

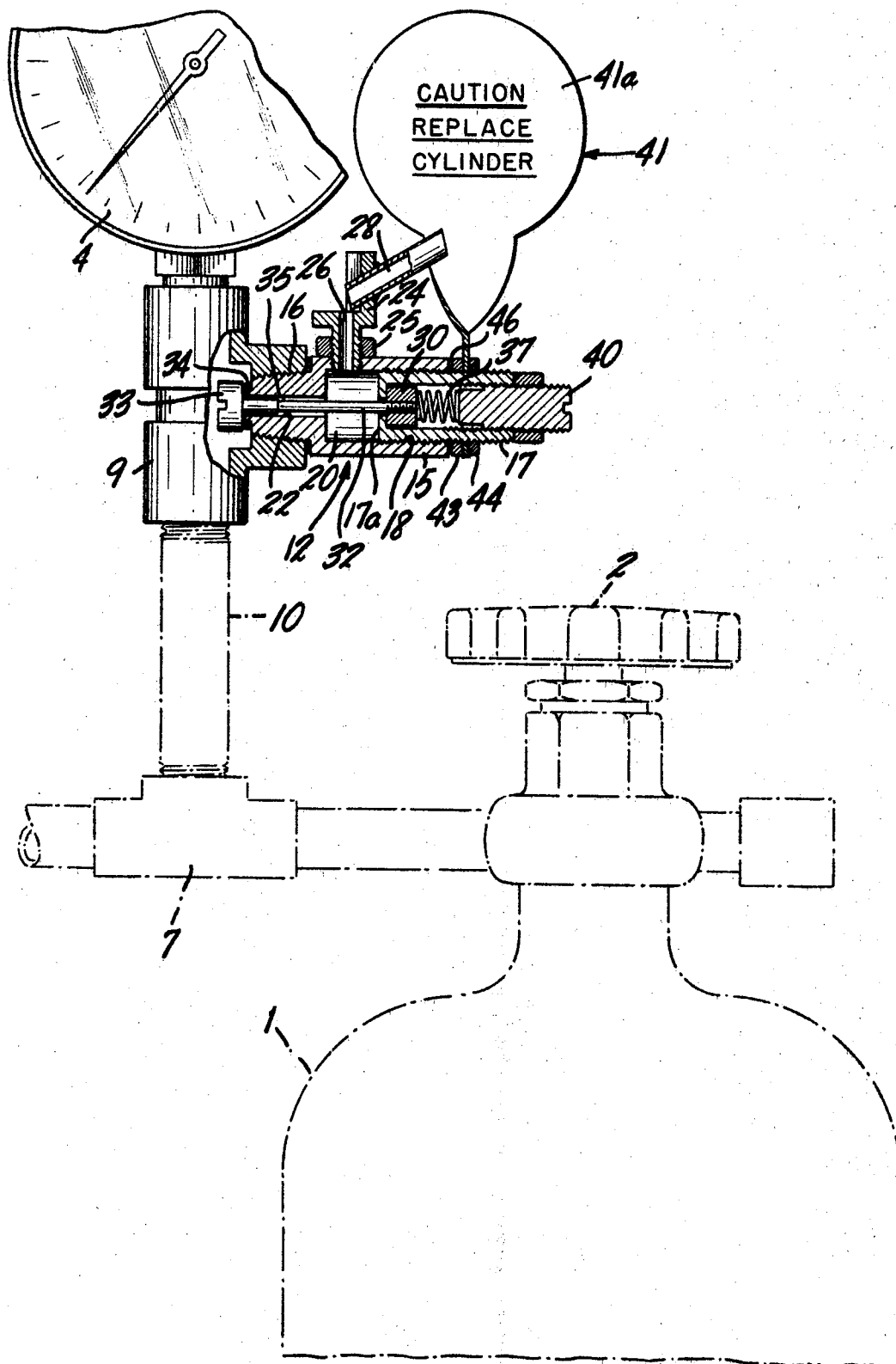
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LOW GAS SIGNAL AND INDICATOR FOR GAS CYLINDERS

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**LOW GAS SIGNAL AND INDICATOR FOR
GAS CYLINDERS**

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4 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus mountable on a gas cylinder having a piston sensing the internal pressure of the gas cylinder and effective to turn "on" and "off" an acoustic signal. The piston responds to a variably set reduced pressure level set by a spring and is actuated by the spring overcoming the reduced gas pressure for turning on the audible signal. The audible signal is in turn turned "off" by a visual signal means or an indicator continuing the indication visually that the gaseous contents of the cylinder are at a reduced level. If the visual signal is moved from its visual indicating position the audio signal is automatically turned "on" again so that there is always a continuous signal, visual or audible, that the reduced pressure level, and therefore reduced contents, obtains in the gas cylinder.

This invention relates generally to gas cylinders and more particularly to a low gas signal and indicator.

Gaseous fluid handling systems and containers such as gas cylinders are generally provided with low pressure indication, for example an acoustic signal or whistle to indicate low pressure. These flow pressure alarms are rendered effective when a reduced pressure exists in a gas container or gas handling system and generally are manually turned off once they have made their audio indication. However, the turning off of the alarm leaves the cylinder or system without indication of the low gas condition to others other than those who have heard the audio or acoustic signal.

In certain operations continuance of indication of a low gas condition is essential once an audible alarm has been turned off. For example, a patient, receiving oxygen from an oxygen cylinder during an operation or similar situation, who must continuously be provided with oxygen requires that there must not be accidental loss of oxygen flow to him in the event of a change-over from one exhausted cylinder to another filled cylinder. There must not be a lack of indication that the oxygen tank replacing the exhausted tank or cylinder is a "fresh" or filled cylinder.

It is a principal object of the present invention to provide a low gas signal and indicator continuously indicating low gas conditions in a cylinder in which it is used and automatically marking the tank or cylinder as requiring replacement because of exhaustion of the gas therein.

Another object of the invention is to provide a low gas alarm that is independent of any other source except the gas cylinder to which it is attached.

A feature of the low gas signal and indicator in accordance with the present invention is the provision of acoustic signal means rendered effective or turned "on" by gaseous fluid sensing means when a predetermined low level of gaseous fluid contents obtain in a container. A visual indicator, operable to a position to turn off the acoustic signal means and continue visual indication that the gaseous fluid contents are at the low level condition, is effective to turn "on" the audio signal when moved from its indicating position. Thus a constant indication and warning is given that a low gas condition exists in the container or cylinder.

Other features and advantages of the low gas signal

and indicator in accordance with the present invention will be better understood as described in the following specification and appended claims, in conjunction with the drawing in which an elevation view, partly cut-away and partly in section, illustrates a preferred embodiment of the invention.

As illustrated in the drawing a gas cylinder 1, for example an oxygen cylinder, having the usual controls 2 and gauges 4 only some of which are shown. The gauge 4 while generally connected on a T fitting 7 is mounted on a T 9 connected with a nipple 10 to the usual gauge mount and providing a connection for a low gas alarm 12 in accordance with the invention.

The low gas signal and indicator comprises a sleeve body 15 externally threaded at one end portion 16 threaded into the T 9 as illustrated. The body 15 is provided with an externally threaded inner sleeve 17 mounted on internal threads 18 of the body defining a chamber 20 within the body in communication with a bore 22. A whistle 24 secured by a nut 25 and having a passageway 26 there-through ejecting gas as a stream therefrom as later described causes an audible signal from a whistle portion 28.

Within the alarm's body 15 is mounted a piston 30 housed internally of the inner sleeve and reciprocable therein and connected by a piston rod or stem 32 to a second piston 33 sensing the internal gas pressure of the cylinder when the control or valve 2 is open. The gas pressure, when it exceeds a predetermined low pressure level, seats the sensing piston 33 against an O ring 34 precluding gas from entering in a clearance space 35 between the small diameter bore 22 and the piston rod.

When the gas within the cylinder is reduced to the level at which the cylinder should be replaced a spring 37 biasing the first or operating piston 30 in a direction for unseating the second piston 33 overcomes the pressure within the cylinder and the second piston is unseated and gas will flow from the T 9 past the O ring 34 and enters the chamber 20 through the clearance space 35. The gas escapes from the alarm body through the whistle passageway 26 and causes the whistle portion 28 to emit an audible signal indicating that a low gas condition exists in the cylinder 1 and it should therefore be replaced with a fresh cylinder.

The exact pressure at which a low gas condition or replacement of the cylinder situation exists is set by an adjust plug 40 variably controlling the biasing force applied by the spring to piston 30. The low gas signal and indicator is provided with a visual indicator, as later herein described, which continues visual indication that the gaseous fluid contents are at a low level and the gas cylinder must be replaced even through the audible signal is turned off.

In order to carry out the visual indication a flag is rotatably mounted on the inner sleeve 17 and has an enlarged surface 41a on which is written "Caution Replace Cylinder." This flag is in a downward or lowered position, not shown, during the use of the gas from the gas cylinder. The inner sleeve in such a condition has the first piston 30 therein spaced from its inner end 17a which is closed, as shown, and through which the piston rod extends. The piston is biased away from the inner sleeve by the gas when the other piston 33 is seated. The piston in the inner sleeve can then move and seat against the bottom 17a when the low gas condition exists and unseat the second piston 33 to cause the audible alarm. In the condition illustrated in the drawing the flag 41, which is clamped between two lock nuts 43, 44, has been raised by rotating it from its lowered position to its indicating position shown.

When the flag is moved from its lowered position to its raised or indicating position it rotates the inner sleeve 17 so that it travels axially to the right and the bottom

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17a thereof engages the first piston 30 and causes it to travel in a direction toward the right as illustrated in the drawing therefore seating the second piston against the O ring seat thereof thereby rendering the audio signal device ineffective and turning it "off." The raising of the flag continues indication, visually, of the low gas condition. When the flag is raised the whistle acts as a stop as shown. If the flag 41 is lowered the inner sleeve travels in an opposite direction slacking off compression of the spring and the lock nut 43, which is spaced from the body 15 when the flag or operator 41 is in a lowered condition, will abut against the end 46 of the alarm body, and set the desired relation between the first piston and the sleeve end so that internal gas pressure can overcome the spring and the audio signal is in condition for operating as heretofore described.

Those skilled in the art will thus understand that the invention provides a low gas signal and indicator mountable on a gas container and actuated solely in response to gas level conditions in the container and settings on the device itself. The apparatus is provided with acoustic signal means rendered effective by the gas conditions in the container and rendered ineffective and effective by a visual indicator that indicates a low gas condition when it renders the acoustic signal device ineffective and will restore its effectiveness when it no longer indicates visually. Thus continual warning as to low gas or otherwise conditions, is provided on the container on which the alarm device of the invention is mounted.

While a preferred embodiment of the invention has been shown and described it will be understood that many modifications and changes can be made within the true spirit and scope of the invention.

What I claim and desire to be secured by Letters Patent is:

1. Apparatus for use on a container of gaseous fluid for indicating the gaseous contents of the container are about to become exhausted or are reduced to a selected low level comprising, means comprising pressure-responsive means mountable in use in communication with the gaseous contents of said container sensing the pressure thereof, means cooperative with said pressure-responsive means comprising an audible signalling means rendered effective by said pressure-responsive means when said gaseous contents reach a given reduced pressure level, means comprising visual signalling means operable to a position indicative that the container should not be used

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without increasing the gaseous contents thereof and rendering the audible signalling means ineffective and rendering said signalling means effective when not in said position, said pressure-responsive means comprises means defining a chamber, a first piston reciprocable in said chamber, a second piston connected to said first piston and disposed to sense the pressure of the gaseous contents of said container for actuation thereby, and means biasing the second piston in opposition to said pressure thereby to determine the reduced pressure at which said pressure-responsive means render said audible signalling means effective.

2. Apparatus according to claim 1, in which said audible signalling means comprises a whistle, and in which said means defining said chamber comprises means defining a fluid flow path comprising said chamber in communication with said whistle under control of said first and second pistons.

3. Apparatus according to claim 2, in which said second piston is disposed for opening and closing said fluid flow path.

4. Apparatus according to claim 3, including means under control of said visual signalling means operating said second piston to a position closing said fluid flow path when in position visually indicating said reduced pressure level obtains and allowing said second piston to move to a position opening said fluid flow path when moving away from said position in which said visual-indication is given.

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