

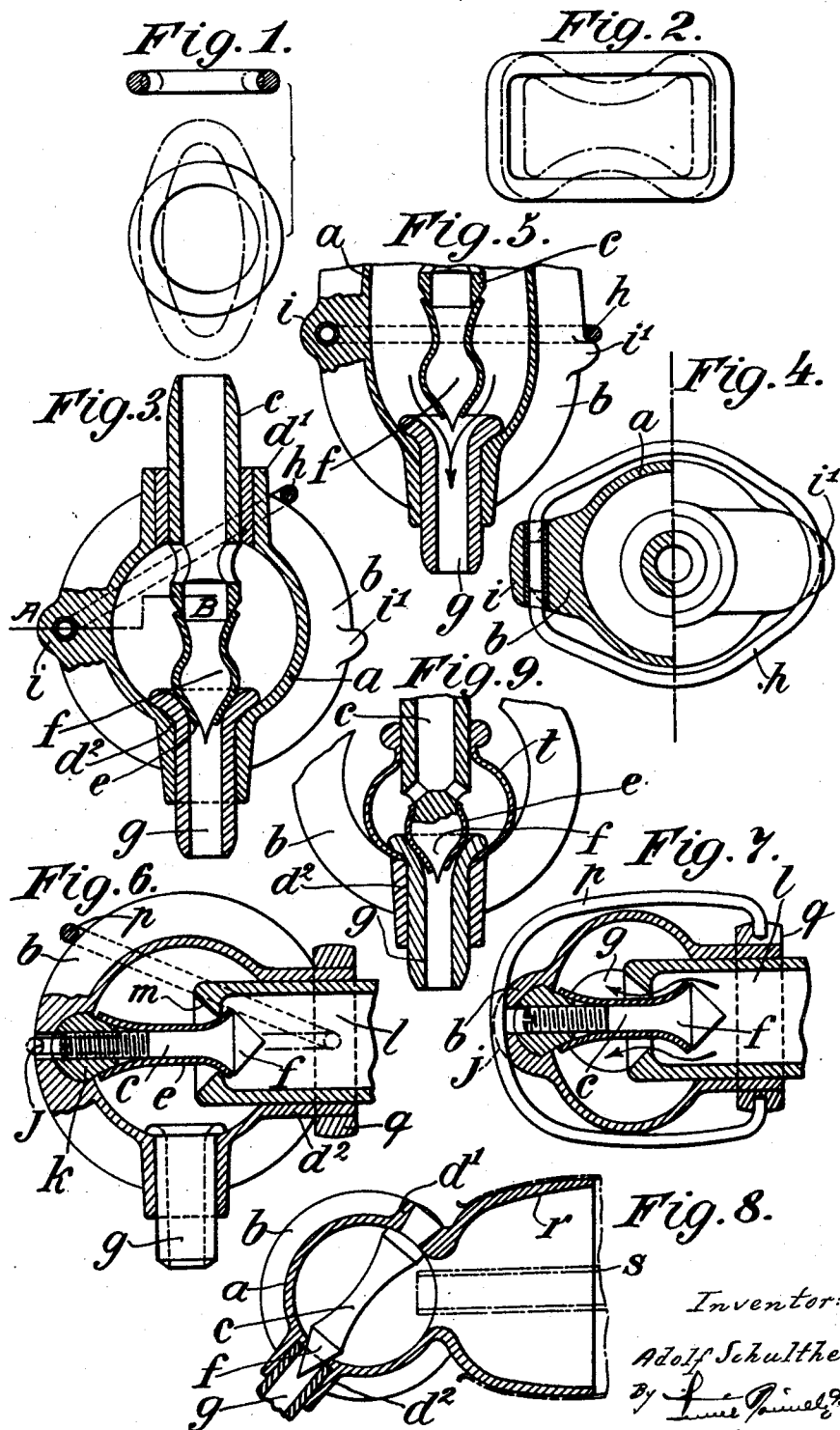
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CLOSING DEVICE

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CLOSING DEVICE.

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The invention relates to a means for retaining fluids in and releasing them from receptacles. The invention is based on the fact that an elastic annular member, when pressed inwards at two opposite points, undergoes a change or distortion in length in the direction of its parallel planes. By parallel planes is meant the planes in which the elastic annular member or actuator lies, such planes for instance would be those in Fig. 2 which pass through the length and breadth of the actuator.

According to the invention this fact is utilized to open by laterally applied pressure an orifice normally closed by the elasticity of the material. For this purpose a pad, in the form of a band or the like, may for example surround a diametrical plane of a spherical receptacle of elastic material. The closing member or valve is secured at one pole of the pad and the orifice to be closed by the member is arranged at the opposite pole. The closing member is formed so that when no external pressure is applied on the pad the rim of said orifice bears tightly, owing to the inherent tension of the pad, against the closing device and closes the orifice but when the pad is pressed inwards the orifice is uncovered.

Figures 1 and 2 of the accompanying drawings illustrate the changes of form under laterally applied pressure of pads respectively of circular and rectangular form. Fig. 3 is a longitudinal section of a device according to the invention in which the pad is annular and in the position in which the orifice is closed. Fig. 4 is in part a cross section on the line A—B of Fig. 3 and partly a plan. Fig. 5 shows a portion of the same embodiment with the orifice uncovered. Figs. 6 and 7 show two longitudinal sections mutually at right angles, through a second embodiment, the orifice being closed in Fig. 6 and open in Fig. 7. Figs. 8 and 9 are longitudinal sections through other modifications.

The example shown in Figs. 3-5 can be used, instead of a cock for ordinary industrial purposes. *a* is a bulb or casing of elastic material such as rubber and *b* is a pad or actuator integral with the bulb and surrounding it diametrically. Both the bulb and the pad are open at two diametrically opposite parts and these openings are sur-

rounded by nipples. The closing device consists of a member *c*, in the shape of a hollow spindle the central portion of which is fixed to or adjustably mounted in one of the nipples *d'*, its outer end protruding beyond the nipple *d'* for attachment to a flexible tube or the like while its inner end is formed into a pearshaped knob or conical tip *f* comprising a valve. The latter may either be separate from or integral with the spindle *c* and is provided with a detachable covering *e* of softer material such as rubber. A short discharge pipe *g* containing the orifice to be closed is inserted into the lower nipple *d''*. The shape of the tip *f* and its distance from the point at which the spindle *c* is mounted in the nipple *d'* are such in relation to the diameter of the bulb *a* and the size of the bore in the discharge pipe *g* that when no pressure is applied on the part *b* the flared inner end of the discharge pipe is caused to bear tightly against the tip *f* or its covering by the tension due to the elasticity of the part *b*.

If pressure is applied on each side of the bulb *b*, that is approximately in the direction A—B, the part *b*, increases in length. It therefore assumes a shape somewhat similar to that shown in Fig. 5, the discharge pipe *g* being consequently moved away from the tip *f* so that the discharge orifice is uncovered and the contents of the bulb can escape through the pipe *g*. As soon as the external pressure on the part *b* is relieved it returns to its original shape and the discharge orifice is again closed.

To avoid the necessity of maintaining a constant pressure by the hand on the part *b* if a considerable volume of liquid is to be discharged, a strap *h* is mounted on a lug *i* disposed on one side and approximately at the centre of the periphery of the part *b*. The normal position of the said strap is that shown in Fig. 3, but when the middle of the part *b* is pressed inwardly the strap *h* slides down the part *b* until it reaches a stop *j* situated about midway on the opposite side of the said part *b* and holds the receptacle *a* and *b* in the position shown in Fig. 5.

The connection between the valve spindle *c* and the nipple *d'* may be such that the pressure of the discharge pipe *g* against the tip *f*, that is the pressure in the bulb *a*, can be modified by varying the longitudi-

nal position of the nipple relatively to the spindle.

In the embodiment shown in Figs. 6 and 7 the closing device *c* consists of two parts screwthreaded together. One part is secured in the part *b* and is provided with a head *k*. The other part which is provided with a head *f* is fitted with a soft and preferably detachable covering *e*, such as a piece of rubber tubing, and projects into a length of pipe *l* which carries the receptacle *a* and *b* by means of the nipple *d*², said pipe being adapted to be attached in known manner, for example, directly to a vessel. The end of this pipe inside the bulb *a* is provided with an annular flange *m*, which under the tension of the pad *b* bears against the hollow neck of the part *c* adjacent to the head *f* and thus closes the inlet orifice. If, however, the pad *b* be pressed inwards from the left in the longitudinal direction of the spindle *c*, the head *f* will be moved away from the flange *m* and thereby uncover the inlet orifice in the pipe *l*, so that the liquid can flow from the latter through the bulb *a* into the discharge pipe *g*.

The part *b* is provided with a bore in alignment with the spindle *c* to enable the thread on the spindle to be reached by a screw driver or the like to alter the distance between the heads *f* and *k* and thus modify the pressure with which the head *f* bears against the flange *m*.

To enable the valve to be kept open for a considerable time without having to exert continuous pressure on the part *b* by hand, one end of a strap *p* is mounted in a ring *q* applied to the nipple *d*². Normally, that is when the valve is closed, the said strap *p* occupies an oblique position somewhat as shown in Fig. 6. When the part *b* is pressed inwards the strap slides down over it and drops into a horizontal groove *j* on a level with the spindle (Fig. 7) thus holding the part *b* in the pressed in position.

The embodiment shown in Fig. 8 is intended for application to a urinal vessel. In this case the bulb *a* is attached to a pan *r* which is connected to a catheter *s* and is adapted to be attached to the male organ by means of a slip on rubber sleeve. The closing member *c* secured in the nipple *d*¹ is arranged obliquely and the discharge pipe *g* is at an obtuse angle to the inflow-direction and the conical tip *f* of said member *c* ordinarily closes the discharge orifice situated in the nipple *d*² above the discharge pipe *g*.

Such a vessel possesses, inter alia, the advantages over the usual types that it takes up less room does not require any metal clamps or the like for its attachment, nowhere exerts any pressure likely to produce irritation of the body and contains no parts

liable to chafe the wearer. It is very easy to manipulate and can be emptied without contaminating any other parts.

As mentioned with reference to Fig. 2 the invention can be applied, for example, to cylindrical as well as to spherical hollow bodies, with the difference that in such case the longitudinal contraction, instead of extension, of the hollow body is utilized for uncovering the discharge orifice.

The part *b* may be situated inside or partly inside and partly outside, instead of outside the hollow receptacle *a*. In an embodiment such as represented in Figs. 6 and 7, the valve spindle *c* might be extended right through the pipe and into the vessel from which liquid is to be withdrawn, so that the head *f* under the action of the tension of the part *b* would bear against the end of the pipe *l* inside said vessel. In this way a larger discharge aperture would be obtained than in the example shown.

The characteristic feature of the invention may be embodied in a great variety of ways, the constructional details of the closing member being, for example, capable of many modifications without departing from the scope of the invention. The invention is capable of adaptation to numerous purposes and for both liquid and gaseous media, for instance for vapours of various kinds.

Closing devices of the type shown in Figs. 3 to 5 and 8 may also serve as safety valves since the internal pressure has a similar effect on the relative position of the walls of the receptacle and the spindle *f* as the pressure described on the part *b*.

On the other hand a bulb or other hollow body for carrying the part *b* is not always required. The pad with the necessary nipples may be formed as an independent body and the inlet member (hollow spindle *c* or pipe *l*) may be connected directly with the discharge pipe *g* by means of a suitably designed member *t* as shown in Fig. 9.

What I claim is:—

1. In a closing device, an elastic endless member adapted to be pressed inwards at two opposite points, while retaining its original plane, said member having an orifice therein, a closing member, adapted to close normally this orifice under the action of the inherent tension of said elastic member, said orifice being adapted to be opened by external pressure applied on the elastic member in the direction of its parallel planes.

2. In a closing device having an elastic annular member, a radially extending opening therein, a spindle shaped closing member arranged in a plane of the annular member and secured thereto on one hand, while on the other hand the seat surrounding said opening bears tightly against this closing member by the action of the inherent

tension of said annular member, but is adapted to be released from the closing member by the application of external pressure.

cupying normally an oblique position in which its middle part rests on the opposite side on the periphery of the pad, a stop on this part of the pad situated about diametrically opposite to the pivot of the strap, this latter being adapted to slide with its middle part down the pad when external pressure is exerted upon this pad and to be stopped on said stop.

3. In a closing device having an elastic annular member, two radially extending openings therein, a spindle shaped closing member extending radially through the annular elastic member and secured thereto, an extensible hollow bulb connecting said two openings one of which is normally closed by the closing member under the action of the inherent tension of the annular member but is adapted to be opened by pressing the annular member inwards.

4. In a closing device, a bulbous elastic body, an elastic annular pad surrounding this body, said elastic pad having two openings therein, a spindle shaped closing member secured in the pad and extending to one of said openings, the seat of this latter opening bearing tightly against the closing member by the inherent tension of said annular pad but adapted to be moved from said member by pressing this pad inwards.

5. In a closing device, a bulbous elastic body, an elastic annular pad integral with and surrounding this body, said body and pad having two openings therein, a spindle like closing member extending radially through the bulbous body to one of said openings, a bearing for this closing member in the pad, the length of the closing member within the bulbous body being such that the seat surrounding said opening bears tightly against one end of the closing member under the action of the inherent tension of said elastic pad, but which seat may be removed from said end of the closing member by an external pressure exerted on the pad, and means for altering the length of the closing member between its bearing and said opening and thus varying the tension or pressure with which the closing member and the seat surrounding the opening bear against one another.

6. In a closing device, a bulbous elastic receptacle or body, an elastic annular pad integral with and surrounding this body, said body and pad having two openings extending therethrough on diametrically opposite points thereof, a spindle like closing member extending through one of these openings and attached there to the pad, a bore in this member leading from the outside into the interior of the bulbous receptacle, the seat surrounding the second of said openings bearing normally against the inner end of said closing member under the action of the inherent tension of the elastic pad but removable therefrom by an external pressure exerted on the pad.

7. In a closing device according to claim 6, a strap pivotally mounted on the pad about in the middle of its height and oc-

8. A closing device for fluids comprising an elastic actuator having inlet and outlet openings; and a valve secured to the actuator at the inlet opening and adapted to close the outlet opening due to the tension of the elastic actuator, said actuator being adapted to be distorted in the direction of its parallel planes by applying pressure thereon in order to lift the valve from the outlet opening.

9. A closing device for fluids comprising an elastic actuator having an opening; and a valve secured to the actuator and adapted to normally close the opening due to the tension of the elastic actuator, said actuator being adapted to be distorted in the direction of its parallel planes by applying pressure on said actuator in order to lift the valve from the opening.

10. A closing device for fluids comprising an elastic actuator provided with an outlet; and a valve secured at one end to the actuator and the other end adapted to normally close the outlet due to the tension of the elastic actuator, said actuator being adapted to be distorted in the direction of its parallel planes by applying pressure on the actuator in order to open the outlet.

11. A closing device for fluids comprising an elastic actuator provided with an outlet; and a valve for the actuator adapted to normally close the outlet due to the tension of the elastic actuator, said actuator being adapted to be distorted in the direction of its parallel planes in order to regulate the flow through said outlet.

12. A closing device for fluids comprising an elastic actuator provided with an outlet; a valve secured at one end to the actuator and the other end adapted to normally close the outlet due to the tension in the elastic actuator; and means for distorting the actuator in the direction of its parallel planes by applying pressure thereon in order to actuate the valve.

13. A closing device for fluids comprising an elastic actuator provided with an outlet; a valve secured at one end to the actuator and the other end adapted to normally close the outlet due to the tension in the elastic actuator; and a strap on said actuator for distorting it in the direction of its parallel planes by applying pressure thereon in order to actuate the valve.

14. A closing device for fluids comprising a continuous elastic actuator having an open-

ing therein; a valve secured to the actuator and adapted to normally close the opening due to the tension of the elastic actuator; and means for distorting the actuator in the direction of its parallel planes by applying pressure thereon in order to lift the valve from the opening.

15 15. A closing device for fluids comprising a casing; an elastic actuator for the casing and provided with an opening; a valve in said casing and secured to the actuator, said valve being adapted to normally close said opening due to the tension in the actuator; and means for applying pressure on the ac-
15 tuator in order to distort it in the direction

of its parallel planes to thus actuate the valve.

16. A closing device for fluids comprising a casing; an elastic actuator surrounding said casing and provided with an outlet; a valve in said casing and secured to the actuator, said valve being adapted to normally close said outlet due to the tension in the actuator; and a strap for the actuator for applying pressure thereon in order to distort it in the direction of its parallel planes to thus actuate the valve.

In testimony whereof I have affixed my signature.

ADOLF SCHULTHEIS.