Nov. 3, 1936. D. MAPES 2,059,969

DISCHARGING OF STORED PRESSURE MEDIUM CONTAINERS

Filed Aug. 17, 1934 2 Sheets-Sheet 1

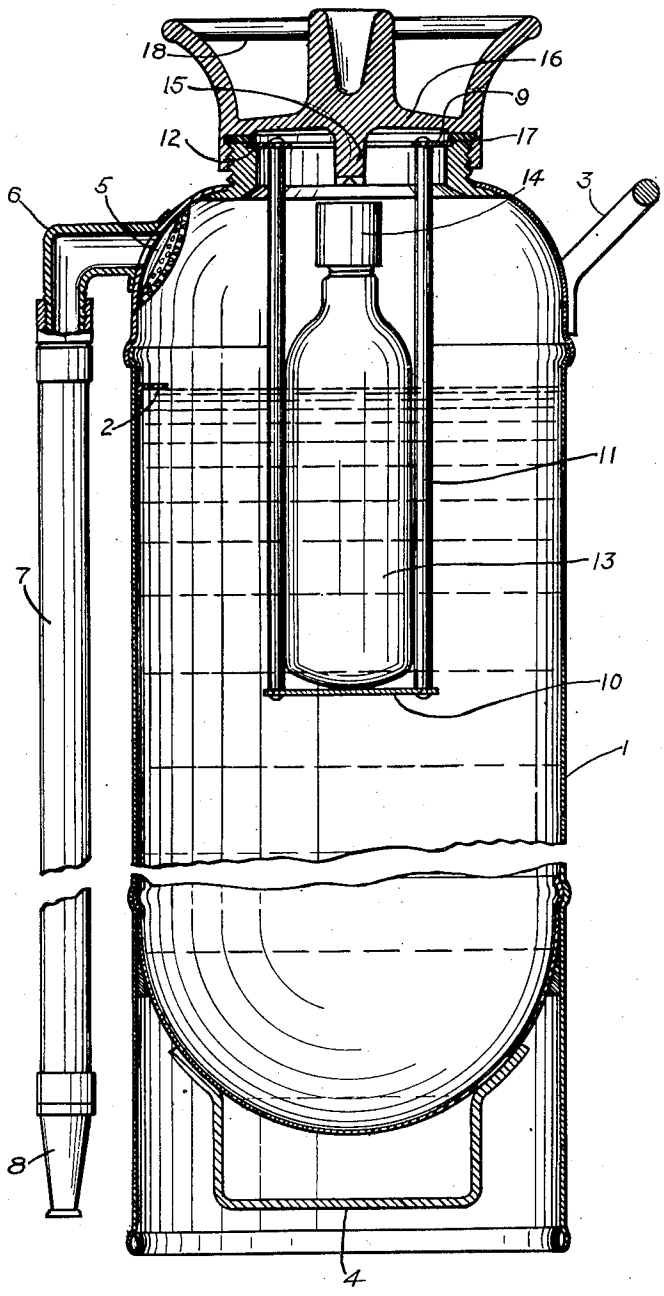

FIGURE 1

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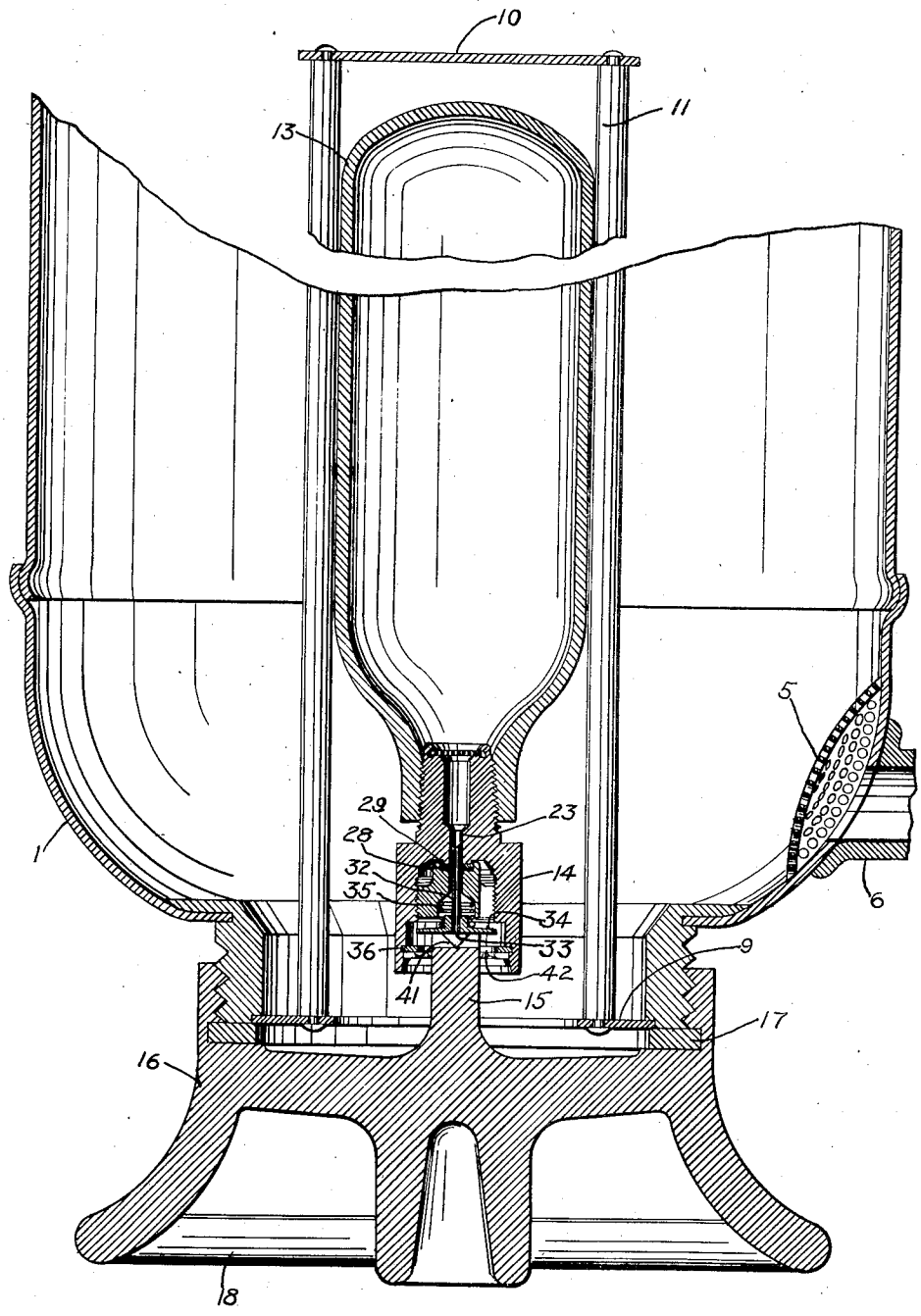

FIGURE 2

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Patented Nov. 3, 1936 2,059,969

UNITED STATES PATENT OFFICE

2,059,969

DISCHARGING OF STORED PRESSURE MEDIUM CONTAINERS

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Application August 17, 1934, Serial No. 740,255
In Canada February 28, 1933

7 Claims. (Cl. 169—31)

The present application is a continuation in part of my application Serial No. 604,335, filed April 9, 1932 which application has been abandoned.

The present invention relates to fire extinguishing apparatus employing a fire extinguishing liquid propelled by a medium stored under pressure in a cartridge or other container, by way of example liquid carbon dioxide, and embodies more specifically means for ensuring uniform discharge of the pressure medium so as to obtain uniform discharge of the liquid fire extinguishing medium.

In fire extinguishing apparatus of the type in question and employing a pressure producing cartridge containing a medium such as liquid carbon dioxide, erratic discharge has been encountered at temperatures near the freezing point of the liquid medium due to the great reduction in temperature occurring upon the expansion of the liquid carbon dioxide during discharge with consequent cooling and solidification of the liquid medium adjacent the discharge orifice of the cartridge, resulting in stoppage of the discharge orifice. It has also been observed that a solidification of the carbon dioxide, itself, in the discharge orifice occurs when the carbon dioxide is discharged into any medium, liquid or gaseous, at extremely low temperatures, it being understood that the term solidification, with respect to the carbon dioxide, is employed in the limited sense of the formation of a solid mass of carbon dioxide snow, and not in the broad sense of the transition from the liquid state to the solid state.

The present invention therefore contemplates charging into the pressure cartridge or other container a sufficient quantity of a substance which will prevent solidification of the liquid fire extinguishing medium adjacent the discharge orifice, or the solidification of the carbon dioxide in the discharge orifice, of the cartridge to an extent which would impair the action of the apparatus.

With apparatus employing water as the fire extinguishing medium, propelled by the discharge from a cartridge containing liquid carbon dioxide, it has been found that a small quantity of ethyl alcohol placed in the cartridge before charging it with liquid carbon dioxide will not only have the desired anti-solidifying effect but will not impair the extinguishing action of the water. A small amount of alcohol will also prevent the solidification of the carbon dioxide in the discharge orifice when the carbon dioxide is discharged into any medium, liquid or gaseous, at extremely low temperatures.

It has also been found that several other substances may be employed instead of ethyl alcohol which will have the desired effect. Such chemicals as methanol, phosphorus trichloride and butynol when discharged through a small orifice with carbon dioxide will prevent undesirable solidification of the carbon dioxide at the point of discharge. At the same time such a chemical will prevent the solidification, adjacent the discharge orifice, of any liquid into which the carbon dioxide is being discharged.

Therefore, it is to be understood that the present invention contemplates the use of any suitable substance for preventing solidification of any liquid fire extinguishing medium propelled by any pressure medium of a nature which would normally cause solidification of the liquid medium to an extent which would impair the operation of the extinguisher.

While the invention is not associated with any particular design of extinguisher, it will nevertheless be described in connection with the accompanying drawings, wherein:

Figure 1 is a central longitudinal sectional view of an extinguisher of the type with which the invention may be advantageously employed.

Figure 2 is a view in central longitudinal section of a portion of the extinguisher shown in Figure 1 when in its inverted or operated position.

In Figure 1 of the drawings there is represented at 1 a standard shell or container for holding a liquid fire extinguishing medium, such as water, calcium chloride solution or other suitable fire extinguishing medium, which is filled into the container up to the level of the filling indicator 2. The shell is provided with a handle 3 for carrying the extinguisher in an erect position, another handle 4 for carrying the extinguisher in an inverted position, a strainer 5, an outlet elbow 6 and a standard hose 7 coupled to the outlet elbow and having a discharge nozzle 8. A cage comprising an upper flange 9, a bottom plate 10 and suspension rods 11 is supported upon a shoulder 12 in the neck of the shell and in turn supports a cartridge 13 containing a medium under pressure such as liquid carbon dioxide, for propelling the liquid fire extinguishing medium from the shell. The cartridge 13 is provided with a coupling 14 containing means for effecting release of the pressure medium from the cartridge, said releasing means becoming operative upon inversion and

jarring of the shell whereby to clause forcible engagement of the releasing means with a projection 15 formed on a cap 16 and extending within the shell. The cap 16 is threaded to the neck of the shell with an intervening gasket 17 which not only effects a leakage-tight joint with the shell, but secures the flange 9 of the cage against movement. The cap 16 is otherwise standard, being provided with a rim 18 for carrying the extinguisher in an upright position and for effecting rotation of the cap.

With the extinguisher in its erect position as shown in Figure 1, operation of the extinguisher involves overturning it, grasping it by the handle 4, and jarring the extinguisher as by striking it on the floor or ground, so as to cause the cartridge releasing means to forcibly engage the projection 15 on the inner side of the cap 16, in connection with which it should be noted that Figure 2 illustrates the inverted operated position of the extinguisher. The essential features of the releasing device shown in Figure 2 are the coupling 14, the frangible disc 28 and the sealing gasket 29 arranged to normally close a passage 23 communicating with the interior of the cartridge 13. The disc puncturing element is shown at 32 and is normally maintained out of contact with the frangible disc 28 by means of a spring 35 bearing against a flange 34 secured to the element 32, said flange normally resting against a stop ring 36. The disc puncturing element 32 is shown provided with a passage 33 and the innermost end of the projection 15 is cross-grooved at 41 to provide free escape of the pressure medium, when the frangible disc 28 has been ruptured by reason of forcible engagement of the flange 34 with the projection 15, from the passage 33 through the opening 42 in the stop ring 36 and thence into the liquid extinguishing medium in the shell 1 through which the pressure medium rises to the upper surface of the liquid medium, upon which the pressure acts to propel the liquid medium through the hose 7 and nozzle 8.

In extinguishers of the type just described, in which the pressure medium is liquid carbon dioxide or any medium producing a large drop in temperature upon release of the pressure medium, difficulty is often encountered at operating temperatures near the freezing temperature of the liquid fire extinguishing medium due to solidification of the liquid extinguishing medium adjacent the point of discharge of the pressure medium thereinto, at which point the greatest cooling effect takes place.

It has been discovered that this difficulty can be overcome by charging into the pressure medium cartridge or container a small quantity of a substance which, upon being discharged with the pressure medium, prevents solidification of the surrounding liquid medium to an extent which would impair the action of the extinguisher. However, it has been found that any substance which will operate successfully must have a freezing point less than the freezing point of carbon dioxide or any other pressure medium. The freezing point of carbon dioxide is at 57° below zero centigrade which is the triple point of that medium. The requirement, of a lower freezing point, is necessary in order that the carbon dioxide will not itself form carbon dioxide snow and freeze in the discharge passage when it is being discharged under low temperature conditions.

At ordinary temperatures the addition of some chemical, such as ethyl alcohol, merely serves the function of reducing the freezing point of the liquid fire extinguishing medium immediately adjacent the point of discharge of the carbon dioxide. Thus the alcohol prevents freezing of the liquid fire extinguishing medium and permits free egress of the carbon dioxide into the fire extinguishing medium. As was pointed out hereinbefore, the alcohol is charged into the carbon dioxide container and is introduced into the fire extinguishing medium when the carbon dioxide is discharged thereinto. If a large amount of alcohol were mixed with the fire extinguishing medium it might have a harmful effect on the extinguishing properties of that medium, but the amount employed in the pressure container in accordance with the present invention is insufficient to reduce the freezing temperature of the entire body of liquid fire extinguishing medium; yet it is sufficient to reduce the freezing temperature of the medium at the discharge point of the carbon dioxide into that medium. It will also of course reduce the freezing point of the carbon dioxide in the discharge passage.

While it has been found, with apparatus employing water as the fire extinguishing medium, propelled by the discharge from a cartridge containing liquid carbon dioxide, that a small quantity of alcohol, or any of the substances hereinbefore mentioned, placed in the cartridge before charging it with liquid carbon dioxide will not only have the desired anti-solidifying effect but will not impair the extinguishing action of the water, it should be understood that the present invention broadly contemplates the use of any suitable substance for preventing solidification of any liquid fire extinguishing medium propelled by any pressure medium of a nature which would normally cause solidification of the liquid medium to an extent which would impair the operation of the extinguisher.

From the foregoing description it will be seen that I have made a decided improvement in discharging of stored pressure medium containers and while the invention has been described with specific reference to the accompanying drawings, it is not to be limited, save as defined in the appended claims.

I claim:—

1. Fire extinguishing apparatus comprising a container of water to serve as a fire extinguishing medium and a vessel within said container containing carbon dioxide stored in liquid form for propelling the water from said container, and a small quantity of a substance selected from the group consisting of ethyl alcohol, methanol and butynol charged into the vessel, to be discharged with the liquid carbon dioxide, to prevent solidification of the water adjacent the point of discharge of the carbon dioxide thereinto.

2. Fire extinguishing apparatus comprising a container of water to serve as a fire extinguishing medium and a vessel within said container containing carbon dioxide stored in liquid form for propelling the water from said container, said liquid carbon dioxide being a medium which will cause solidification of the water upon discharge thereof into the water, and a small quantity of methyl alcohol charged into the vessel, to be discharged with the liquid carbon dioxide, to prevent solidification of the water adjacent the point of discharge of the carbon dioxide thereinto to an extent which would impair the action of the apparatus.

3. The combination of a vessel for carbon dioxide in liquid form, a container holding a liquid medium capable of freezing upon the discharge of liquid carbon dioxide thereinto, means to discharge the carbon dioxide from said vessel into the liquid medium in said container, and a substance selected from the group consisting of ethyl alcohol, methanol and butynol charged into said vessel to prevent solidification of said liquid medium and said carbon dioxide upon the discharge of said vessel.

4. The combination of a vessel for carbon dioxide in liquid form, a container holding a liquid medium capable of freezing upon the discharge of liquid carbon dioxide thereinto, means to discharge the carbon dioxide from said vessel into the liquid medium in said container, and methanol charged into said vessel to prevent solidification of said liquid medium and said carbon dioxide upon the discharge of said vessel.

5. The combination of a vessel for carbon dioxide in liquid form, a container holding a liquid medium capable of freezing upon the discharge of liquid carbon dioxide thereinto, means to discharge the carbon dioxide from said vessel into the liquid medium in said container, and butynol charged into said vessel to prevent solidification of said liquid medium and said carbon dioxide upon the discharge of said vessel.

6. The combination of a vessel for carbon dioxide in liquid form, a container holding a liquid medium capable of freezing upon the discharge of liquid carbon dioxide thereinto, means to discharge the carbon dioxide from said vessel into the liquid medium in said container, and ethyl alcohol charged into said vessel to prevent solidification of said liquid medium and said carbon dioxide upon the discharge of said vessel.

7. An apparatus comprising a container of liquid to be discharged and a vessel within said container containing carbon dioxide in liquid form for propelling the liquid medium from said container, said liquid medium being capable of freezing upon the discharge of liquid carbon dioxide thereinto, and a substance selected from the group consisting of ethyl alcohol, methanol and butynol charged into said vessel, to be discharged with the carbon dioxide, to prevent solidification of the liquid medium adjacent the point of discharge of the carbon dioxide thereinto.

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