June 11, 1957 F. LAURENTY 2,795,390

VALVE

Filed Sept. 10, 1951

Fig. 1.

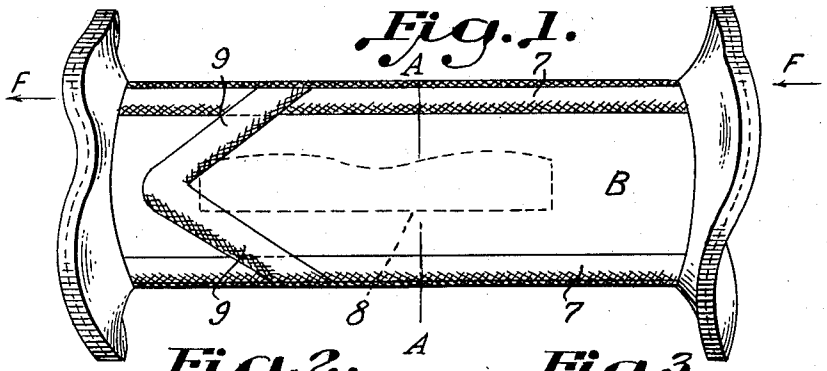


Fig. 2.

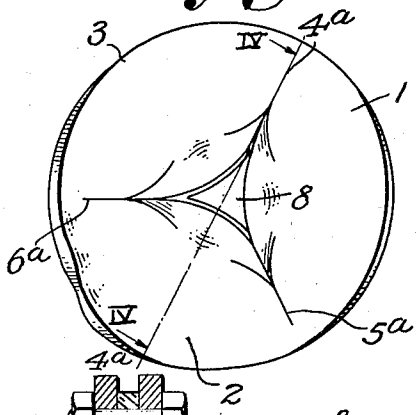
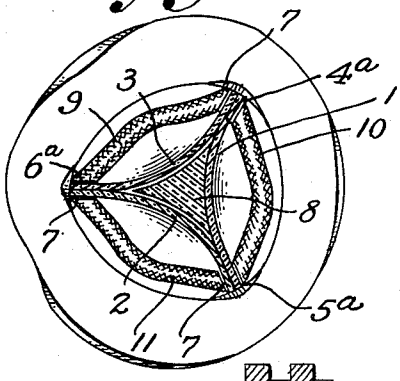


Fig. 3.



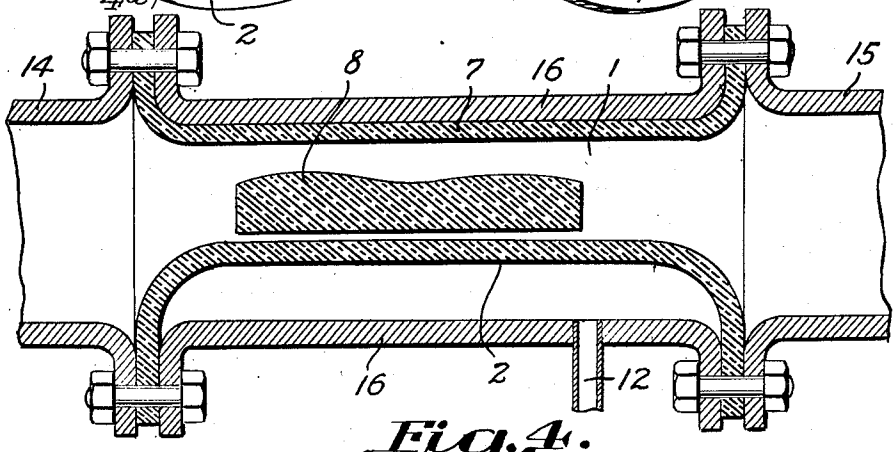


Fig. 4.

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VALVE

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6 Claims. (Cl. 251—5)

The object of the present invention is to provide that improvement in a flexible tubular valve which is adapted to vary the cross section of its passageway by the deformation of the said valve through the action of an auxiliary fluid which bears externally against the valve, a deformable internal tube being employed which presents a curvilinear polygonal central portion, conforming folds extending over said central portion which are normally contracted and bear against the central portion in acute angle folds and supply means for the auxiliary fluid which enters the space between the external tube and internal deformable tube whereby the internal tube presents a curvilinear preset tube to maintain opposite walls of the internal tube in contact with each other when there is no fluid pressure within the flexible internal tube.

The invention obviates the difficulty with leakage in tubes in the prior art. The prior art uses internal tubes of circular cross section or of star-shaped cross section and the tubes in the collapsed condition leave small openings which permit the flow of fluid through the internal tube although the tube is in the closed condition.

According to another object of the invention, the sleeve or diaphragm is formed so that it can be closed, under the external effect of a pressure only very slightly greater than that existing within the sleeve or diaphragm, by providing a sleeve or diaphragm which, in its rest position, is closed and which opens under the effect of an internal pressure slightly greater than the external pressure.

Another object of the invention is to provide a deformable wall which is made up of sheets of flexible and fluid-tight material such as proofed fabric, the sheets being assembled edge-to-edge along their longitudinal sides so as to form acute angles. Over their deformable part, the sheets are advantageously of rectangular or substantially rectangular shape.

The assembly is made by gumming, plasticizing or the like of the superimposed edges of the sheets (plastic) while the sheets are held by any appropriate means such as clamps, after those edges have been preferably covered with a reinforcing fabric.

The assembly can also be made by machine sewing in lieu of or in addition to the above operations.

The invention provides, in particular, for the fluid-tight deformable wall to have the cross-section of a curvilinear polygon (preferably a curvilinear triangle), the apices of which are points of contraflexure, that is to say, having pairs of sides in which the two sides are substantially parallel to each other at the apices of the polygon. Such a wall maintains itself normally closed and opens only under the influence of an internal pressure.

The invention also provides for fixing to one of the faces of the said polygonal wall, a core having the shape of the central orifice, said core being left open by the said polygonal wall when the later is at rest.

Another object of the invention is to provide means such as ties or other members to transmit to fixed or substantially fixed points the tensions which are exerted on the central longitudinal fibres of the wall under the effect of the pressure of the fluid. According to one embodiment of the invention, the polygonal deformable wall is provided with ties connecting the central part of the faces to the apices.

By way of example and in order to render the present description more complete, there have been shown in the accompanying drawings:

Figure 1 is a longitudinal view of an embodiment of an elastic wall in accordance with the invention.

Figure 2 is an end view of the elastic wall according to Figure 1.

Figure 3 is a section on A—A in Figure 1.

Figure 4 is a cross-sectional view taken upon section line IV—IV of Figure 2 and showing the valve clamped in a passageway .

By reference to Figures 1, 2 and 3, it will be seen that the flexible wall has a curvilinear polygonal section having points of contraflexure (that is to say, with pairs of sides which are tangential at the apices of the polygon). According to Figures 1 to 3, the polygon is a triangle.

The faces **1**, **2**, **3** of the wall are formed of three sheets of rubberised fabric which, over their useful part, are in the form of rectangles assembled edge to edge to form acute angles (i. e. to provide points of contraflexure). That method has the advantage of ensuring fluid tightness at the angles *4a*, *5a* and *6a*, which can be obtained only with very great difficulty by any other method, such as folding or predetermining of the angles. In the example shown, the elasticity of the diaphragm tends to close the device and press the faces into contact with each other while the opening is effected by the internal pressure.

Such a diaphragm can be manufactured by maintaining the edges of two faces of the rubberised fabric clamped against each other and vulcanising hot the thus-clamped edges. Preferably, a reinforcing fabric **7** is applied which is caused to be held to the rubberised fabric during the vulcanising.

Another method consists in sewing the edges while they are disposed as shown in Figures 1 to 3 and then vulcanising them, the stitches serving as the clamping means.

As can be seen from Figures 2 and 3, the device comprises an internal part **8**, preferably flexible and, for example, of rubber, stuck to one of the faces, the face **1** for example, and of the shape of the central orifice which is left by the flexible wall when the latter is at rest. This expedient ensures complete fluid tightness of the device with only a very small excess of pressure on the external face. The part **8** need not be provided over the whole length of the deformable wall but only over part of it, preferably the rear part (in the direction of flow of the fluid). It is preferably shaped so as to be slightly sinuous as indicated in Figure 1, in order to provide greater fluid tightness.

Furthermore, the deformable wall can advantageously comprise ties or the like such as **9**, **10**, **11** (Figure 3) which transmit to substantially fixed points the force exerted on the longitudinal central fibres of the deformable wall. According to Figure 3, these substantially fixed points are simply the arrises *4a*, *5a* and *6a*, which are relatively rigid and which, under the action of the tension, tend to accentuate the closing. Any other fixed points would serve as well. From their obliquity these ties which are not extensible but which are flexible can be deformed sufficiently in order not to be an obstacle to the opening of the valve. The arrises are the preferable fixing points because they allow the ties **9**, **10**, **11**

to be provided in advance on any deformable wall which is to be used independently of the tube or of the cock in which it is to be placed.

The ties **9**, **10** and **11** provide an assembly of reinforcing strips to conform to the configuration of the walls **1**, **2** and **3**. Assuming the direction of the flow of the fluid to be that which is indicated by the arrows FF, when the wall is closed, a substantial suction is produced on the delivery side which is transmitted to the rear B of the wall; that suction pulls the central fibres of the wall and tends to separate them, thus causing a leak. The ties **9**, **10**, **11** eliminate that disadvantage by preventing the separation and leaking and thereby eliminating the force exerted on the said central fibres

In Figure 4 the valve is shown as clamped between the central element **16** of the passageway and the end passageways **14** and **15**. An inlet is shown at **12** for the pressure fluid.

I claim:

1. A tubular valve comprising a rigid exterior tubular wall, a flexible interior tubular valve located within said wall forming a space therebetween having sides and disposed in a manner to permit the closing and the variation of the cross-section of the passage of fluid by means of an auxiliary fluid acting within said space between the exterior tubular wall and the flexible interior valve, said flexible interior tubular valve being moulded of a flexible material substantially in the closing position so that opening thereof is produced only when the internal pressure is superior to the pressure of the auxiliary fluid, the ends of said flexible interior valve being sealed at their ends to said exterior tubular wall, said tubular valve having a central core in the form of a curvilinear polygon whose apices are points of contraflexure and the sides of said tubular valve being exactly applied against said core in rest position.

2. In a valve according to claim 1 wherein said flexible interior tubular valve has a core in the form of a curvilinear triangle.

3. A valve as in claim 2 wherein said flexible interior tubular valve comprises separate curvilinear edge sheets edge to edge in fluid tight relationship.

4. A valve as in claim 3 wherein said sheets are rubberized vulcanized rectangles, the vulcanized edges being reinforced with rubberized fabric.

5. A valve as in claim 4 wherein ties are secured to the central part of one face of said flexible tube and to join to the vulcanized edge portion of said tube in order to prevent longitudinal deformations of said interior tubular valve.

6. A valve as in claim 2 wherein the faces of said triangle are tangential to each other where the angles of said triangle are formed and the ends of said triangle open out in circular form to form substantially circular joints.

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