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F. W. STALKER ET AL

PRESSURE RESPONSIVE DIAPHRAGM

Filed June 11, 1920

Fig. 1

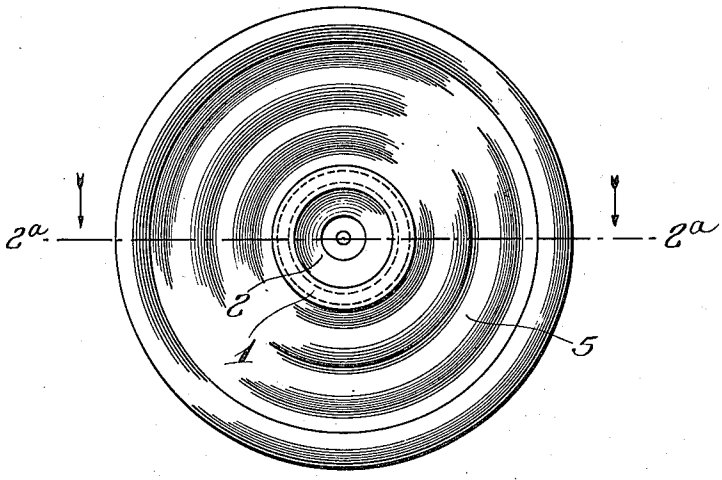
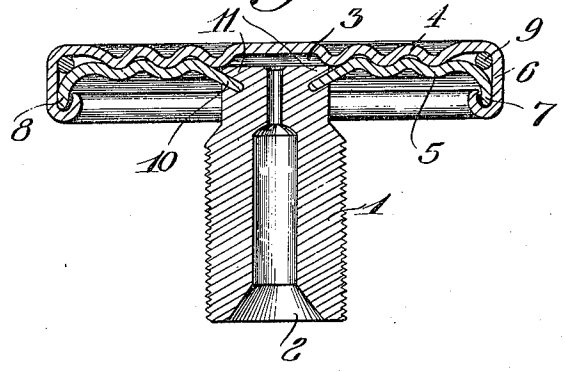


Fig. 2



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UNITED STATES PATENT OFFICE.

FREDERICK W. STALKER AND DURWOOD D. ROSENBURGH, OF ROCHESTER, NEW YORK, ASSIGNORS TO TAYLOR INSTRUMENT COMPANIES, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

PRESSURE-RESPONSIVE DIAPHRAGM.

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To all whom it may concern:

Be it known that we, FREDERICK W. STALKER and DURWOOD D. ROSENBURGH, citizens of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pressure-Responsive Diaphragms; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of the specification, and to the reference numerals marked thereon.

This invention relates to pressure responsive diaphragms of the variety employed to translate fluid pressure into proportional mechanical motion for actuating valves, indicators and the like, and, more particularly, to diaphragms of the so called "capsular" or "wafer" type.

The chief object of the invention is to simplify the character and method of construction of such diaphragms while at the same time producing a very efficient and durable article. To these and other ends, the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a bottom plan view of a diaphragm embodying the present invention.

Fig. 2 is a transverse section on the line 2^a—2^a of Figure 1.

Similar reference characters throughout the several views indicate the same parts.

The pressure responsive device herein shown and described as embodying the features of the present invention consists preferably of a plug 1 provided on the outside thereof with screw threads or other suitable means for attaching it to some fluid conductor or other pressure container, and is provided on the inside with a passageway 2 leading into the expansible chamber 3 which is formed between the upper and lower diaphragms 4 and 5. The latter are corrugated as shown in collapsed state to provide greater extension when expanded. Each diaphragm is provided on its outer edge with a flange united by solder 8, and the flange 6 of the upper diaphragm is, after soldering, bent around the flange 7 of the lower diaphragm in the manner shown. A spacing member 9, preferably of curved cross section is located contiguous to the bend between the upper diaphragm and its peripheral flange and serves the dual purpose of separating the diaphragms and also as a form for the bend between the upper diaphragm and its peripheral flange in order to prevent this bend becoming unduly sharp during expansion and contraction of the pressure chamber.

The lower diaphragm is provided with a central aperture therein through which the plug 1 is fitted. This plug is provided near its upper end with a circumferential groove into which are inserted the edges 10 of the lower diaphragm. After the inner edges 10 have thus been inserted the sides of the groove are compressed to securely hold the edges 10 in position, or in other words the portions 11 of the plug are upset or bent over to securely hold the edges 10. The top diaphragm and the spacing member 9 may next be inserted over the lower diaphragm, when, after soldering, the peripheral flanges 6 and 7, one flange may be bent over the other in the manner shown to form a fluid tight joint. Figure 2 shows the inner edges 10 of the lower diaphragm normally disposed at an angle to the plane of the lower diaphragm while the latter is collapsed, but these edges 10 are in substantial alinement with the lower diaphragm when the pressure chamber is expanded, and by this arrangement undue bending of the lower diaphragm adjacent the plug is prevented while subjected to pressure stresses. The flexure caused by expansion and contraction takes place over a wider area with the arrangement shown than would be the case if the inner edges 10 were in substantial alinement with the lower diaphragm in its normal retracted position, while the curvature is more uniform and the stresses more nearly tensile in character.

It is apparent that the construction is simple in character, necessitating but few parts while the method by which it is effected is convenient and economical, and produces a durable efficient article.

I claim as my invention:

1. In a pressure responsive element, the combination of a flexible diaphragm having a peripheral flange, a second flexible dia-

phragm having a peripheral flange folded about and secured to the flange of said first diaphragm, and a supporting member between said diaphragms having a curved surface supporting the area of flexure of the second diaphragm adjacent its flange to control the radius of flexure at said area.

2. In a pressure responsive element, the combination of a pair of flexible diaphragms having their peripheral portions curved in the same direction to form angularly disposed flanges a first one of which is formed about and secured to the margin of the second, and a supporting member between said diaphragms having a curved surface in supporting engagement with the curved base of said first flange to control the radius of flexure thereof.

3. In a pressure responsive element, the combination of a pair of flexible diaphragms having peripheral flange portions turned angularly in the same direction with the margin of one of said flange portions formed upon itself in the opposite direction transversely of the diaphragms about the margin of the other flange portion to provide a solder retaining joint, solder securing said flange margins together, and a spacing member between the diaphragms having a curved surface in supporting engagement with said first flange portion and the diaphragm adjacent thereto.

4. In a pressure responsive element, the combination of a flexible corrugated disk having its periphery curved gradually to provide an angularly disposed flange, a second flexible corrugated disk having its periphery curved to extend in the same direction as said flange and bent upon itself about said flange toward said diaphragms to provide a solder holding joint, and a wire ring spacing said diaphragms and in supporting engagement with the curved periphery of said second diaphragm to maintain the radius of curvature of the latter during flexure.

5. An expansible chamber comprising an upper diaphragm provided with a flange on the peripheral edge thereof, a lower diaphragm joined on its periphery to the upper diaphragm and a spacing member of curved cross section separating the upper and lower diaphragms, located in the joint between the upper diaphragm and its flange and contiguous with all portions of the bend whereby the spacing member by its curved shape limits the sharpness of the bend during expansion and contraction of the chamber.

6. An expansible chamber comprising upper and lower diaphragms provided with cooperating flanges on the peripheral edges thereof which are secured by soldering and bending of one around the other and a former or spacing member separating the diaphragms and located in the bend between the upper diaphragm and its flange and shaped to conform to the bend, said upper diaphragm being supported by its flange and the spacing member whereby the latter is adapted to cause the bend between the upper diaphragm and its flange to conform to the shape of the spacing member.

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