

W. E. ZIERDEN.
EXPANSIBLE DIAPHRAGMS.
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1,109,499.

Patented Sept. 1, 1914.

Fig. 1.

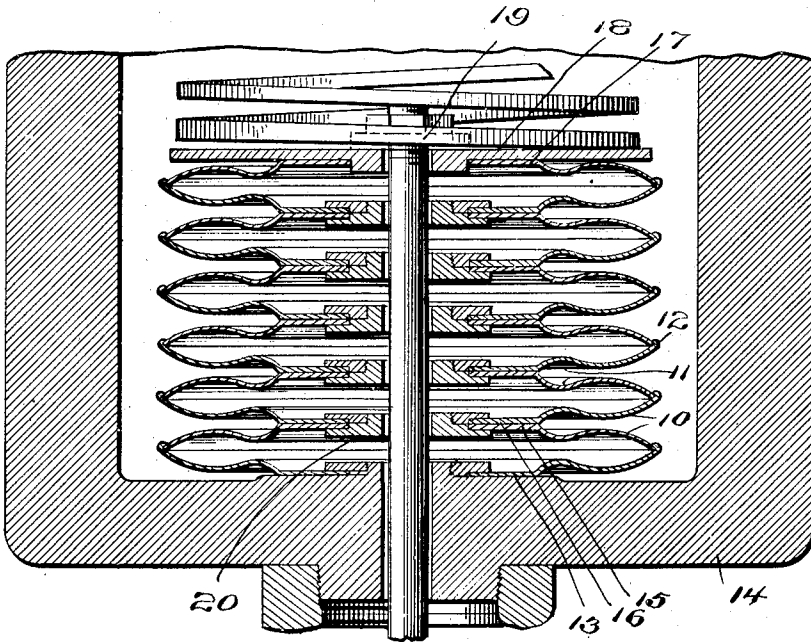
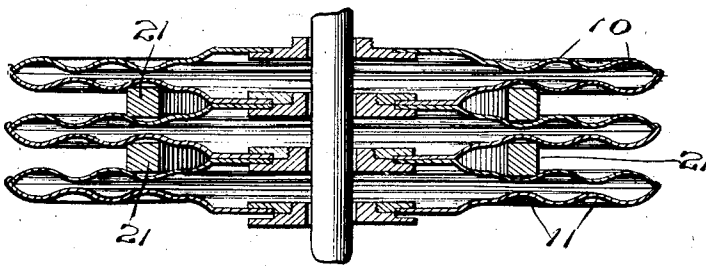


Fig. 2.



Witnesses

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To all whom it may concern:

Be it known that I, WILLIAM E. ZIERDEN, a citizen of the United States, residing at Johnsonburg, in the county of Elk and State of Pennsylvania, have invented certain new and useful Improvements in Expansible Diaphragms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to expansible diaphragms and has for an object to provide a diaphragm adapted for fluid pressure regulating mechanisms which permits the enlargement of the diaphragm above the maximum usually recognized.

In the employment of expansible diaphragms in fluid pressure regulating mechanisms it is found that the more sensitive diaphragms are those provided with annular or circumferential corrugations but the limit of diameter in the use of such diaphragms is very quickly reached for the reason that the circumferential corrugations serve to permit the diaphragms to expand locally without actuating the mechanism to which they are attached. It is also found under many conditions desirable to enlarge the diameter of such diaphragms to increase the accuracy and nicety of control.

The present invention embodies means for enlarging the diaphragms to any desired diameter without departing from the flexibility of the diaphragms, produced by the annular corrugations and yet at the same time increasing the internal area upon which the pressure of the fluid is applied.

With these and other objects in view the invention comprises certain novel constructions, combinations and arrangement of parts as will be hereinafter more fully described and claimed.

In the drawings:—Figure 1 is a diametrical sectional view through a battery of diaphragms showing conventional retaining means and operated mechanism. Fig. 2 is a modification whereby diaphragms embodying a greater number of annular corrugations may be successfully employed.

Like characters of reference indicate corresponding parts throughout the several views.

At Fig. 1 the diaphragms are shown with a single annular rib 10 and a single annular

furrow 11, the peripheries of such diaphragms being secured together as shown at 12 whereby the opposing plates form a receptacle for the reception of the fluid under pressure. As shown therein the first diaphragm in the series is provided with a substantially plane annular portion 13 which engages against the supporting member 14. The opposite side of the diaphragm shown at 15 is also plane and engages for any desired distance flatly against a similar plane portion 16 of the adjacent diaphragm. The diaphragms are united in as great numbers as desired, the last diaphragm being provided with a plane annular portion 17 abutting against the plane ring 18 which is carried by the valve stem or other movable member to be adjusted 19. The several diaphragms are united by substantially the usual and ordinary annular nuts 20 whereby the several diaphragms are in communication and rendered fluid-tight so that the fluid admitted to the interior of the several diaphragms acts simultaneously upon all of such diaphragms. It will be apparent that the plane annular portion at the center of the diaphragms may be increased to as great a diameter as desired so that the diameter of the diaphragms is thereby increased without interfering with the flexibility of the united diaphragms.

As shown in Fig. 2, two annular ribs 10 are employed with also two annular furrows 11 forming such ribs. The increase in the number of corrugations produced by the furrows and ribs renders the outer portion of the diaphragms too flexible so that under excessive pressure the diaphragms expand locally without moving the central portions. To prevent such local expansion, rings 21 are inserted between the adjacent diaphragms which does not interfere in any way with the flexibility of the diaphragms in expanding to move the valve stem 19 but does prevent such local expansion as would interfere with the proper actuation of such valve stem. It will be apparent that if more annular corrugations are employed more rings may also be employed as found desirable. The function accomplished by the central plane portion, as shown in Fig. 1, and the rings as shown in Fig. 2, is to prevent the adjacent members of adjacent diaphragms from approaching each other but to confine the expansion to an enlargement

of the interior of the diaphragm by raising the central portion which is attached to the member to be adjusted.

I claim:—

- 5 A fluid pressure regulating device comprising a plurality of annular diaphragms composed of resilient material and formed with corrugations, a plane portion extending within the corrugated portion of the
10 diaphragms and a clamping member en-

gaging part only of the plane portion and rigidly clamping together the central portions of the proximate members of adjacent pairs.

In testimony whereof I affix my signature 15
in presence of two witnesses.

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