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SAFETY DEVICE FOR GAS DISPENSING SYSTEMS

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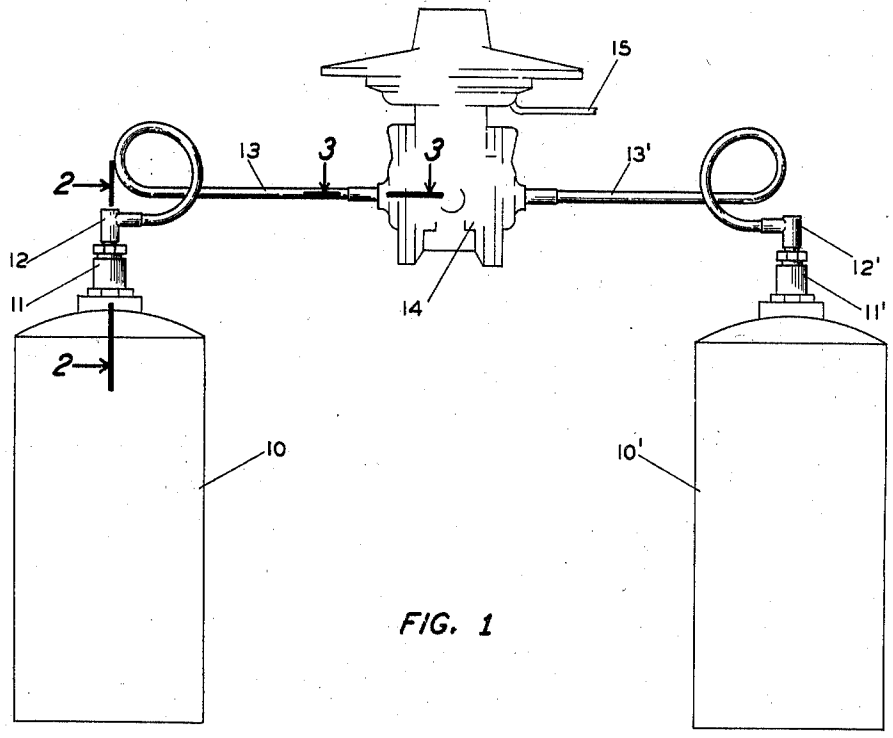


FIG. 1

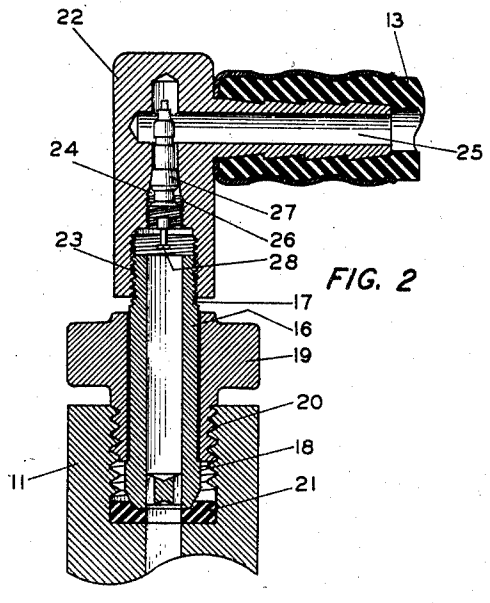


FIG. 2

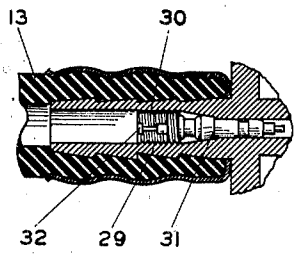


FIG. 3

INVENTOR.
CHARLES MAC SPORRAN

BY
Hudson, Young, Linkey & Young
ATTORNEYS.

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SAFETY DEVICE FOR GAS DISPENSING SYSTEMS

Charles MacSporran, Detroit, Mich., assignor to Phillips Petroleum Company, a corporation of Delaware

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2 Claims. (Cl. 221—73.5)

This invention relates to safety devices and more particularly to safety devices of the character adaptable for use with dispensing equipment for compressed gases such as liquefied petroleum gas or other high pressure gases.

The liquefied petroleum gas industry has expanded rapidly in recent years, especially in its application to various industrial fields and to isolated consumers, such as small communitites and farms. With this growth of the industry, there have been numerous advancements in types of equipment used in the distribution and utilization of the gas. The usual two drum system for the distribution of bottled gas comprises a pair of gas cylinders, a pressure regulator serving both cylinders, and a service line for conveying the gas at reduced pressure from the regulator to the gas consuming appliances. Present advanced types of pressure regulators are designed to have two first stage regulators, each fed from its respective cylinder and in turn feeding into a common second stage regulator from which the gas flows directly to the appliances. These regulators do not have adequate provision for preventing back flow of gas from the active cylinder, through the regulator and thence into the previously exhausted cylinder or to the atmosphere when the exhausted cylinder is disconnected.

There is also the danger of a high pressure line becoming leaky or a break occurring in the line or at one of the line connections. In the event that anything of this nature should happen, there is a possibility of gas from the active cylinder passing through the regulator and being emitted to the atmosphere at the damaged portion of the high pressure line of the exhausted cylinder.

Another objection of the conventional methods of distributing liquefied petroleum gas is that a portion of the high pressure gas may be trapped in the pigtail or high pressure line connected to the exhausted cylinder. When the cylinder connection is detached, the entrapped gas is emitted to the atmosphere. The sudden rush of escaping gas sometimes frightens women and customers not familiar with the equipment. Then there is the additional danger of fire if the gas should be released near an open flame.

The instant invention affords simple and dependable means for eliminating the objectionable and highly undesirable conditions and dangers enumerated above.

The primary object of this invention is to provide safety means in gas distribution systems whereby gas from a high pressure cylinder is prevented from flowing back into a previously exhausted cylinder.

Another object of this invention is to provide safety devices in high pressure gas dispensing systems which will prevent the sudden escape of gas entrapped in high pressure lines when an empty cylinder is removed from the system, and, which also eliminate the fire hazard created by the emission of the gas which has been so entrapped.

A further object of this invention is to provide safety devices in high pressure gas dispensing systems which will prevent the escape of gas to the atmosphere at any time while a cylinder is disconnected from the system.

A still further object of this invention is to provide safety devices in high pressure gas dispensing systems which are inexpensive to manufacture and thoroughly dependable in operation.

These and other objects and advantages will be apparent from the following specification and annexed drawing which describe and illustrate a preferred embodiment of the invention.

In the drawing:

Figure 1 is a schematic representation in elevation of a gas dispensing system.

Figure 2 is an enlarged vertical sectional view taken about on line 2—2 of Figure 1.

Figure 3 is an enlarged vertical sectional view taken about on line 3—3 of Figure 1.

Referring to the drawing and more particularly to Figure 1, reference numerals 10 and 10' indicate a pair of containers or cylinders for containing and dispensing liquefied gas, such as butane, propane, or mixtures thereof. These cylinders are normally closed by valves, not shown, in high pressure gas outlet members 11 and 11' which are connected by couplings 12 and 12' to high pressure withdrawal conduits or lines 13 and 13'. Lines 13 and 13' terminate in a pressure reducing regulator 14 which in turn is connected to a consumer's service or supply line 15 for conveying the gas at reduced pressure to the gas consuming appliances.

The essential elements of a preferred type of coupling 12 is illustrated in Figure 2. It is to be noted that the details of this coupling are the same as for the one shown at 12'. In the coupling, a nipple 16, having its upper portion 17 threaded and a shoulder 18 near its lower end, is in communication with cylinder outlet 11. Concentric with nipple 16 is a sleeve 19 which is threaded externally at its lower portion 20. Through the action of the sleeve 19 on shoulder

18, nipple 16 is firmly seated on a resilient gasket 21. An L-connector 22 has internal threads 23 at its lower end to engage with threaded portion 17 of the nipple and is designed at the opposite end to make a snug connection with line 13. Each leg of connector 22 is provided with an internal bore 24 and 25, and it is seen that these borings intersect and communicate with each other. With this arrangement, the cylinder outlet 11 is in communication with line 13. Connector 22 is also tapped at 26 to embrace a check valve 27. Although I do not intend to limit myself to any single type of check valve, I find that a valve of the well known tire valve core type having a stem 28 is highly satisfactory for the purposes of my invention.

In Figure 3, high pressure gas line 13 is shown connected with gas inlet 29 on the left side of regulator 14. Regulator gas inlet 29 is tapped internally at 30 to receive check valve 31 which, like valve 27, is preferably of the tire valve core type and has a corresponding valve stem 32. A duplicate of this valve is located at the opposite side or in the right hand gas inlet of the regulator.

When cylinder 10 is supplying gas to the system, the liquefied petroleum gas can readily pass through check valves 27 and 31 and thence to the regulator 14. The ease with which this gas is permitted to pass through these valves is merely a matter of properly designing the valves so that they will open at any desired pressure. Likewise, the corresponding check valves in coupling 12' and at the right hand gas inlet of regulator 14 will allow high pressure gas to be transmitted from cylinder 10' to the regulator.

Let us assume that cylinder 10 has been emptied and that a change-over in regulator 14 has just been made so that cylinder 10' is now supplying gas to the system. If the loading or setting on the regulator after the change-over has taken place is not sufficient to close off the left hand side gas admission to the regulator, then some of the gas from cylinder 10' will tend to flow into line 13 and finally into cylinder 10. However, such a back flow of gas will not take place because the pressure of the gas will immediately close valve 31. Nor will there be any undesirable loss of gas through line 13 in the event that the line is leaky or otherwise defective. Any high pressure gas which may remain in line 13 will be entrapped in the line for check valve 27 will prevent back flow of this gas into cylinder 10. Also, when cylinder 10 is removed from the system preparatory to replacing it with a full cylinder of gas, the gas entrapped in line 13 will be prevented by valve 27 from escaping to the atmosphere. The fire hazard and startling effect of the sudden rushing out of the high pressure gas are therefore both eliminated.

There may be instances in which it is desirable in the interests of economy to use only one check valve on each side of the regulator instead of the two valves illustrated in the drawing. For example, if there is no danger of the high pressure gas lines becoming defective in any way or where the length of these lines is comparatively short, the check valves at the regulator inlets are unnecessary. Then again, where an installation is regularly serviced by experienced men, the fire hazard and the normally startling effect of escaping gas are negligible factors and the check valves in the couplings may be eliminated. In this case a check valve in each regulator inlet will be adequate. Summing up, there are three arrangements of the check valves, each of which is especially suited to particular circumstances; namely, (*a*) a check valve in couplings 12 and 12', directly above the cylinders, and a check valve in each regulator inlet; (*b*) a check valve in each coupling only; and (*c*) a check valve in each regulator inlet only.

It is to be understood that the form of this invention, herewith shown and described, is to be taken as a preferred example of the same and that various changes in size, shape and arrangement of parts may be resorted to without departing from the spirit of this invention, and further that the theories of operation set out, although believed to be accurate, are not to be considered as the sole basis of the operativeness of this device, but that this device does operate successfully whether or not upon the principles described herein, this invention to be limited only by the appended claims.

I claim:

1. In a system for storing and dispensing high pressure hydrocarbon gas, the combination comprising a pair of containers for the gas, a common pressure reduction means, a pair of high pressure gas lines connected to the pressure reduction means, detachable means for placing each high pressure line in communication with its corresponding container, and check valve means in each high pressure line and located intermediate the pressure reduction means and the detachable means, said check valve means operating to permit the flow of gas from the containers to the common pressure reduction means but to prevent gas which is admitted into the common pressure reduction means from being transmitted therefrom into either of the containers.

2. In a system for storing and dispensing high pressure hydrocarbon gas, the combination comprising a pair of containers for the gas, a common pressure reduction means, a pair of high pressure gas lines connected to the pressure reduction means, detachable means for placing each high pressure line in communication with its corresponding container, and check valve means of the tire valve core type in each high pressure line and located intermediate the pressure reduction means and the detachable means, said check valve means operating to permit the flow of gas from the containers to the common pressure reduction means but to prevent gas which is admitted into the common pressure reduction means from being transmitted therefrom into either of the containers.

CHARLES MACSPORRAN.