

Jan. 4, 1944.

J. SCATTOLONI

2,338,544

FLUID TRANSLATING APPARATUS

Filed April 30, 1941

2 Sheets-Sheet 1

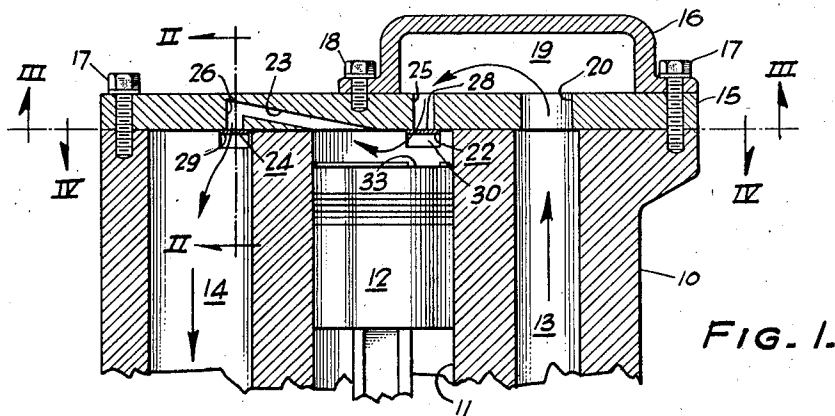


FIG. 1.

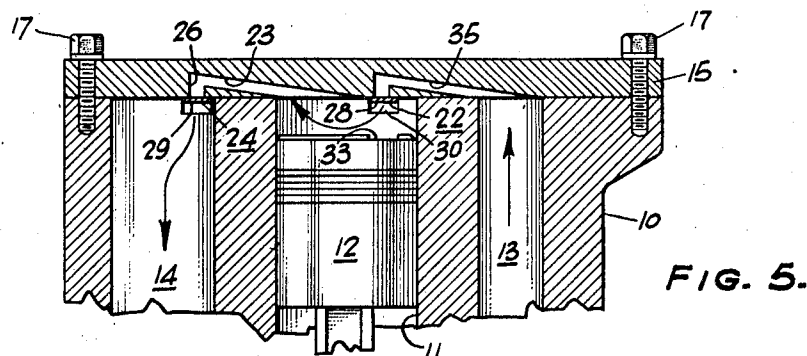


FIG. 5.

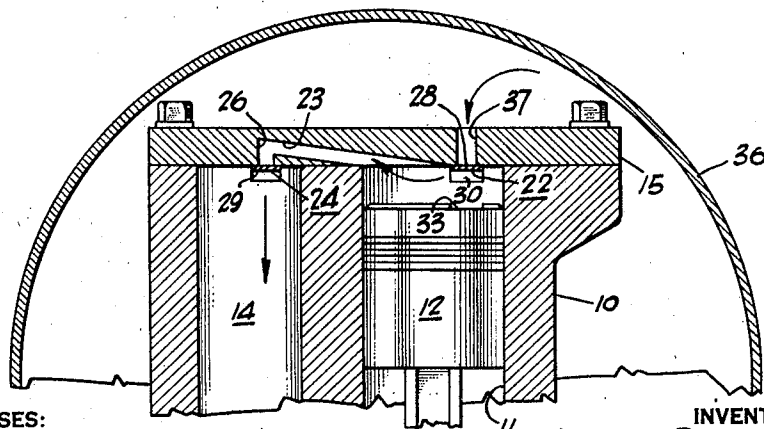


FIG. 6.

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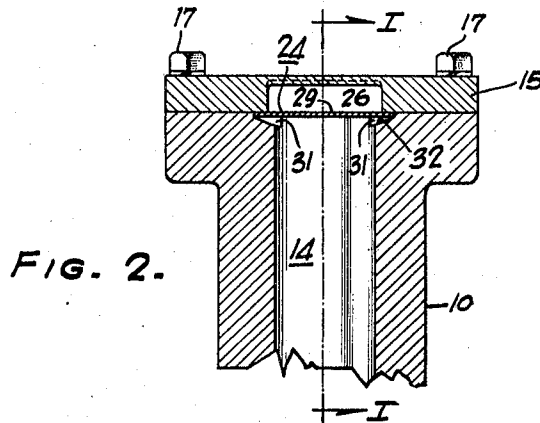
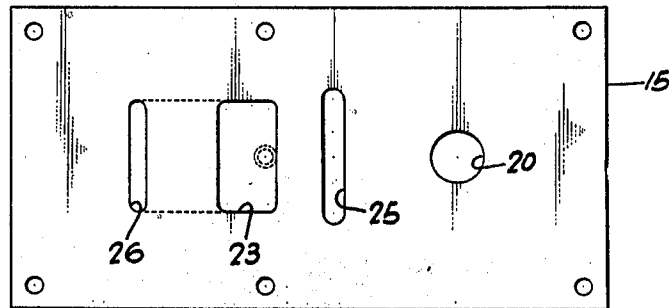
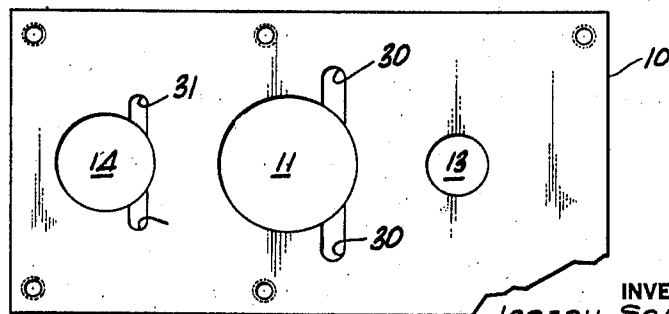
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2 Sheets-Sheet 2



WITNESSES:

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FLUID TRANSLATING APPARATUS

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Application April 30, 1941, Serial No. 391,170

2 Claims. (Cl. 230—231)

This invention relates to fluid compressors and the like, more particularly to a discharge valve and cylinder head arrangement therefor.

Prior discharge valve structures for compressors usually comprise a plate disposed between the movable valve member and the cylinder member. A port is formed in the valve plate and the valve seats on the upper surface of the plate around the port. The valve is usually positioned by a guide member which is bolted to the valve plate.

An object of this invention is to provide an improved valve structure of the character set forth.

Another object of this invention is to provide an improved arrangement for passing fluid to and from the cylinder of a compressor.

Another object is to provide a simplified cylinder head and valve arrangement that is economical and easy to assemble.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a vertical sectional view taken on line I—I of Fig. 2, showing one embodiment;

Fig. 2 is a vertical sectional view taken on line II—II of Fig. 1;

Fig. 3 is a bottom view of the cylinder head as seen on line III—III of Fig. 2;

Fig. 4 is a plan view of the cylinder block as seen on line IV—IV of Fig. 2;

Fig. 5 is a vertical sectional view of a second embodiment; and

Fig. 6 is a vertical sectional view of a third embodiment.

Referring now to the drawings in detail, a portion of a reciprocating compressor in which this cylinder head and valve arrangement is incorporated is shown in Fig. 1. The compressor includes a cylinder block 10 in which a cylinder 11 is formed. The cylinder extends perpendicular to and terminates in the plane surface formed on the top of the cylinder member. A reciprocating piston 12 operates within the cylinder 11. The cylinder member is further formed with a fluid inlet passage 13 and a fluid outlet passage 14 in juxtaposition with the cylinder 11.

A cylinder head 15, having a lower plane surface, is positioned on the upper plane surface of the cylinder member, and a member 16 providing a suction chamber 19 is positioned above the cylinder head. The cylinder head is bolted to the cylinder member by bolts, some of which are

indicated at 17. One side of the member 16 is fastened to the cylinder head by the same bolts that fasten the head to the cylinder member and the other sides of the same are fastened to the head by bolts 18.

The suction chamber 19 communicates with the inlet passage 13 through a port 20 formed in the cylinder head 15 and with the cylinder 11 through a suction valve indicated generally by the reference numeral 22. The cylinder 11 communicates with the outlet passage 14 through a passage 23 which opens into the outlet passage through a port 26 and a discharge valve indicated generally by the reference numeral 24.

The valves 22 and 24 are of the type known as the "reed valve." The suction valve 22 comprises a port 25 formed in the cylinder head 15 and a thin resilient valve reed or strip 23 which seats against that portion of the lower surface of the cylinder head surrounding the port 25. The discharge valve 24 comprises the port 26 and a thin resilient valve reed or strip 29 which seats against that portion of the lower surface of the cylinder head surrounding the port 25. The suction port 25, the discharge port 26, and the passage 23 are all shown as being oblong in cross-section; however, it will be understood that they may be formed in any satisfactory shape. As will be seen from the drawings, the discharge valve strip or reed 29 extends across and through the outlet passage 14 at the end thereof, both ends projecting beyond the outlet passage 14. The cylinder block 10 is formed with recesses 31 for receiving the projecting end portions of the discharge valve strip 29. These recesses are formed so as to restrain the valve strip against either longitudinal or traverse movement in the plane of the valve strip. The lower surfaces of the recesses, however, are curved downwardly, as shown at 32 in Fig. 2. Accordingly, the recesses permit the valve strip to be bowed downwardly away from the cylinder head. It will be understood that the suction valve reed or strip 23 extends across and through the cylinder 11 in a similar manner, recesses 30 being provided in the block 10 for receiving the end portions of the strip.

The valve strip 23 is bowed downwardly into the cylinder 11 by the suction gas flowing into the cylinder upon the downward or suction stroke of the piston 12. The valve strip 29 is bowed downwardly into the outlet passage 14 by the discharge gas upon the upward or compression stroke of the piston 12.

The upper surface of the piston 12 is prefer-

ably recessed, as shown at 33 in Fig. 1, to receive the valve strip 23, so that the major portion of the upper surface of the piston may approach more closely the lower surface of the cylinder head 15. This arrangement minimizes the volumetric clearance, that is, the space in the cylinder at the end of the compression stroke.

In the operation of the compressor, the piston 12 is reciprocated in the usual manner. The downward movement of the piston tends to create a vacuum in the cylinder 11, whereupon the gaseous fluid is drawn through the inlet passage 13, the port 20, the suction chamber 19 (Fig. 1) and the suction valve 22 into the cylinder 11. The flow of suction gas causes the suction valve strip 23 to be flexed or bowed downward along a single curve into the cylinder. The gaseous fluid flows through the port 25 and on opposite sides of the valve strip 23. During the suction stroke the discharge valve strip 29 is held in closed position against the lower plane surface of the cylinder head by the higher pressure in the outlet passage 14.

Upon the upward or compression stroke of the piston 12, the suction valve strip 23 assumes its normal flat position against the lower plane surface of the cylinder head and as the gas in the cylinder is compressed it is held tightly against its seat. At the same time, the discharge valve strip 29 is flexed downwardly into the outlet chamber 14 by the gas flowing from the cylinder 11. The gaseous fluid flows through the passage 23 and port 25 and passes on opposite sides of the valve strip 23.

In Fig. 5, an embodiment of this invention is shown wherein the suction valve 22 communicates with the inlet passage 13 through a passage 35 formed in the cylinder head 15. The passage 35 is similar in shape to the passage 23. With this arrangement no suction chamber is needed. In other respects, this embodiment is the same as the preceding embodiment.

In Fig. 6, an embodiment of this invention is shown which is particularly suitable for hermetically-sealed compressor units. In this embodiment, the compressor is enclosed in a hermetically-sealed or fluid-tight container 36 to which the refrigerant is returned. The inside of the container 36 is at suction pressure and fluid is admitted to the suction valve 22 through opening 37, in the cylinder head 15, which communicates with the interior of the casing 36. In other respects, this embodiment is the same as the preceding embodiments.

An advantage of this invention is that it does not require separate pieces to serve as guides for the discharge valve and it is therefore more economical to manufacture.

Another advantage is the ease with which the valves are assembled. This is done by merely placing the suction valve strip 23 in the slots 30

and the discharge valve strip 29 in the slots 31 in the cylinder member, and then bolting the cylinder head 15 down on the cylinder member.

From the foregoing description taken in connection with the drawings, it will be seen that this invention provides an improved arrangement for passing fluid to and from the cylinder of a compressor that is simple, economical and easy to assemble.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In a compressor or the like, the combination of a cylinder member having a cylinder therein, a piston movable in said cylinder, an outlet passage, a cylinder head closing one end of said cylinder and said outlet passage, a second passage in said cylinder head through which refrigerant compressed by said piston is discharged, said second passage having one end in registry with said cylinder and its other end in registry with said outlet passage, there being a recess in said cylinder member, and a thin flexible valve reed or strip disposed in said recess with the ends of said reed retained between said cylinder member and said cylinder head, said reed seating against the under side of said cylinder head to close said second passage on the intake stroke of said piston.

2. In a compressor or the like, the combination of a cylinder member having a cylinder and an outlet passage formed therein in juxtaposed relationship, a piston movable in said cylinder, a cylinder head closing one end of said cylinder and said outlet passage, said cylinder head having a second passage therein through which refrigerant compressed by said piston is discharged, said second passage having one end in registry with said cylinder and its other end in registry with said outlet passage, a thin flexible valve reed or strip disposed against the end of said second passage that opens into said outlet passage, said valve strip being disposed between said cylinder member and the cylinder head and extending across said outlet with both ends thereof projecting beyond the outlet passage, and said cylinder member being formed with recesses adapted to receive the projecting end portions of the valve strip and permit the same to move therein when the valve strip is bowed into the outlet passage to open said second passage upon the compression stroke of the piston, said strip seating against the under side of said cylinder head to close said second passage upon the suction stroke of said piston.

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