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(54) Neutral shaped pump diaphragm

(57) In the invention, the diaphragm for an air-operated double diaphragm pump is molded in an "S" shape which corresponds to the shape of the diaphragm in the center (of the pump stroke) or relaxed position. By allowing the pump to be assembled in this center or relaxed position, the diaphragm need not be flexed in order to perform the pump assembly.

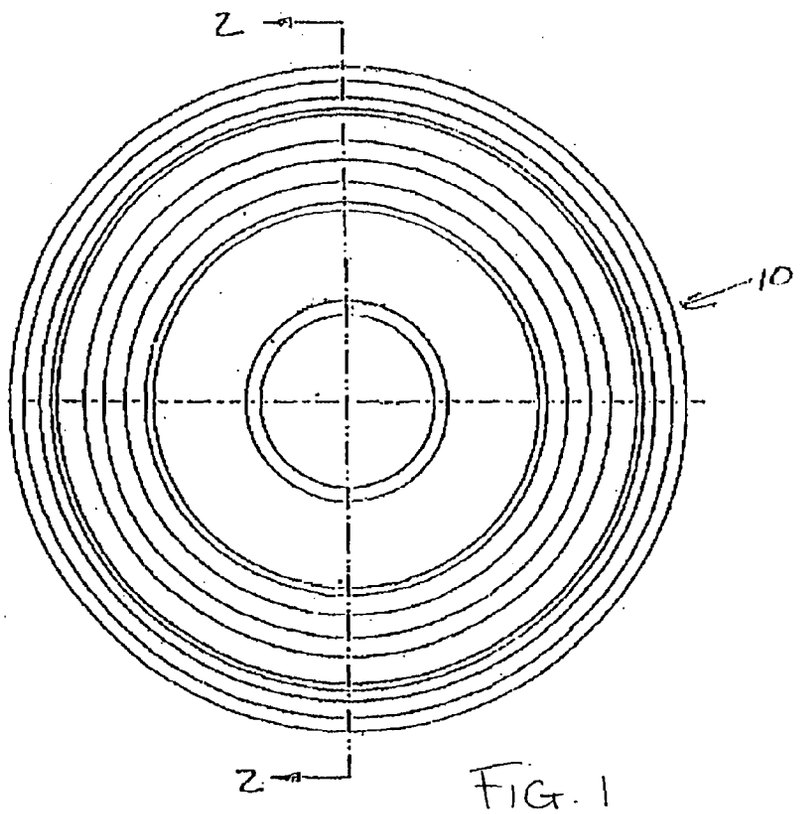

FIG. 1

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Description

BACKGROUND OF THE INVENTION

Air operated double diaphragm pumps of various sorts have been known and used for many years. Such pumps typically utilize a pair of diaphragms molded from various materials depending upon the chemical compatibility required for the pump. The diaphragms are typically molded in a hat shaped configuration. Because one side of the diaphragm is designed to face the fluid and the other to face the air chamber, when assembling the pump it is generally necessary to turn one of the "hats" inside out for assembly. In larger pump sizes, this requirement may be especially difficult.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a diaphragm for such pumps which will ease the assembly of such pumps and which would exhibit increased life compared to prior art designs.

In the instant invention, the diaphragm is molded in an "S" shape which corresponds to the shape of the diaphragm in the center (of the pump stroke) or relaxed position. By allowing the pump to be assembled in this center or relaxed position, the diaphragm need not be flexed in order to perform the assembly.

The use of such diaphragms should also lead to increased life of the diaphragm. There is less chance for the diaphragm to rub and be abraded on either the fluid cover or air cover housings. Further, the maximum distance that the diaphragm will flex is substantially less than with diaphragms manufactured according to current practice. Improved diaphragm life due to reduced applied stress at pump stroke changeover will result as the diaphragm profile facilitates a natural roll motion through the peak stress points in pump operation. Proportionally larger arc segments can be used in this diaphragm profile cross-section as well to improve the flex life of diaphragms.

The diaphragm as shown in the attached drawing is made of a rubber material (such as VITON™) having a nylon fabric reinforcement and is manufactured using a compression molding process. Of course this same technique may be used for diaphragms made of other materials as well. For a 14 inch diameter diaphragm in a 3 inch pump, the diaphragm has a nominal thickness of .160 inches.

These and other objects and advantages of the invention will appear more fully from the following description made in conjunction with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views.

A BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of the diaphragm of the instant invention.

Figure 2 is a sectional view taken along line 2-2 of Figure 1.

Figure 3 shows the diaphragm in its relaxed position in solid and at the two extreme positions in phantom.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the instant invention, the diaphragm 10 is molded in an "S" shape which corresponds to the shape of the diaphragm in the center (of the pump stroke) or relaxed position. By allowing the pump to be assembled in this center or relaxed position, the diaphragm need not be flexed into the first 12 or second 14 extreme positions in order to perform the assembly.

The diaphragm 10 as shown in the attached drawings is made of a rubber material (such as VITON™ having a nylon fabric reinforcement and is manufactured using a compression molding process. Of course this same technique may be used for diaphragms made of other materials as well. For a 14 inch diameter diaphragm in a 3 inch pump, the diaphragm has a nominal thickness of .160 inches.

It is contemplated that various changes and modifications may be made to the diaphragm without departing from the spirit and scope of the invention as defined by the following claims.

Claims

1. A diaphragm for use in an air-operated double diaphragm pump, siad diaphragm flexing during use between first and second extreme positions, the improvement comprising said diaphragm being molded in a relaxed state so as to be shaped similar to the shape of said diaphragm intermediate said first and second positions.

2. The diaphragm of claim 1 wherein said relaxed state shape is the shape of said diaphragm at a position equidistant from said first and second positions.

3. The diaphragm of claim 1 wherein said diaphragm is S-shaped in cross-section.

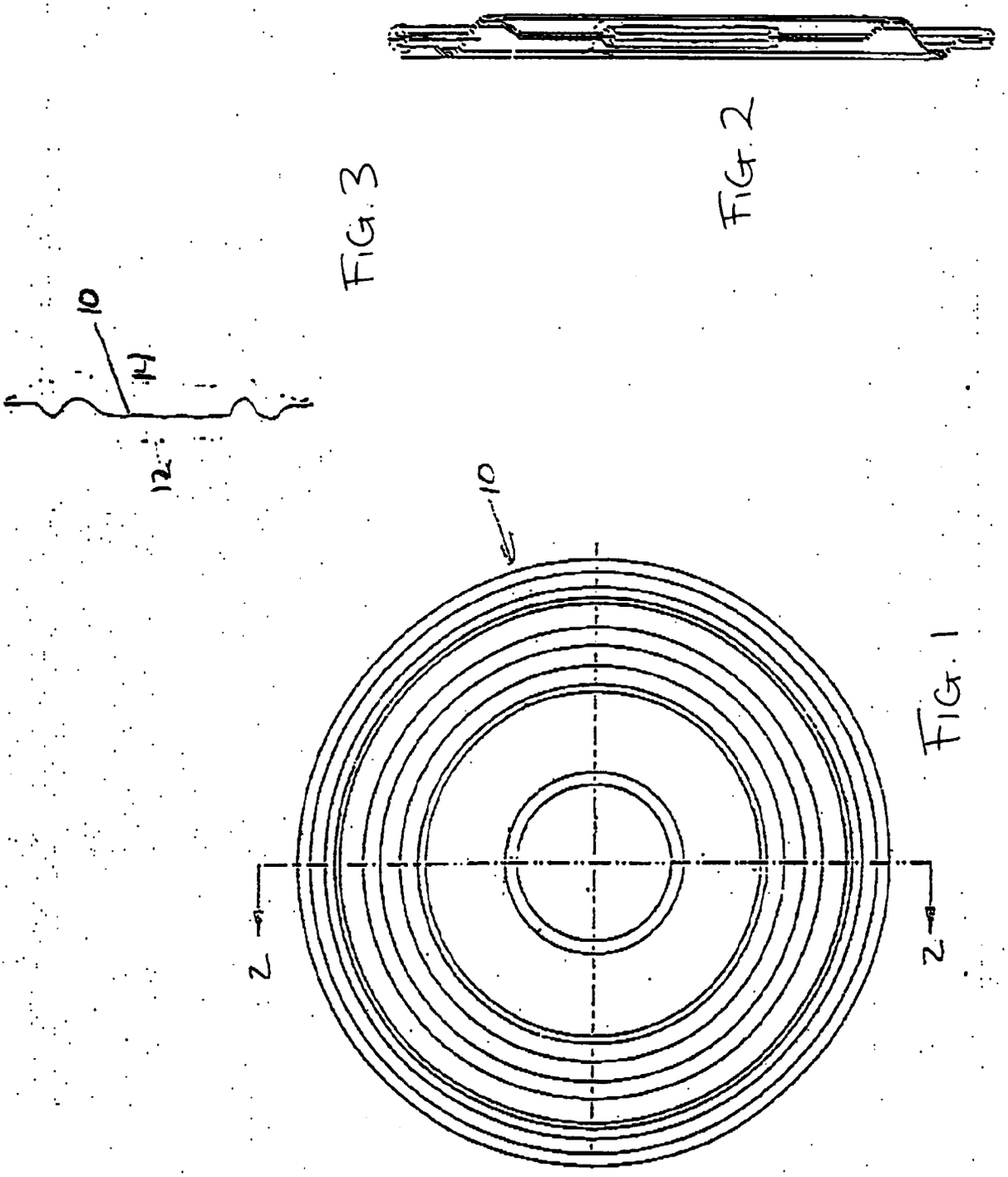

FIG. 3

FIG. 2

FIG. 1