March 20, 1956 A. A. MULLER 2,739,201

PRESSURE RESPONSIVE SIGNAL DEVICE

Filed Nov. 16, 1953

Fig.3

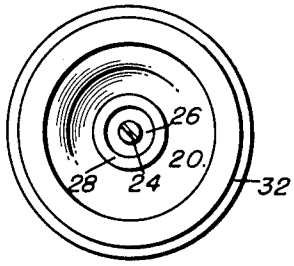
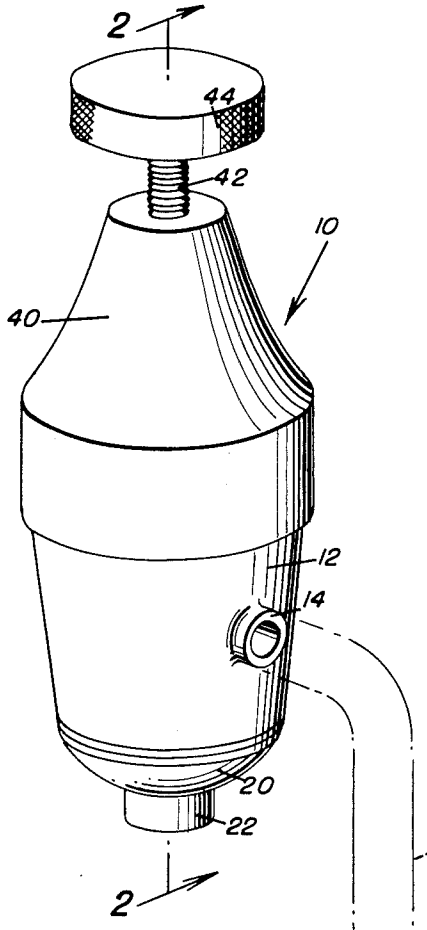


Fig.1



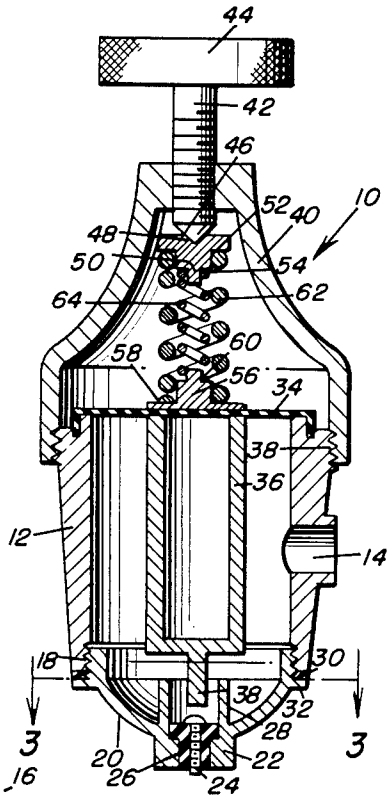
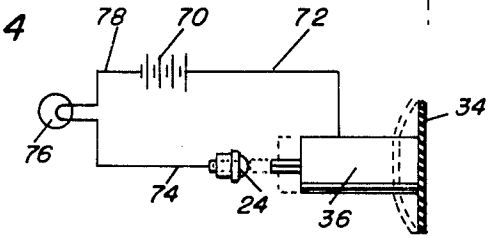


Fig.2

Fig.4



Alfred A. Muller
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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PRESSURE RESPONSIVE SIGNAL DEVICE

Alfred A. Muller, Fowler, Ind.

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2 Claims. (Cl. 200—83)

This invention relates to a pressure responsive signaling device and more particularly to means responsive to fluctuations in the pressure of a gas below a particular level.

The primary object of this invention resides in the provision of means closing an operative electrical circuit to provide an audible or visable signal as may be desired when gas pressure falls below a particular predetermined level. The device is especially adapted for use in installations for bottling carbonated drinks utilizing carbon dioxide since the carbon dioxide content of the finished product must be maintained within a particular minimum tolerance.

The construction of this invention features a movable contact attached to a diaphragm which is held out of engagement with a fixed contact by the particular gas pressure which the device is set to monitor. Resilient means of novel construction are utilized for adjusting the diaphragm and hence the movable contact to close only when the gas pressure falls below the particular level at which the device is adjusted.

Still further objects and features of this invention reside in the provision of a pressure responsive signal switch that is strong and durable, simple in construction and manufacture, capable of being readily and easily adapted for a variety of uses, and which is inexpensive to produce.

These, together with the various ancillary objects and features of the invention which will become apparent as the following description proceeds, are attained by this pressure responsive signal switch, a preferred embodiment of which has been illustrated in the accompanying drawings, by way of example only, wherein:

Figure 1 is a perspective view of the device comprising the present invention;

Figure 2 is a vertical sectional view as taken along the plane of line 2—2 in Figure 1;

Figure 3 is a sectional detail view as taken along the plane of line of 3—3 in Figure 2; and

Figure 4 is a schematic circuit diagram illustrating one manner in which the device can be utilized.

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, reference numeral **10** generally designates the pressure responsive signal switch comprising the present invention which includes a main body **12** having an inlet opening **14** for connection with a gas line **16** adapted to supply gas under pressure. The main body **12** is internally threaded as at **18** for threaded reception of a cap **20** having a cylindrical extension **22** within which a fixed contact **24** is emplaced, the fixed contact **24** being insulated by means of a filler **26** from the cap **20** and thus the body **12** and the rest of the switch **10**. Cylindrical guides **28** are integrally formed with the cap **20** and a suitable gasket **30** is positioned between the shoulder **32** on the cap **20** and the body **12**. It is noted that the fixed contact **24** may

be threaded so that it may be adjusted within the filler **26** if such is at any time desired.

Attached to the body **12** by soldering or by any other means is a diaphragm **34** of any suitable material which has affixed thereto a tubular movable contact **36** which has a contact tip **38** adapted to be received between the cylindrical guides **28** and which is adapted to engage the fixed contact **24** under certain circumstances. The use of the tubular movable contact **36** is highly desirable since such beneficially affects the sensitivity of the switch **10** inasmuch as the tubular contact **36** engages a portion of the diaphragm **34** spaced from the center thereof at a portion of the diaphragm where displacement of the diaphragm portion most closely approximates a linear function with respect to stress applied thereto. Further, the tubular contact **36** occupies a substantial part of the chamber and thereby reduces the area of the diaphragm on which gas pressure can be exerted, thus additionally increasing sensitivity.

The body **12** is externally threaded as at **38** for threaded reception of a spring housing **40** which has an adjusting screw **42** provided with a knurled operating handle **44** threadedly secured therein. The adjusting screw **42** is provided with a conical shaped head **46** adapted to seat within a conical recess **48** formed in a floating collar **50** of stepped cylindrical construction thus forming the shoulders **52** and **54**. Another collar **56** of stepped cylindrical construction having shoulders **58** and **60** is bonded or otherwise affixed to the diaphragm **34** on the opposite side of the tubular movable contact **36** thereby assuring against uneven strain along the diaphragm **34** to such a degree as would likely rupture the diaphragm **34**. Secured on the collars **50** and **56** and engaging the shoulders **52** and **58** is an outer coil spring **62** while an inner coil spring **64** is engaged on the collars **50** and **56** seated on the shoulders **54** and **60**, the inner spring **64** forming means for retaining and mounting the spring **62** which is coaxial therewith.

Incorporated with the switch **10** is of course a suitable source of electrical current such as is indicated at **70** which is connected by a suitable conductor as at **72** to any portion of the body or switch insulated from the fixed contact **24** by means of the filler **26**. Another conductor **74** is connected to a signal device such as a lamp as illustrated at **76** or to an audible signaling device such as a buzzer or bell, not shown, which is thence connected by any other suitable connector **78** to the source of power **70**. Hence, when the movable contact **36** engages the fixed contact **24** an operative electrical circuit from the source of power **70** to the signal device **76** will be attained.

In use, gas will enter through the passage **14** under pressure thus exerting a pressure on the diaphragm **34** tending to force the contacts **36** and **24** apart. With the pressure in the gas line at a desired value, the adjusting screw **42** is turned until the external force on the diaphragm **34** caused by the springs **62** and **64** is great enough to overcome the force exerted by the gas. The contacts **36** and **24** will then be closed completing the operative electrical circuit. When the indicator **76** signals the closing of the contacts **36** and **24** external pressure on the diaphragm **34** may then be decreased by backing off the adjusting screw **42** until the indicator or alarm **76** no longer operates. At this point the pressure exerted by gas is just great enough to hold the contacts **36** and **24** apart. If gas pressure falls below this point the force exerted by these springs **62** and **64** will overcome the force exerted by the gas and the contacts **36** and **24** will close.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since

numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A gas pressure responsive signal device comprising a main body forming a chamber, said body having a gas inlet opening therein, a cap having an insulated fixed contact mounted therein, said cap being detachably secured to said body, a diaphragm secured to said body having a movable contact secured thereto in opposition to said fixed contact, a spring housing threadedly detachably secured to said body, an adjusting screw threadedly detachably secured through said spring housing, a first collar fixed to said diaphragm, a second collar freely floating in said spring housing engaged by said adjusting screw, and resilient means biasing said first and second collars and extending therebetween, said first and second collars being of stepped cylindrical shape having pairs of shoulders, said resilient means including inner and outer coil springs coaxial with each other and engaging said collars about said shoulders.

2. A gas pressure responsive signal device comprising a main body forming a chamber, said body having a gas inlet opening therein, a cap having an insulated fixed contact mounted therein, said cap being detachably secured to said body, a diaphragm secured to said body having a movable contact secured thereto in opposition to said fixed contact, a spring housing threadedly detachably secured to said body, an adjusting screw threadedly detachably secured through said spring housing, said adjusting screw having a conical-shaped end, a first collar fixed to said diaphragm, a second collar freely floating in said spring housing engaged by said adjusting screw, and resilient means biasing said first and second collars and extending therebetween, said first and second collars being of stepped cylindrical shape having pairs of shoulders, said resilient means including inner and outer coil springs coaxial with each other and engaging said collars about said shoulders, said second collar having a conical recess therein adapted to receive said conical-shaped end of said adjusting screw, said movable contact having a tubular portion occupying a substantial part of said chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,069,222	Creamer	Feb. 2, 1937
2,421,797	Malone	June 10, 1947
2,445,756	Bean	July 27, 1948
2,468,768	Malick	May 3, 1949
2,514,632	Flubacker	July 11, 1950