June 30, 1970 M. E. BALMES, JR 3,517,746

DRY CHEMICAL FIRE EXTINGUISHING SYSTEM

Filed April 24, 1968

Fig. 1

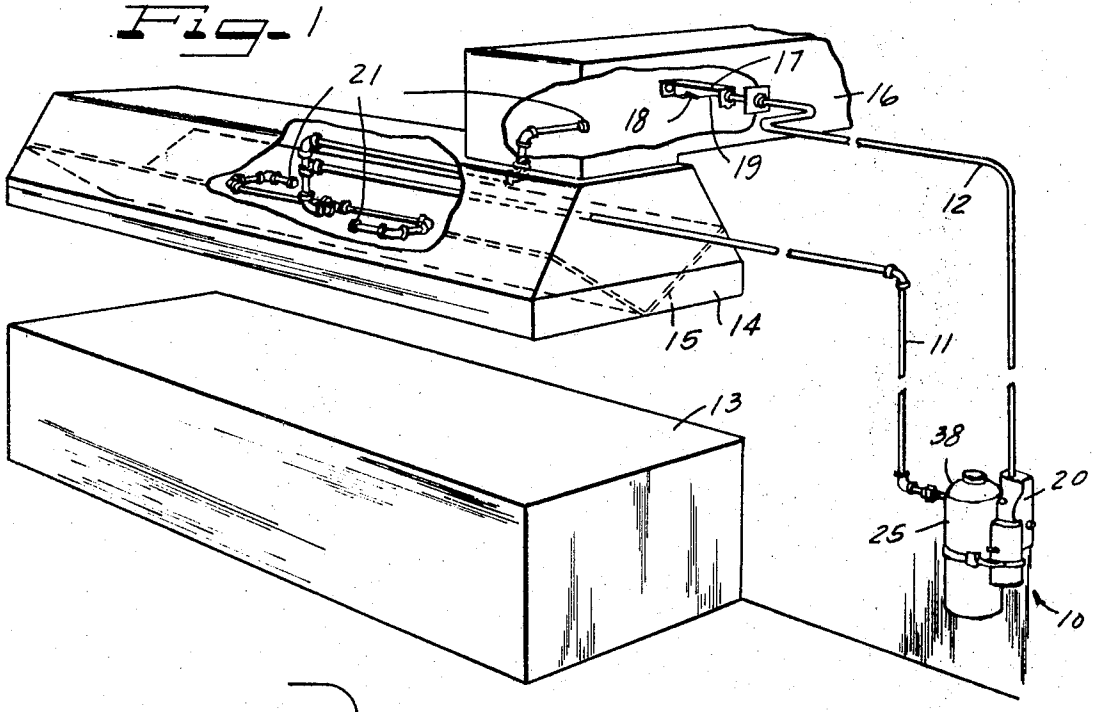


Fig. 2

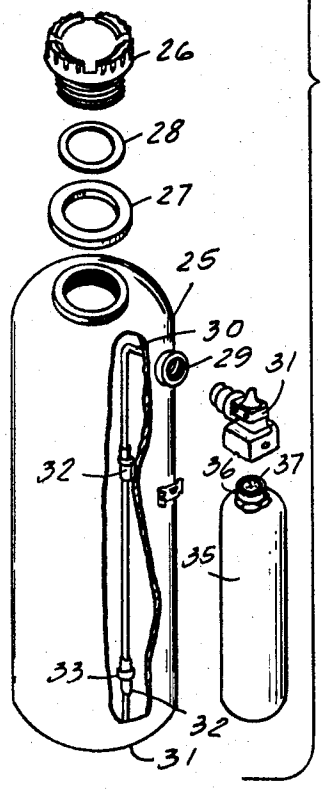
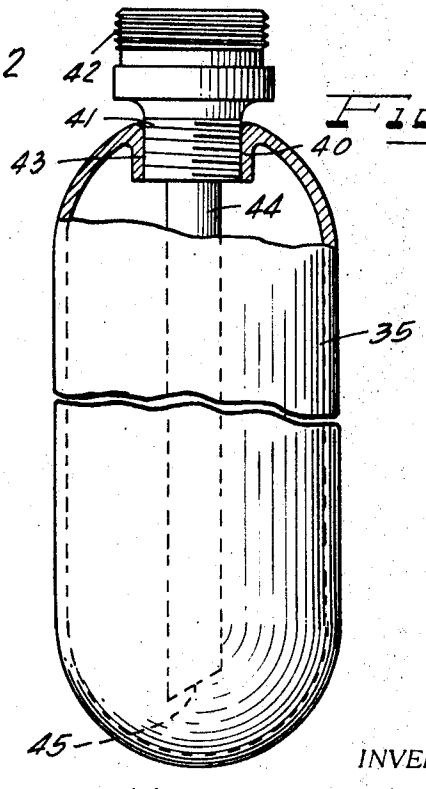


Fig. 3



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DRY CHEMICAL FIRE EXTINGUISHING SYSTEM

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U.S. Cl. 169—9 1 Claim

ABSTRACT OF THE DISCLOSURE

A dry chemical fire extinguisher system having a separate pressurizable storage container for dry chemical extinguisher and a pressure vessel for liquid gas with a siphon tube therein for introducing liquid gas to the storage container wherein it can vaporize and intermix with the dry chemical to propel the same through a piping system to a fire source.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to fire extinguishers and more particularly to a dry chemical fire extinguisher system utilizing liquid gas as a propellant.

Prior art

Dry chemical fire extinguisher systems utilizing pressured gas to propel the dry chemical through a piping system to a fire source are known to the art. Some prior art systems have stored the dry chemical in one container and the propellant gas in another container with a valve mechanism between the two to release the propellant gas to the dry chemical storage container. In those prior art devices which have utilized pressured gas in its vapor form, large gas storage containers were required. It has, however, been known to use liquid gas which is allowed to vaporize in its storage container when the valve is opened. However, in these systems, especially when operating under adversely cold weather conditions, it is possible for the liquid gas, usually CO_2, to crystallize in the container and form Dry Ice, thus reducing the amount of CO_2, in gaseous form, available to the chemical container.

SUMMARY

These and other disadvantages of the prior art are overcome by the present invention which provides propellant gas in its liquid form to the dry chemical storage container.

The invention utilizes two separate containers, one of which carries a large supply of dry chemical extinguisher in a container which can be subjected to pressure. A second pressure vessel is used to contain the liquid gas, preferably CO_2, and a valve is positioned between the two containers. A siphon tube in the pressure vehicle assures that the gas will exit to the dry chemical container in a liquid form. The liquid gas is preferably directed interiorly of the dry chemical container by a piping system which has a plurality of openings for discharging the liquid to the container at different areas wherein it is allowed to vaporize and mix with the dry chemical, thereby propelling the same through a discharge piping system to the fire source as a mixture of dry chemical and gas.

The supplying of liquid gas to the dry storage container allows simultaneous gas mixture, pressure buildup, and discharge to occur without loss of gas pressure through the formation of Dry Ice.

It is therefore an object of this invention to provide a new and improved dry chemical fire extinguisher system.

It is a further object of this invention to provide an improved dry chemical fire extinguisher system utilizing two containers, one of which is used to store dry chemical.

It is a further object of this invention to provide an improved dry chemical fire extinguisher system utilizing two containers, one of which is used to store dry chemical and the other of which is used to store propellant gas in a liquid state and has a siphon tube therein to deliver the gas in its liquid state to the dry chemical storage container.

It is a further object of this invention to provide an improved dry chemical fire extinguisher system utilizing a pressure vessel containing liquid gas with a siphon tube therein to supply propellant gas in its liquid form to a container containing dry chemical to prevent the crystallization of the gas.

Other and further objects of this invention will be apparent to those skilled in this art from the following detailed description of the annexed sheet of drawings which, by way of a preferred embodiment of the invention, illustrates one example of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic illustration of the dry chemical fire extinguisher system of this invention installed in a cooking surface hood and duct.

FIG. 2 is an exploded view partly in section, illustrating the storage containers of this invention.

FIG. 3 is a fragmentary plan view partly in section of the liquid gas pressure vessel of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a dry chemical fire extinguisher system utilizing an extinguisher storage and control apparatus **10**, a piping system **11** for extinguisher discharge and an actuating system **12**. The system is designed for use in extinguishing fires connected with large area cooking apparatus **13** such as is found in restaurants. As commonly used, the cooking apparatus **13** has a hood **14** positioned above it. The hood **14** contains filter screens **15** and communicates to an exhaust duct **16**. Positioned within the exhaust duct **16** is a fire sensing device **17** such as a fusible link **18** designed to separate at a certain temperature. The link **18** is connected to a cable **19** which feeds through a conduit **12** to a control mechanism **20** located in the apparatus **10**. The control mechanism **20** controls the discharge of dry chemical extinguisher and propellant gas through the piping system **11** to nozzles **21** located in the hood **14** and duct **16**. Discharge of the dry chemical extinguisher through the nozzles **21** extinguishes the fire.

FIG. 2 illustrates the two storage containers used with this invention. A large container **25** is used to store the dry chemical extinguisher. The container **25** has a threaded screw-on cap **26** which is sealed to container **25** through a washer **27** and O-ring seal **28**. A threaded fitting **29** through the side of the container **25** communicates with an internal piping system **30**. The piping system **30** extends from the fitting **29** to near the bottom **31** of the container **25**. The piping system **30** is hollow and is pinch-closed at the bottom. At one or more points along the length of the pipe **30**, bleed holes are pierced through the pipe. Expandable rubber sleeves **32** encircle the bleed holes and are retained on the pipe **30** by collars **33**.

A valve mechanism **34** is threaded into the fitting **29**. A second pressure vessel storage container **35** is used to store the pressured gas (such as CO_2) in its liquid form.

The top 36 of the vessel 35 is threaded into a suitable opening in the valve 34. When the valve 34 is actuated, a seal 37 in the top 36 of the pressure vessel 35 is pierced allowing escape of the liquid gas therein. The gas escapes through the valve 34 into the piping system 30 interior of the chamber 25. Due to the pressure buildup of the gas in the piping system 30, the rubber sleeves 32 are expanded and the gas escapes outwardly through the pierced holes in the piping system 30 beyond the rubber sleeves 32. The provision of more than one set of holes and sleeve 32 allows the gas to be introduced to the dry chemical at the same time in different areas of the container 25 thereby insuring a good admixture of gas and chemical.

As the gas passes through the rubber sleeves 32 into the chamber 25, it vaporizes due to the difference in pressure. This vaporization is almost instantaneous with its passage through the pressure differential and the gas readily mixes with the dry chemical stored in the container 25. An exit port 38 in the container 25 communicates the interior of the container with the piping system 11 connecting the container 25 to the discharge nozzles 21. The pressure buildup in the container 25 caused by expansion of the gas forces the mixed gas and chemical out of the low-pressure exit port 38 into the piping system 11.

Supplying the gas to the dry chemical storage container 25 in its liquid form prevents loss of gas through formation of Dry Ice, in the case of CO_2 propellant, and allows the large volume increase caused by the change from the liquid to the gaseous form to take place in the dry chemical storage container 25. This produces a better mixture of gas and dry chemical in the piping system 11.

FIG. 3 illustrates the pressure vehicle 35 used to contain the liquid gas. The vehicle 35 is generally cylindrical with rounded ends at the top and bottom. The top has a shouldered opening 40 therethrough which is threaded to receive a double-threaded end fitting 41. The end fitting 41 carries therein the seal 37 which is punctured by the valve 34. External threads 42 and 43 allow the fitting 41 to be threaded into the valve 34 and the pressure vessel 35 respectively. A siphon tube 44 is threaded into the fitting 41 and projects therefrom into the pressure vessel 35 where it terminates in spaced relation from the bottom thereof. The use of the siphon tube 44 in the pressure vessel 35 assures that when the seal 37 is broken, liquid gas will be introduced to the storage chamber 25.

The gas retains its liquid form in the pressure vessel 35 due to the pressure therein. When the seal 37 is broken and the liquid gas begins to exit through the siphon tube 44 to the container 25, some of the gas will expand and form vapor within the pressure vessel 35 thereby keeping the pressure within the vessel constant until all or most of the remaining liquid gas has been forced through the siphon tube. It is only at the point when the level of the liquid gas in the pressure vessel 35 falls below the bottom 45 of the siphon that gas in its vapor form is introduced to the storage chamber 25. By correct sizing of the amount of gas in the pressure vessel 35 to the amount of dry chemical in the container 25, it is possible to assure that all or the majority of the dry chemical will have been expelled through the piping system 11 prior to the time the liquid level in the pressure vessel falls below the bottom 45 of the siphon 44.

It can therefore be seen from the above that my invention provides an improved dry chemical fire extinguisher system in which the dry chemical and the propellant gas are stored in separate containers and in which the gas is introduced to the dry chemical in a liquid form to enhance the intermixing thereof and to eliminate the possibility of system blockage caused by the formation of gaseous solids in the gas storage container.

Although I have herein set forth my invention with respect to certain specific principles and details thereof, it will be understood that these may be varied without departing from the spirit and scope of the invention as set forth in the hereunto appended claim.

I claim as my invention:

1. A dry chemical fire extinguisher system comprising: a dry chemical extinguisher storage container containing dry powder chemical extinguisher which substantially fills the said container, a hollow inlet tube in said container extending from the upper level thereof through the container to the bottom level thereof, said tube communicating through a wall of the container adjacent the top thereof with a valve means, the said tube having a plurality of apertures therethrough interior of the container, the said apertures located at a depth in the container below the normal level of extinguisher powder, the said apertures closed by flexible sleeves positioned around the said tube, the bottom of the said tube closed, an exit port for said container, said exit port communicating through the wall of the said container to the interior thereof in the upper level of the said container, the said port communicating exteriorly of the said container with a conduit system for distributing exiting extinguisher from the said container to a fire source, means for filling the said container with dry powder chemical extinguisher, a pressure vessel, said pressure vessel having an opening in the top thereof, a fitting threaded into said opening, said fitting including a siphon tube extending from the said fitting to a position adjacent the bottom of the said vessel, the bottom of the said siphon tube open to the said vessel, the top of the said siphon tube normally closed by means of a seal member, liquefied propellant gas contained in said pressure vessel and retained therein by said seal, means on said fitting for attaching the said pressure vessel to the said valve means and means responsive to heat for activating said valve means, said valve means when activated including means for breaking the said seal whereby liquefied propellant gas will be forced through said siphon tube, fitting, valve means and tube into the said container where it will exit through said apertures below the normal level of dry chemical extinguisher in said container as a liquid.

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