

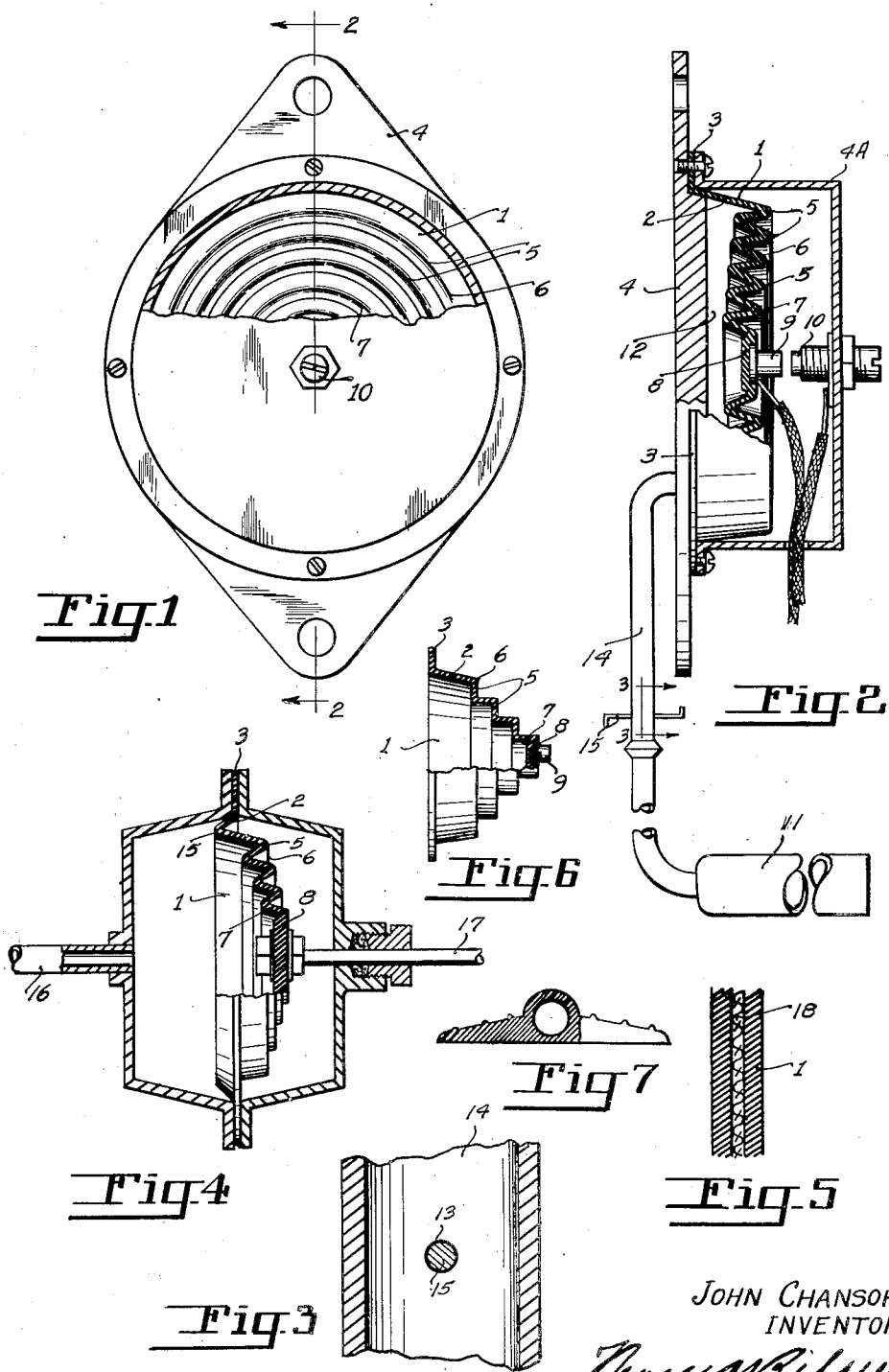
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J. CHANSOR

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FLEXIBLE CORRUGATED DIAPHRAGM

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JOHN CHANSOR
INVENTOR

Thomson & Blythe
ATTORNEY

UNITED STATES PATENT OFFICE

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FLEXIBLE CORRUGATED DIAPHRAGM

John Chansor, Park Place, Oreg.

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2 Claims. (Cl. 200—83)

My invention is intended for use in connection with mechanical or electrical controlling devices where either positive or negative pressures are used as the controlling means.

5 My invention is comprised of a series of concentrical annular corrugations. The apex of each of the corrugations lies in a plane parallel to the base, the plane of the apex of each corrugation being spaced apart from the plane of the apex 10 of the corrugation circumscribing it. The spacing of the planes is progressive from the outer corrugation toward the inner, but may be in either direction along the common center line. The innermost corrugation terminates in a flat central 15 surface for securing thereto any suitable contact or actuating member.

The primary object of my invention is to provide a flexible corrugated diaphragm that may be flexed a great number of times and through a wider range without breaking or cracking in any 20 of the joints.

A further object of my invention is to provide a diaphragm so constructed that expansion or contraction of the diaphragm itself will not produce a buckling of the diaphragm.

25 A still further object of my invention is to provide a diaphragm wherein a bending of the diaphragm adjacent the retaining flange is minimized, thus reducing the possibility of the diaphragm being broken adjacent the flanges when it is being flexed.

30 With these and incidental objects in view, the invention consists in certain novel features of construction and combination of parts, the essential elements of which are set forth in the appended claims, and a preferred form of embodiment of which is hereinafter shown with reference to the drawing which accompanies and forms a part of this specification.

40 In the drawing:

Fig. 1 is a plan view partially in section of my flexible diaphragm shown in use upon a device that controls any other suitable device by opening and closing electric contacts.

45 Fig. 2 is a sectional side view of the device shown in Fig. 1, being taken on line 2—2 of Fig. 1 looking in the direction indicated.

Fig. 3 is a sectional view of the air release of the device illustrated in Figs. 1 and 2, being taken on line 3—3 of Fig. 2 looking in the direction indicated.

50 Fig. 4 is a sectional side view of my diaphragm shown in connection with a device that controls any other suitable device by direct mechanical connection.

Fig. 5 is a sectional view illustrating the construction of my new and improved diaphragm.

Fig. 6 is a side view, partially in section of my diaphragm shown in full extended position.

Fig. 7 is an end view partially in section of a 5 modified form of diaphragm actuating hose.

Like reference characters refer to like parts throughout the several views.

Referring to Figs. 1 and 2, my diaphragm is shown at 1. In these views it is shown used in connection with a device that is to actuate any other device by establishing an electric circuit. The electric circuit may be established by the action of compressed air or fluid upon the diaphragm 1.

15 The diaphragm is comprised of an annular body member 2 having a peripheral flange 3 formed obliquely to the body 2, thus providing a means for securing the diaphragm to any suitable base plate 4. A cover plate 4A is provided 20 and the diaphragm is secured between the cover plate 4A and the base plate 4 in any well known manner. A series of concentrical annular corrugations 5 comprise the effective diaphragm surface. If the outermost portion 6 of the outside 25 corrugation is taken to be the top or apex, it will be seen that the apex of each corrugation is slightly lower than the one circumscribing it, or each corrugation apex may be slightly higher than the one circumscribing it, as shown in Fig. 4. 30 The innermost corrugation 7 terminates in a flat surface 8. Any suitable contact 9 may be imbedded within the flat portion 8 or secured in any other suitable manner. The vertex contour of each of the corrugations is formed on a radius 35 while the V formed by the corrugation is formed as by two intersecting lines.

This construction has been found to have advantages over any other form of construction. By the use of this construction expansion or contraction within the diaphragm caused from heat or cold will not cause the diaphragm to buckle in either direction. If the vertex of the corrugations were all in the same plane it would be impossible to control the direction that the center 45 of the diaphragm would move should the diaphragm expand. When it is desirable to make contact between the terminals 9 and 10 pressure is applied to the hose 11 which causes air to be forced into the chamber 12. This in turn causes 50 the center portion 8 of the diaphragm to be forced toward the contact 10. A restricted opening 13 is provided in the pipe 14. After the contact is made the air escapes through the opening 55 13 which decreases the pressure in the chamber

12 and permits the diaphragm to return to its normal position as shown in Fig. 2. A pin 15 inserted through the opening 13 restricts the size of the opening and provides a means for keeping the opening clear. In Fig. 4 my diaphragm is shown applied to a brake cylinder. In this view an additional corrugation is provided as shown at 15. The object of providing the additional corrugation is to increase the flexibility and to increase the possible movement of the diaphragm. In this view pressure is applied to the diaphragm either by fluid or air through the pipe 16. A brake rod 17 may be secured at one end to the center portion 8 of the diaphragm and connected at the opposite end to a brake lever. The diaphragm may be actuated by either a positive or negative pressure from the pipe 16.

Fig. 5 illustrates the method employed in fabricating my diaphragm. One or more layers of fabric 18 may be formed within the rubber body of the diaphragm. The purpose of the fabric is to prevent excessive stretch of any one portion of the diaphragm.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the embodiment herein shown and described, as it is susceptible of embodiment in various forms, all coming within the scope of the claims which follow.

What I claim is:

1. In a device of the class described, the com-

bination of a diaphragm made of live rubber, said diaphragm having corrugations disposed central thereof and a flange outwardly extending from the corrugated portion, a base, a cover plate, said cover plate having a flange outwardly extending therefrom and said flange of the housing adapted to engage the flange of the diaphragm when disposed upon the base and for hermetically sealing the diaphragm within the cover plate when the cover plate is tightly secured to the base, means for subjecting one side of the diaphragm to a fluid under pressure, electric terminals secured respectively to the diaphragm and to the cover plate and said terminals being in registry with each other and an electric conductor associated with each of the electric terminals.

2. In a device of the class described, the combination of a base and a cover plate, said cover plate being flanged to facilitate attachment to the base, a flanged corrugated diaphragm disposed within the cover plate with the flange of the corrugated diaphragm forming a gasket between the flanges of the corrugated diaphragm when the cover plate is secured to the base to hermetically seal the diaphragm within the cover plate, an electric terminal fixedly secured to the diaphragm and an electric terminal adjustably secured to the cover plate with said electric terminals being in registry with each other and normally out of contact with each other and means for subjecting one side of the diaphragm to a fluid under pressure.

JOHN CHANSOR.