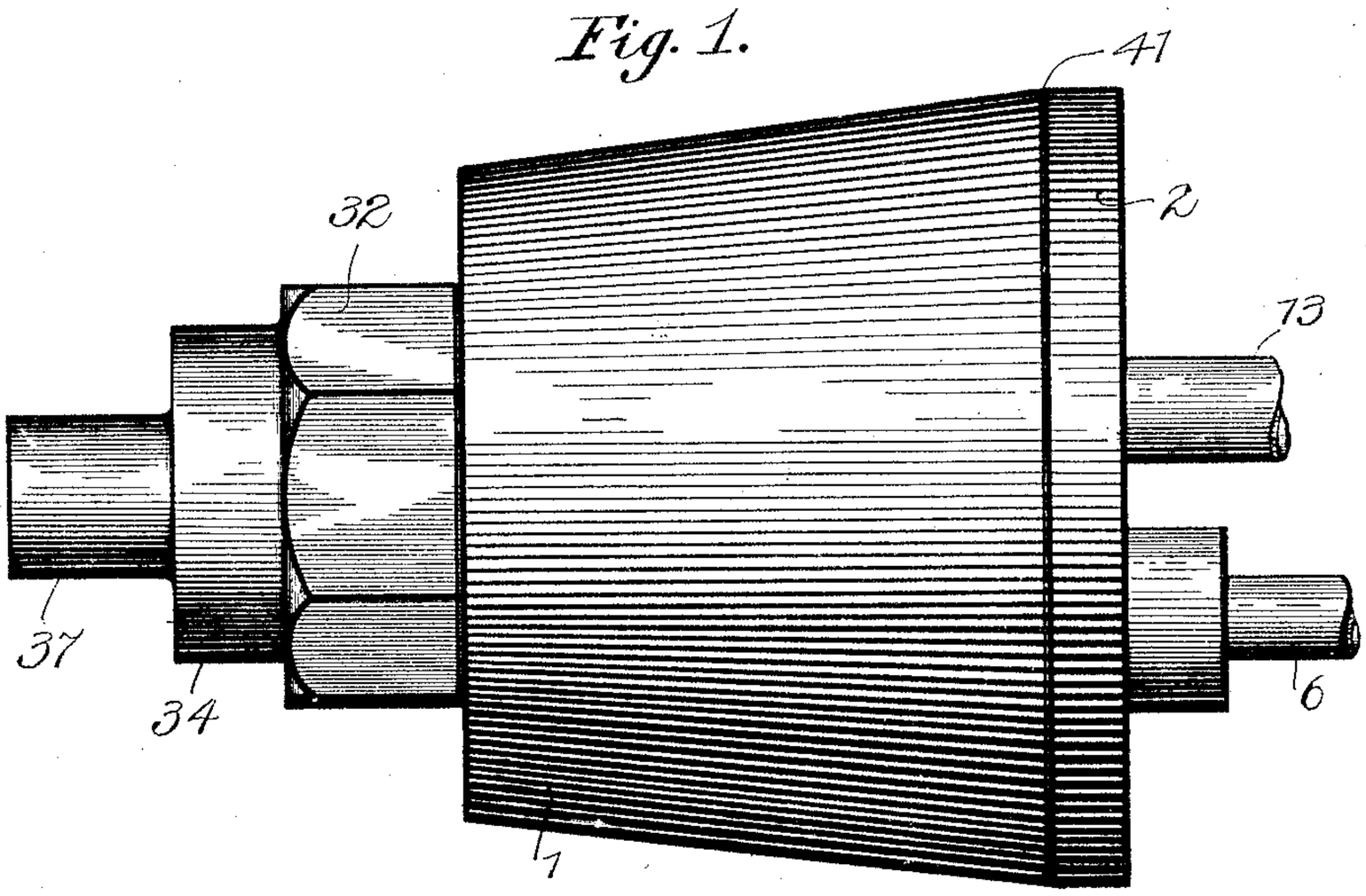
No. 828,687. PATENTED AUG. 14, 1906.

R. F. SPAMER.

AUTOMATIC CIRCUIT CONTROLLING DEVICE.

APPLICATION FILED JAN. 25, 1905.

Fig. 1.



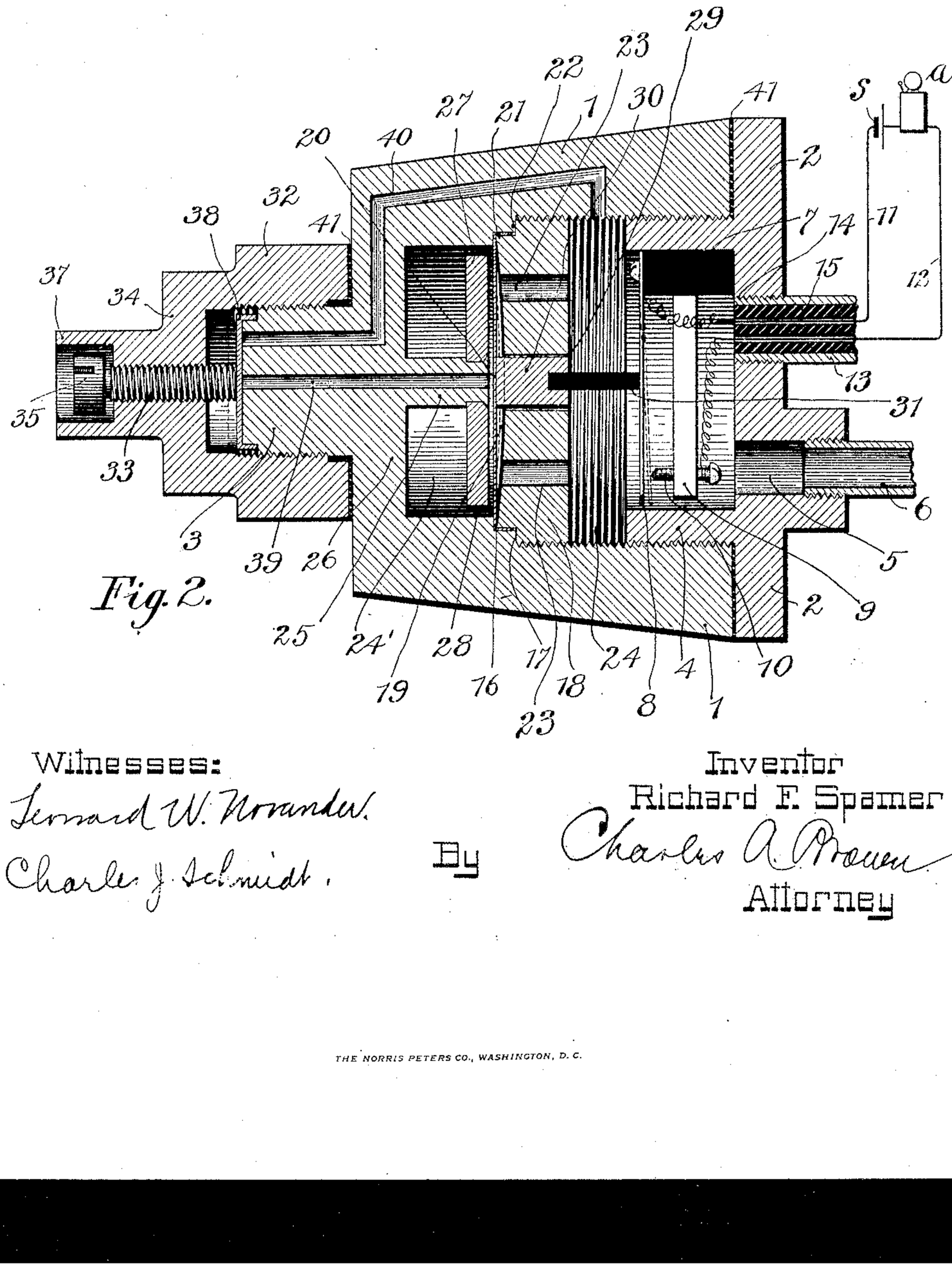


Fig. 2.

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AUTOMATIC CIRCUIT-CONTROLLING DEVICE.

No. 828,687. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed January 25, 1905. Serial No. 242,696.

To all whom it may concern:

Be it known that I, RICHARD F. SPAMER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Automatic Circuit-Controlling Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to automatic circuit-controlling devices for pressure systems; and its object is the provision of an improved device connected with a pressure system to be actuated upon predetermined amount of change in the pressure to actuate an electrical alarm-circuit.

It is customary to provide an alarm-circuit for pressure systems where it is desired to actuate an alarm or indicating devices upon a certain amount of change of pressure in the system, and this has usually heretofore been done by including the hand of the ordinary pressure-gage used with the system and a contact in a circuit including alarm or indicating devices, the alarm-circuit being either opened or closed when the pressure is normal, but closed or opened upon actuation of the gage-hand due to the change in pressure to a certain degree, whereby the alarm is sounded. In such devices, however, the actuating parts continually under strain will not respond to sufficiently small changes in pressure after having remained in an abnormal position for a length of time. For instance, the apparatus actuating the hand of an ordinary pressure-gage, after being in a strained condition for a length of time, loses its elasticity and fails to return the hand toward its normal position upon decrease in pressure, for instance.

In the device of my construction, however, the actuating parts are normally in unstrained condition and become strained and actuated only when the pressure in the system changes from its normal value.

The device will be more readily understood with reference to the accompanying drawings, in which—

Figure 1 is an elevation view thereof, and Fig. 2 is a diametrical sectional view thereof.

The device consists of a main cup-shaped body portion 1, provided with a cover 2 for its open end and having a threaded lug 3 extending from the other end. The cover 2 has an annular flange 4, threaded to the body portion 1, as shown. An opening 5 leads through the cover 2 and communicates with piping 6, leading therethrough and connected with the pressure system. At the inside of the cover within the annular flange 4 is a mounting-block 7 of insulating material, from which extends a contact 8 and a contact-arm carrying an adjustable contact-screw 10, the contact spring and screw being connected with conductors 11 and 12. These conductors pass through piping 13, communicating with the opening 14 through the cover 2. Insulating material 15 fills the end of the piping 13 and the opening 14 to hermetically seal this opening. Toward the rear of the body portion 1 are provided annular shoulders 16 and 17, engaged by a plate or wall 18, having screw-threaded engagement with the interior of the body portion 1. The inner face 19 of the plate 18 is dished, as shown, and a diaphragm-cap 20 fits over the neck 21 of the plate 18. As the plate 18 is screwed into the body portion the diaphragm-cap is clamped to the shoulder 16 and between the neck 21 of the plate 18 and the wall 22 of the body portion. Openings 23 23 through the plate 18 afford communication between the main compartment 24 and the space between the diaphragm and the plate 18.

A stud 25 extends from the rear wall 26 of the body portion into the secondary compartment 24′ and at its front end carries a disk or plate 27, which may be riveted thereto, as shown, or otherwise secured. This disk 27 approaches the diaphragm, but is separated therefrom by a small gap and is also separated from the walls of the body portion by the annular gap 28. The wall 18 is also provided with a central opening 29, through which passes a piston or plunger 30. Secured in this piston and extending forwardly therefrom is a stud 31, of insulating material, engaging at its forward end with the contact-spring 8. Under normal conditions, however, the contact-spring 8 is out of engagement with the contact-screw 10; but under abnormal conditions, as will be described later, the diaphragm will be actuated to move the piston 30, so that the stud 31 will cause the contact-spring 8 to engage the contact-screw 10, whereupon the alarm-circuit will be closed, the alarm-circuit including the con-

ductors 11 and 12, a source of current *s*, and an alarm for an indicating device *a*, such as an electric bell, as shown.

Over the lug 3 a cap 32 engages, and a screw 33 passes through the rear wall 34 of the cap and is provided with a head 35, which may be disposed within a projecting flange 37. A cap or valve 38 is adapted to be engaged by the end of the screw 33 and fits over the end of the lug 3. A channel 39 extends through the lug 3, the rear wall 26 of the body portion, and the stud 25, while a channel 40 extends through the lug 3, the rear wall 26, and through the side wall of the body portion 1 into engagement with the main compartment 24. With the valve 38 released from the stud 3 the compartment 24 will be in communication with the compartment 24′ through the channels 39 and 40; but when the valve 38 is held over the outlets of the channels 39 and 40 from the lug 3 communication between the two compartments will be cut off. To render this device pressure-tight, means, such as packing 41, may be employed between the cover 2 and the body portion and between the cap 32 and the rear wall of the body portion.

The operation of my device is as follows: Upon connection thereof with the pressure system through piping 6 the screw 33 is withdrawn to release the valve from the lug 3, whereupon the elastic fluid under pressure from the system will distribute itself uniformly through the compartment 24 and by means of the channels 39 and 40 also in the compartment 24′, and thus the pressure at both sides of the diaphragm will be equal. The screw 33 is thereupon actuated to close the valve to prevent communication between the channels 39 and 40, and consequently to cut off communication between the compartments 24 and 24′. While the pressure in the system from now on remains at its normal value, there will be no deflection in either direction of the diaphragm, which is consequently neutral and entirely free from strain. Should the pressure in the system, however, be diminished, this diminution will be communicated to the main compartment 24, while the normal pressure will still remain in the secondary compartment 24′. The result will be a deflection of the diaphragm toward the wall 18, and the piston 30 will be carried forwardly, and if the pressure has decreased a sufficient amount the forward movement of the piston will be sufficient to cause the stud 31 to carry the spring 8 into contact with the screw 10, and the alarm-circuit will be closed and the indicating apparatus actuated. The diaphragm, the spring 8, and the normal gap between the spring 8 and contact-screw 10 can be adjusted to cause closure of the contacts for any predetermined amount of pressure decrease. Instead of closing the alarm-circuit, as here shown, the arrangement may also be to open a normally closed alarm-circuit upon a predetermined decrease in the pressure, and instead of causing actuation of alarm apparatus upon decrease in pressure the apparatus might be arranged to cause such alarm upon increase in the pressure.

The forward deflection of the diaphragm 20 is limited by the dished inner wall 19 of the plate 18, and when the expansion within the compartment 24′ is sufficient to force the diaphragm against this inner wall further strains on the diaphragm will be taken up by the plate 18 and the diaphragm thus protected. On the other hand, should the pressure in the system, and consequently the main compartment 24, increase above the normal value then deflection of the diaphragm will result toward the left; but here again the deflection will be limited by the disk 27, which will take up all further strains on the diaphragm after the diaphragm is pressed against the disk. The additional large portion of the compartment 24′ to the left of the disk 27 is provided for the purpose of preventing deflection of the diaphragm due to internal condition changes of the fluid in the small section between the disk 27 and the diaphragm. In other words, if the compartment 24′ consisted only of the space between the disk 27 and the diaphragm slight temperature changes would cause sufficient change of the fluid to influence the diaphragm independently of the pressure changes in the system.

I thus provide a simple device which can be attached to any pressure system and in which the operative parts are normally entirely free from strains and will therefore under abnormal conditions be sensitive and retain all their properties.

As many changes may be made in the mechanical arrangement and construction of the various parts, I do not wish to be limited to the exact arrangement and construction herein shown. I think it entirely new with me to provide a device with two compartments separated by a diaphragm, in which compartments the pressure is normally uniform and the diaphragm free from strain and in which under abnormal conditions the pressure becomes different to cause deflection of the diaphragm to actuate suitable circuit-controlling apparatus.

I therefore claim as new and desire to secure by Letters Patent—

1. In a device of the class described, the combination with a cup-shaped body member having interior threads, a cap member engaging said threads for closing said body member, a partition member engaging said threads to divide the cup member into two compartments, the lower wall of the partition member being dished, a flexible diaphragm stretched over said dished surface

and secured at its edges to the walls of the cup member by the partition member, openings through the partition member for leading fluid from the one compartment to the upper side of the diaphragm, an abutment-plate at the other side of the diaphragm, said diaphragm normally cutting off communication between the two compartments, an extension from the base of the cup member, a cap member engaging said extension to form a valve-chamber, a passage-way from the upper compartment to said valve-chamber, a passage-way from the lower compartment to the valve-chamber, and a valve in said valve-chamber for controlling said passage-ways.

2. In a device of the class described, the combination with a cup-shaped body member having interior threads, a cap member engaging said threads for closing said body member, a partition member engaging said threads to divide the cup member into two compartments, the lower wall of the partition member being dished, a flexible diaphragm stretched over said dished surface and secured at its edges to the walls of the cup member by the partition member, openings through the partition member for leading fluid from the one compartment to the upper side of the diaphragm, a post extending inwardly of the base of the cup member, a plate secured at the end of said post forming an abutment for the other side of the diaphragm, said compartments being normally out of communication by virtue of said diaphragm, an extension from the base of the cup member, a cap member engaging said extension to form a valve-chamber, a passage-way from the upper compartment leading through the walls of the cup member and through the extension therefrom and terminating in said valve-chamber, a passage-way leading from said valve-chamber through the extension and through the post to the other compartment, and a valve adapted to be actuated to shut off communication between the passage-ways and thereby between the compartments.

3. In a device of the class described, the combination with a cup-shaped body member having interior threads, a cap member engaging said threads for closing said body member, a partition member engaging said threads to divide the cup member into two compartments, the lower wall of the partition member being dished, a flexible diaphragm stretched over said dished surface and secured at its edges to the walls of the cup member by the partition member, openings through the partition member for leading fluid from the one compartment to the upper side of the diaphragm, a post extending inwardly of the base of the cup member, a plate secured at the end of said post forming an abutment for the other side of the diaphragm, said compartments being normally out of communication by virtue of said diaphragm, an extension from the base of the cup member, a cap member engaging said extension to form a valve-chamber, a passage-way from the upper compartment leading through the walls of the cup member and through the extension therefrom and terminating in said valve-chamber, a passage-way leading from said valve-chamber through the extension and through the post to the other compartment, a valve-plate within said valve-chamber, and a screw passing through the lower wall of the cap member for engaging said valve-plate to close communication of the passage-ways with the valve-chamber thereby shutting off communication between the compartments through said passage-ways.

4. In a device of the class described, the combination with a cup-shaped body member, of a cap-plate for closing the mouth thereof, a partition member engaging said cup-shaped member for dividing it into two compartments, a flexible diaphragm secured at its edges between the edges of the partition member and the walls of the cup member, an actuating-stud extending from the diaphragm through the partition member, a circuit-changing member within the cup member adapted for engagement within the stud to be actuated to change the circuit conditions for signaling apparatus disposed without the cup member, the upper compartment having direct communication with the fluid to be controlled, the other compartment being normally separated from the first compartment by said diaphragm, a by-pass for allowing connection between the compartments, valve mechanism for controlling said by-pass, an abutment below said diaphragm, said partition-wall forming an abutment above the diaphragm, said abutments limiting the range of deflection of said diaphragm due to differences of pressure in the compartments.

In witness whereof I hereunto subscribe my name this 21st day of January, A. D. 1905.

RICHARD F. SPAMER.

Witnesses:
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