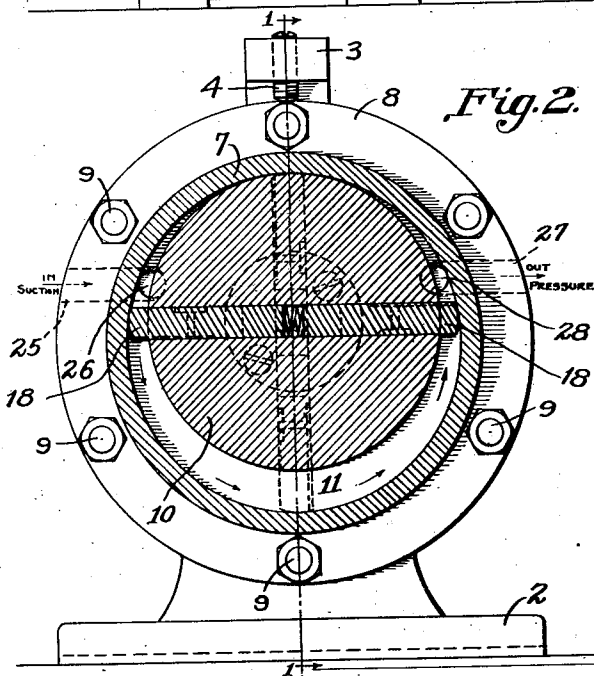


Fig. 2.

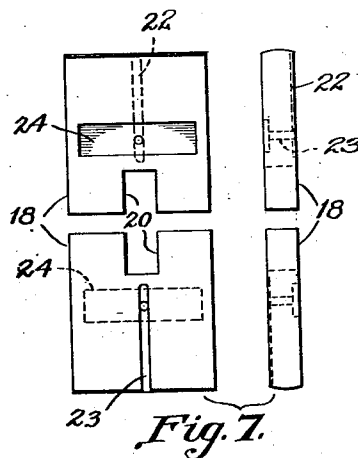


Fig. 3.

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2 Sheets-Sheet 2

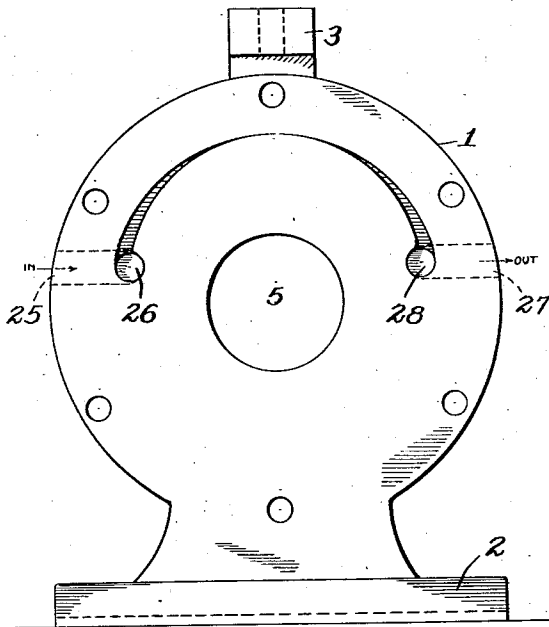


Fig. 4.

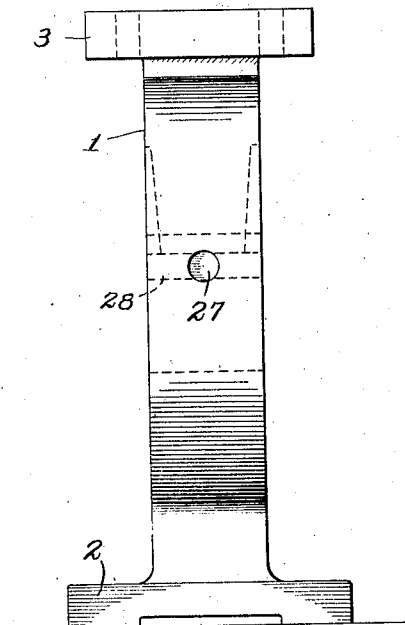


Fig. 3.

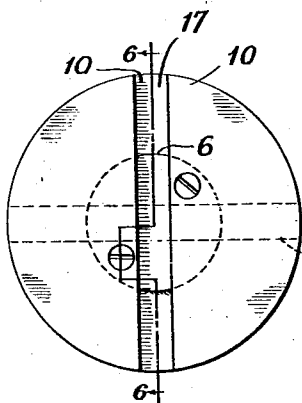


Fig. 5.

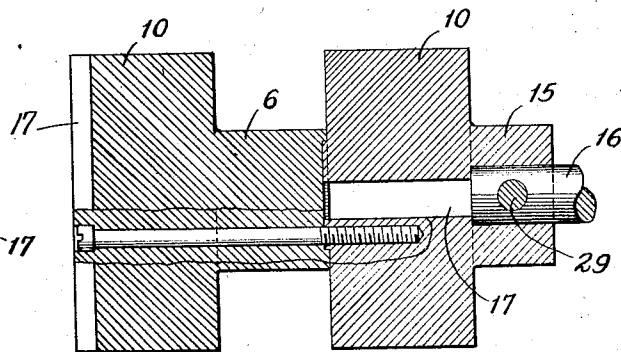


Fig. 6.

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AIR COMPRESSOR.

Application filed January 4, 1928. Serial No. 244,766.

This invention relates to air compressors, pumps and motors, and it relates particularly to structures of this kind in which the principal driven or driving parts are rotary in their action.

The invention herein described and claimed is identical with that disclosed in the abandoned application for patent filed February 1, 1921, Serial No. 441,625.

In the construction hereinafter described, I have for one object to produce operating parts so formed and relatively aggrouped that they may safely be operated at a high speed in order that when, for instance, employed in an air compressor a large volume of air may be compressed in a short time, thus effecting economy in the cost of the motive power employed. Other objects are to provide working parts so formed that in operation they are relieved from undue binding, friction and wear, and in which usual wear of parts may by easy adjustment be compensated for. Another object is to provide in a machine of the kind referred to a compact inexpensive construction in which a maximum compressing or forcing surface is available when used as a compressor or pump, or a large surface to receive impact of a moving liquid or fluid is exposed when used as a motor. Further, the object is to provide a casing, a support or standard, and working parts located in the casing, of such form that assembling of the parts and the substitution of a new part for one worn or injured may quickly be effected without requiring skill in such operations.

The invention is hereinafter described as embodied in air compressors, but an understanding of it will make clear its availability, and the advantages of its novel features, as a pump for forcing liquids or as a motor.

The invention consists in the generically and specifically novel construction and combinations of parts substantially as herein described and illustrated in the accompanying drawing. In this drawing:

Figure 1 is a central vertical sectional view of an air compressor constructed in accordance with my invention, the section being taken in line with the driving shaft on line 2-2 of Figure 1;

Figure 2 is a vertical sectional view taken at a right angle to that shown in Figure 1;

Figure 3 is a front view of the standard

and base of the compressor to which the casing is attached and on which the moving parts are mounted;

Figure 4 is a side view of the standard or base;

Figure 5 is an end view of one of the disk-shaped heads by which the pistons are carried;

Figure 6 is a transverse sectional view of the disk heads, showing the means for connecting the parts thereof to the shaft on which they are mounted and to each other; and

Figure 7 is a face view, showing the form of the abutments or vanes.

The embodiment of my invention herein shown includes an enclosing cylindrical casing, a standard or base dividing the casing and to which the latter is attached, and two disk heads arranged one on each side of the standard, eccentrically located in the casing, and abutments or vanes mounted in the heads and bearing at their outer ends against the inside face of the casing, the abutments or vanes of the respective heads being located at right angles to each other.

The standard or main portion of the frame of the compressor consists of a circular body portion 1 having at its lower end a base 2, and at its top end a transverse bar 3 through which project the adjusting screws 4. Located in the body 1 of the standard is an opening 5 which forms a bearing for the shaft 6 to which the moving parts of the device are connected.

The casing employed is made in two parts secured to the standard. One part 7, which is formed with a peripheral flange 8 receiving screws 9 by which it is attached to the standard, is of a width corresponding to that of the disk head 10, being somewhat larger in diameter than the head so that when the latter is located eccentrically in the casing there is formed a crescent-shaped space 11, constituting a compression chamber between the head and the inner face of the casing. The other part 12 of the casing, receiving a disk head 10 located therein similarly to that in the first part has a flange 13 forming with the screws 9 means for securing it to the standard, and is provided with an extension 14 having an opening therethrough for the reception of a shaft 15 and of a driving shaft 16 which is connected to the shaft 15.

The holes in the sections of the casing which receive the attaching screws are preferably somewhat larger than the screws, in order that by loosening the screws the casing may be moved up or down a short distance independently of the standard.

The disk heads 10 are each formed integrally with their respective shafts 6 and 15 upon which they are mounted. Each disk head has formed in it a transverse channel 17 extending through the head, and of a width to receive and permit longitudinal sliding movements of the abutments or vanes 18. The two disk heads and their shafts are secured together by screw bolts passing through the parts, and the heads are so positioned in respect to each other that the channel 17 of each head extends at a right angle to that of the other.

The abutments or vanes 18 are made in two parts and the adjacent ends of the parts are spaced apart. Each part has in its inner end a socket 20 in which is located one end of a coil spring 21 under sufficient tension to force the parts outward to cause their respective outer ends to bear against the inner faces of the casing.

The disk heads are intended to rotate in the direction indicated by the arrow in Figure 2. In such rotation the abutments or vanes are moved through the spaces 11 in the casing, compressing the air contained in such spaces. When this takes place, the abutments are forced to bear against the sides of the walls of the channels 17 and the friction between the parts tends to obstruct the movements of the abutments radially of the disk heads and to result in wear of the contacting faces. In order to relieve the pressure of the vanes upon the walls of the channels, there is established a communication between those parts of the chambers 11 in advance of the vanes and the spaces between the faces of the vanes, rearward in respect of the direction of movement of the vanes, and the walls of the channels, in order that there shall be maintained in such spaces a pressure of air equal to that created in the compression chamber by the movements of the vanes. To accomplish this the forward face of each vane section has formed in it a groove 22, extending inward from its outer end and communicating with a passage 23 extending through the section. The rear face of each vane section has in it a chamber 24 communicating with the passage 23. The outer ends of the chambers are so located that they are always within the periphery of the disk heads, irrespective of the movements of the vanes. The construction described results in cushioning or balancing the vane sections by maintaining between them and the walls of the channels a body of air under a pressure equal to that bearing on the front faces of the sections, and consequently the

friction between the walls of the channels and the vane sections is reduced to a minimum.

In the assembling of the parts of the compressor the outer surfaces of the disk heads 10 bear against the inner faces of the casing sections at the upper portions of the sections, in order that there may be no communication between the intake and the exhaust ends of the space in which the air is compressed by the operation of the vanes. Continued rotation of the heads in contact with the casing results in more or less wear of the parts which tends to establish a passage through which air compressed by the vanes would escape from the exhaust to the inlet end of the compression chamber. In order to compensate for such wear, the adjusting screws 4 passing through the crosshead 3 of the standard and bearing on the flanges 8 and 13 of the casing sections may be turned to move the latter downward to bring them into contact with the disk heads, closing any space which may be created between the parts by wear.

Air to be compressed is admitted to the compressor through an intake port 25 extending inward from one face of the standard 1, and which connects with a transverse passage 26 communicating with the intake ends of the compression chambers 11 formed on the opposite sides of the standard. On the opposite side of the standard is a discharge port 27 joined to a passage 28 communicating with the discharge ends of the respective compression chambers.

The shaft 15 forming part of one of the disk heads 10 is hollow and receives the inner end of the driving shaft 16, the latter being held by a pin 29 passing through the two shafts.

The driving shaft is packed in order to prevent escape of compressed air from the casing, as by a stuffing box 31 located in the extension 14 of the casing, and a gland 32. The construction of the compressor as described being such that the operating parts are balanced, the device is capable of operating at high speed. Therefore, the driving shaft may be connected directly to and be rotated by a high speed motor, such, for instance, as an electric motor.

I claim:

1. In an air compressor, a standard having a bearing therein, chambers formed on opposite sides of the standard, a disk head having an integral shaft extending therefrom arranged in one of the chambers, and having its shaft located in the bearing, a corresponding disk head and shaft arranged in the opposite chamber, and means for connecting the second disk head to the shaft of the first disk head.

2. An air compressor comprising a casing, a revoluble disk head eccentrically mounted

in the casing and normally bearing against the inner face of the casing, and means whereby the casing may be moved toward the head to compensate for wear between the parts.

5 3. In an air compressor, a standard having a bearing therein and having a crossbar at its upper end, a sectional casing having the parts thereof attached to the standard, and adjusting screws passing through the cross-
10 bar and bearing on the casing sections.

4. In an air compressor, a standard having a bearing therein and having a crossbar at its upper end, a sectional casing having the parts thereof attached to the standard, a disk head
15 having an integral shaft arranged on one side of the standard and having the shaft extending into the bearing, and an oppositely ar-

ranged disk head attached to the shaft, such disk heads normally bearing against the inner faces of the casing, and adjusting screws 20 passing through the crossbar and bearing on the casing sections.

5. In an air compressor, a standard having a bearing therein, two circular chambers formed one on each side of the standard, a 25 disk head eccentrically arranged in one of the chambers and having an integral shaft extending therefrom and located in the bearing, a corresponding disk head and shaft eccentrically arranged in the opposite cham- 30 ber, and means for connecting the second disk head to the shaft of the first disk head.

In testimony whereof I affix my signature.
WILLIAM J. SMITH.