

Filed Jan. 30, 1947

DIAPHRAGM PUMP

2 Sheets-Sheet 1

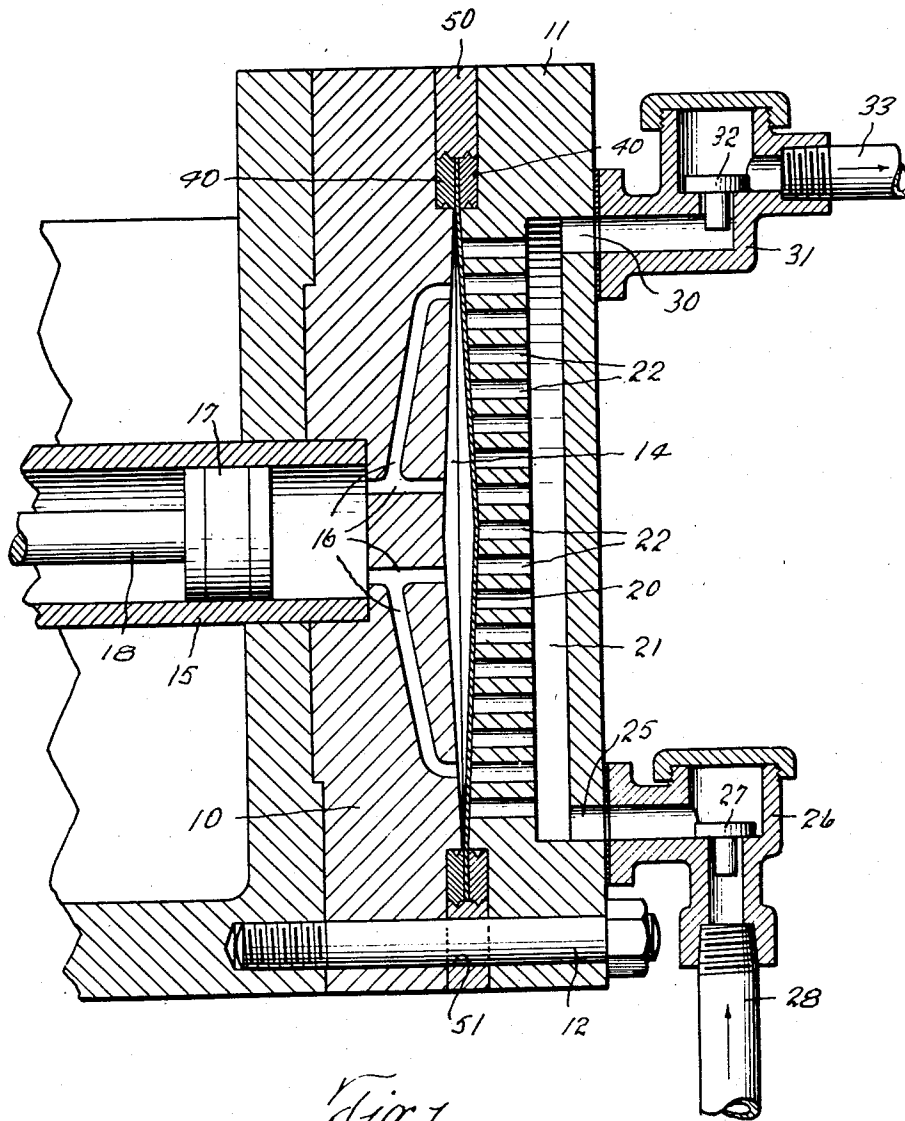


Fig. 1

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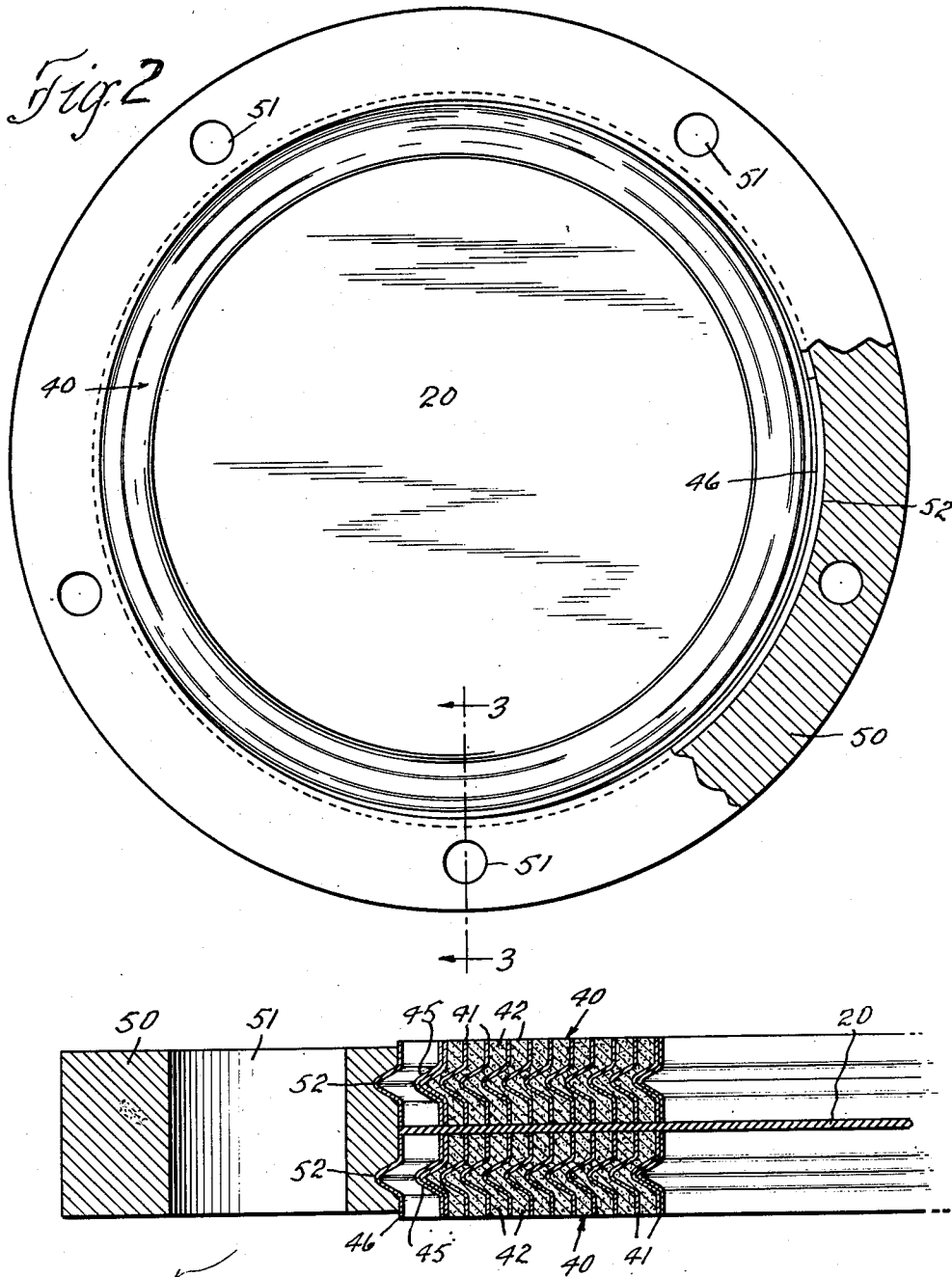
July 13, 1948.

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2,445,293

Filed Jan. 30, 1947

2 Sheets-Sheet 2



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2,445,293

DIAPHRAGM PUMP

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Application January 30, 1947, Serial No. 725,325

1 Claim. (Cl. 103—44)

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This invention relates to diaphragm pumps and more particularly to a pump diaphragm assembly.

An object of the invention is to provide a pump diaphragm support having novel and improved details of construction and features of operation.

Another object is to provide a diaphragm, support and sealing means arranged to be assembled as a unit.

Another object is to provide a novel and improved diaphragm support and gasket assembly for the above purpose.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Although the novel features which are believed to be characteristic of this invention are pointed out more particularly in the claim, the nature of the invention will be better understood by referring to the following description, taken in connection with the accompanying drawings, in which a specific embodiment of the invention has been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a sectional view of a diaphragm pump embodying the present invention;

Fig. 2 is a front elevation of the diaphragm assembly and support; and

Fig. 3 is a partial section on an enlarged scale taken on the line 3—3 of Fig. 2.

Referring to the drawings more in detail, the invention is shown as applied to a diaphragm pump comprising a head 10 and cylinder 11 which are substantially circular in form and are secured together by bolts 12 disposed about the periphery thereof. The head 10 and cylinder 11 are provided with adjacent concave surfaces forming a chamber 14. The head 10 is provided with an axial bore in which a cylinder 15 is disposed. The cylinder 15 communicates through passages 16 with the chamber 14. A piston 17 is disposed in the cylinder 15 and is provided with piston rod 18 which is actuated by suitable mechanical means not shown.

A flexible diaphragm 20 is disposed in the chamber 14 and is adapted to flex into contact with the concave wall of either the head 10 or the cylinder 11. The cylinder 11 contains a pump chamber 21 which communicates with chamber 14 through a plurality of transverse passages 22.

The chamber 21 is provided with an inlet port 23 which communicates with a valve housing 26 containing a check valve 27 which may be of any standard construction adapted to admit fluid to the chamber 21 but to prevent the return flow of said fluid. The valve housing 26 communi-

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cates with a fluid inlet pipe 28 through which the fluid is received. The chamber 21 is also provided with an outlet port 30 communicating with a valve housing 31 containing a check valve 32 which is of any standard type adapted to pass fluid from the chamber 21, but to prevent the return flow of said fluid. The valve housing 31 communicates with a discharge pipe 33.

The peripheral edge of the diaphragm 20 is secured between a pair of gaskets 40 as shown more in detail in Fig. 3. These gaskets are of the spiral wound type comprising a spiral wound strip 41 of metal with a filler 42 of soft material interposed between adjacent metal convolutions. The metal strip 41 is provided with a longitudinal bead 45 and the outer end of the strip 41 is prolonged to form a spring extension 46. A gasket of this type is shown more in detail in the Bohmer Patent No. 2,200,212 dated May 7, 1940, and only so much thereof is disclosed herein as is necessary to an understanding of the present invention.

In accordance with the present invention, a supporting ring 50 is provided which extends around the outer periphery of the gasket 40 and diaphragm 20 and is provided with a plurality of holes 51 adapted to receive the bolts 12. The supporting ring 50 is provided on its inner periphery with a pair of annular recesses 52 which are adapted to receive the beads 45 of the outer convolutions and extensions 46 of the gasket 40. The spring extension of the outer convolutions provide resilience to permit the gasket to be seated with the outer bead 45 in the recess 52. Obviously, if sufficient resilience is otherwise provided, the spring extension 46 may be omitted and the outer convolution of the gasket may be seated directly in the recess 52.

A gasket 40 is disposed on each side of the diaphragm 20 and the gaskets and diaphragms are held assembled by means of the beads 45 seated in the corresponding recesses 52 of the supporting ring 50. It will be noted that, as shown in Fig. 3, the gasket assembly is somewhat wider than the supporting ring 50. This permits the gaskets to be compressed to the width of the supporting ring 50 for exerting sealing pressure on the diaphragm.

In assembly the supporting ring 50 with the gaskets 40 and diaphragm 20 is positioned in a suitable recess between the head 10 and the cylinder 11 as shown in Fig. 1 and the bolts 12 are tightened to compress the gasket body and to cause the same to exert the necessary sealing pressure upon the opposite faces of the diaphragm 20. The diaphragm is thus caused to completely

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seal the chamber 21 from the passages 16 leading to the cylinder 15.

In the operation of this device the pipe 28 is connected to the source of fluid which is to be pumped. The cylinder 15 and chamber 14 on the cylinder side of the diaphragm 20 are charged with a suitable liquid. Actuation of the piston 17 will then cause fluid pressure and suction to be applied alternately to the chamber 14 and will cause the diaphragm 20 to deflect, first into contact with one wall of the chamber 14 and then into contact with the other wall thereof. This flexing of the diaphragm 20 alternately subjects the chamber 21 to suction and pressure. When the chamber 21 is subjected to suction, fluid flows from the pipe 28 through the check valve 26 to fill the chamber 21. When the diaphragm 20 is deflected in the opposite direction to exert pressure on the fluid within the chamber 21, the fluid is forced through the discharge port 30 and check valve 31 to the discharge pipe 33. During this portion of the operation the check valve 26 prevents the fluid from being returned to the pipe 28.

The above described pump is adapted for use with chemicals or similar fluids which are to be completely isolated from the external apparatus. The gaskets 40 provide a positive seal for the diaphragm 20 and, inasmuch as no moving parts extend into the pump chamber, there are no moving surfaces to be sealed. The fluid being pumped is accordingly completely isolated and may be maintained within a closed system. Such a pump may be useful, for example, in refrigerator systems or the like in which a refrigerant is pumped around a closed cycle.

Although a specific embodiment of the invention has been shown for purposes of illustration, it is to be understood that the invention is not to be restricted thereto, but that changes and

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modifications may be made therein as will be apparent to a person skilled in the art. The invention is only to be limited in accordance with the scope of the following claim.

What is claimed is:

In a diaphragm pump, a cylinder containing a fluid chamber and inlet and outlet ports communicating therewith, a head attached to said cylinder and a diaphragm interposed between said cylinder and said head to form a closure for said chamber and means flexing said diaphragm for displacing the fluid in said chamber, sealing means for said diaphragm comprising a pair of gaskets disposed on opposite sides of said diaphragm and engaging said cylinder and said head respectively, each gasket comprising a longitudinally beaded metal strip and a strip of compressible material spiral wound in alternate layers with the longitudinal bead extending around the outer periphery of the gasket, a supporting ring having a pair of annular parallel grooves in its inner peripheral surface, said beads being seated in said grooves to secure said gaskets in said ring and means securing said ring with the gaskets and diaphragm between said head and said cylinder.

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The following references are of record in the file of this patent:

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