

[54] DIAPHRAGM

[75] Inventor: Victor Mastis, Hinsdale, Ill.

[73] Assignee: The Berg Manufacturing Company,
Des Plaines, Ill.

[22] Filed: May 30, 1973

[21] Appl. No.: 365,122

[52] U.S. Cl. 92/101, 92/99, 92/103 R

[51] Int. Cl. F01b 19/00, F16j 3/00

[58] Field of Search.... 92/93, 98 R, 99, 101, 103 R,
92/103 SD

[56]

References Cited

UNITED STATES PATENTS

2,355,721 8/1944 Foutz 92/98 R X
2,545,857 3/1951 Perkins et al. 92/101 X

2,931,311	4/1960	Ulm et al.	92/99 X
3,135,173	6/1964	Jack, Jr.	92/101 X
3,183,789	5/1965	Stelzer	92/99 X
3,435,734	4/1969	Bushway et al.	92/103

Primary Examiner—Martin P. Schwadron

Assistant Examiner—Abraham Hershkovitz

[57]

ABSTRACT

A cup-shaped diaphragm formed of fabric reinforced resilient material, such as rubber, has a plurality of fingers at the merger of the base or body portion and the conical wall of the diaphragm. The fingers are uniformly spaced and are effective to prevent rubbing of the piston against the merger of the conic wall and the body portion, thereby precluding excessive wear of the diaphragm at this point.

2 Claims, 4 Drawing Figures

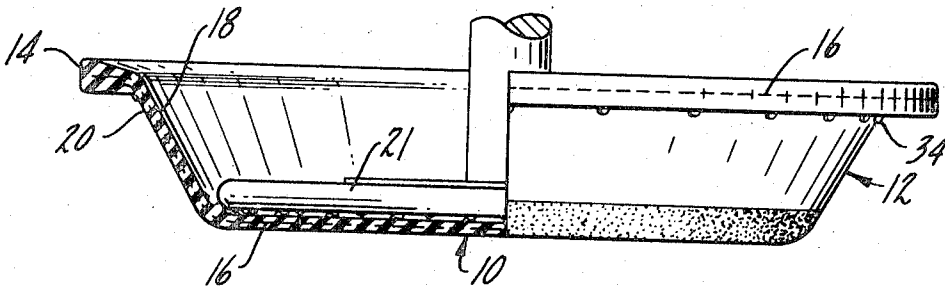
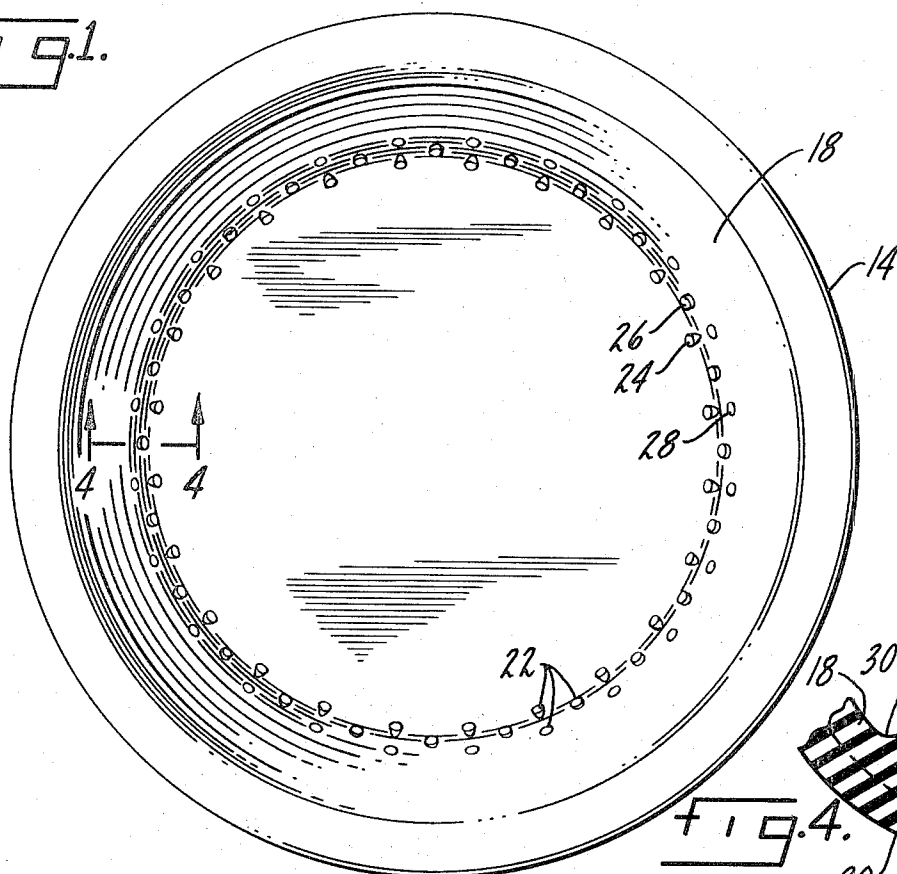
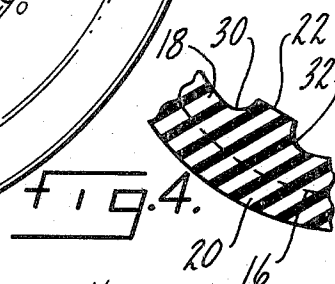
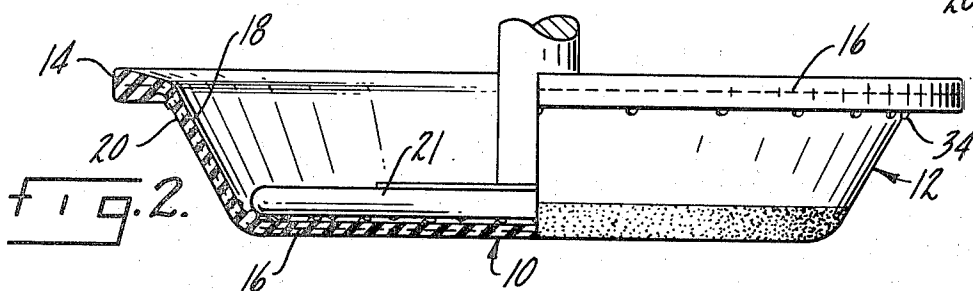
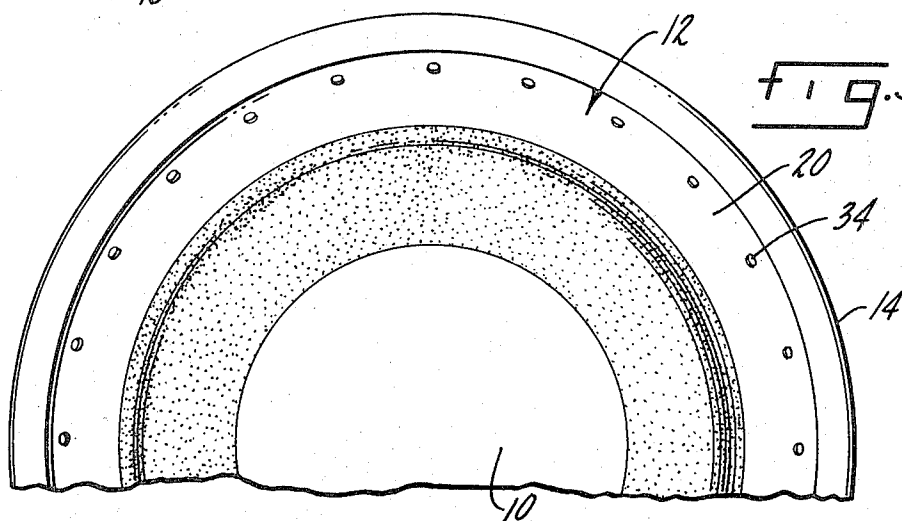


fig. 1.



1

DIAPHRAGM

SUMMARY OF THE INVENTION

This invention relates to a diaphragm for use in an air brake chamber and has particular relation to improvements in such diaphragm as to preclude wear and damage thereto.

A primary purpose of the invention is a diaphragm of the type described made of fabric reinforced resilient material having spacing means at the zone of merger between the wall and the base.

Another purpose is an improved diaphragm for use in an air brake chamber.

Another purpose is a diaphragm of the type described having a plurality of upwardly extending fingers positioned at and adjacent the zone of merger of the wall and base.

Another purpose is a fabric reinforced cup-shaped diaphragm having several rows of fingers at and adjacent the zone of merger of the bottom and side walls of the diaphragm.

Other purposes will appear in the ensuing specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated diagrammatically in the following drawings wherein:

FIG. 1 is a top plan view of the improved diaphragm of the present invention,

FIG. 2 is a side view, in part section,

FIG. 3 is a partial bottom view of the diaphragm, and

FIG. 4 is a section along plane 4—4 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention relates to diaphragms of the type used in air brake chambers and is an improvement on the general type of diaphragm shown in U.S. Pat. No. 3,135,173. The above-mentioned patent discloses a diaphragm of the general configuration shown herein positioned within an air brake chamber. The use of the present diaphragm is generally similar to that shown in the above patent.

The diaphragm includes a bottom wall or base portion 10 which is merged into a conical annular wall 12, with the conical annular wall 12 terminating in an annular lip 14. When the diaphragm is positioned within an air brake chamber, the annular lip 14 is engaged by and secured to the brake chamber housing and the base or bottom of the cup-shaped diaphragm 10 is in engagement with the piston within the brake chamber. A portion of the piston is indicated at 21 in FIG. 2.

The diaphragm is formed by a layer of a suitable fabric, for example nylon, indicated at 16, which is enclosed by a rubber-like material or resilient layers which are positioned, as indicated at 18 and 20, on opposite sides of the fabric layer 16. Ideally, the fabric layer 16 will be centrally positioned relative to the rubber layers 18 and 20. However, it is difficult to always reach this optimum result in a molding process and at times the diaphragm may be closer to one surface or another than is desired. In the event the fabric is exposed to the surface, i.e., the rubber layer having worn away or being overly thin as a result of an inferior molding process, the diaphragm may burst in use, or it may not prevent the introduction of moisture into the air brake chamber. The present invention is particu-

larly directed to a means for preventing wear of the diaphragm at the merger of the bottom and side walls.

There are a plurality of outwardly-extending fingers 22, there being three rows of such fingers, an inner row 24, a middle row 26, and an outer row 28. The inner row 24 extends from the base 10 directly adjacent the zone of merger of the base into the conical wall 12. The middle row 26 is actually at the zone of merger of the base and the conical wall 12, whereas the outer row 28, in a manner similar to that of the inner row 24, extends from the conical wall 12 directly adjacent the zone of merger. The inner row 24 and the outer row 28 are at opposite sides of the middle row 26, with each of the inner and outer rows extending from points directly adjacent the zone of merger.

As particularly illustrated in FIGS. 1 and 4, the cross section of the fingers is generally circular. The fingers or projections of the middle row 26, illustrated in FIG. 4, extend directly out with generally equal sides, illustrated at 30 and 32. The sides of the fingers of the inner and outer rows are generally symmetrical in that one side is shorter than the other. It should be noted, as illustrated in FIG. 1, that the fingers of the inner and outer rows are generally aligned and generally spaced equally and at opposite sides of the fingers of the center or middle row 26. Thus, the fingers are uniformly and symmetrically arranged at the zone of merger and directly adjacent the zone of merger of the base or bottom to the conical side wall 12.

Turning particularly to FIG. 3, the outer surface of the conical wall 12 has a plurality of outwardly-extending fingers 34 which may also serve to prevent wear of that portion of the conical outer wall adjacent the outer annular lip 14 which is secured to the brake chamber housing.

When the cup-shaped diaphragm disclosed herein is mounted within a brake chamber, the fingers 22 will space the corner of the diaphragm from the outer edge of the piston 21. In normal use, wear is caused at this point by the edge of the piston bearing against the corner. The piston may tend to rub into the corner due to a slight degree of misalignment between the piston, brake housing and diaphragm. In the molding process, the most likely location for there to be a thin layer of rubber is at the corner. Thus, the fingers 22 prevent wear from the piston at this point and space the piston from the diaphragm to preserve the integrity of the rubber reinforcing layer over the fabric inner layer.

Whereas the preferred form of the invention has been shown and described herein, it should be realized that there may be many modifications, substitutions and alterations thereto.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A cup-shaped diaphragm of fabric reinforced resilient material for use in an actuator having a housing and a piston member adapted to engage a diaphragm, said diaphragm having an annular outer lip adapted to engage a housing, an annular conic wall merging with said lip and a body portion merging with said annular conic wall at a zone of merger thereof, said annular conic wall and said body portion together forming a concave element, and a plurality of independent spaced fingers each of generally circular cross section extending from said body portion and being integral therewith and said annular conic wall of said concave

3

element, said fingers being arranged in a plurality of rows circumferentially spaced from one another, a first of said rows being positioned adjacent the zone of merger of said body portion with said annular conic wall, said fingers of said first row having one side shorter than another side thereof, a second of said rows being positioned adjacent said zone of merger of said conic wall opposite said first row, said fingers of said second row having one side shorter than another side thereof, a third of said rows being positioned within and being integral with said zone of merger, said fingers of said third row having equal sides, said fingers of said

4

first and second rows being generally aligned radially with respect to said body portion and said conic wall and said fingers of said third row being misaligned with respect to said fingers of said first and second rows.

2. The structure of claim 1 further characterized in that said annular conic wall includes a row of fingers integral with said annular conic wall and arranged circumferentially on a side of said conic wall opposite the side forming said concave element and adjacent its distal end from said zone of merger.

* * * * *

15

20

25

30

35

40

45

50

55

60

65