

[54] **DISPENSING DEVICE AND METHOD FOR INTRODUCING FLUID INTO HIGH PRESSURE LINES**

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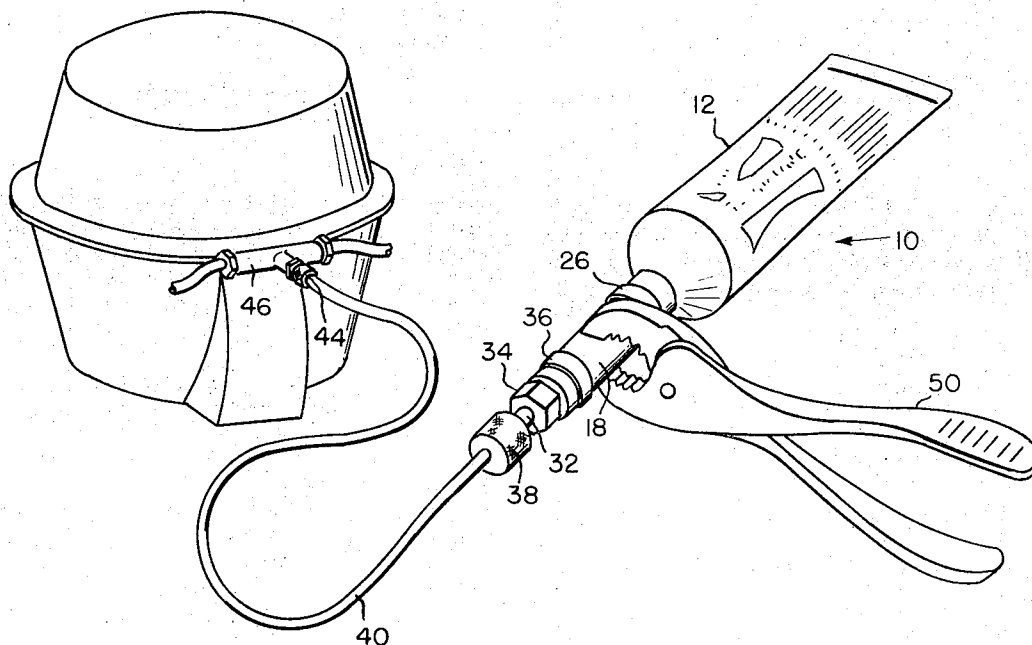
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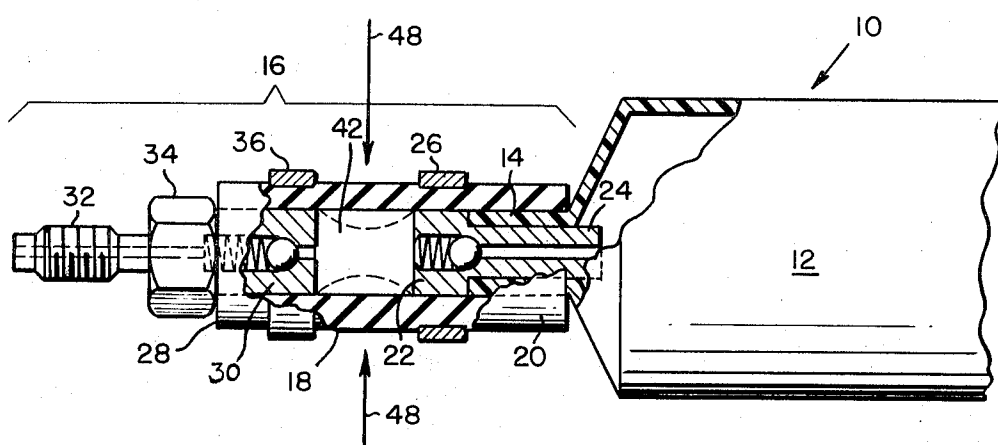
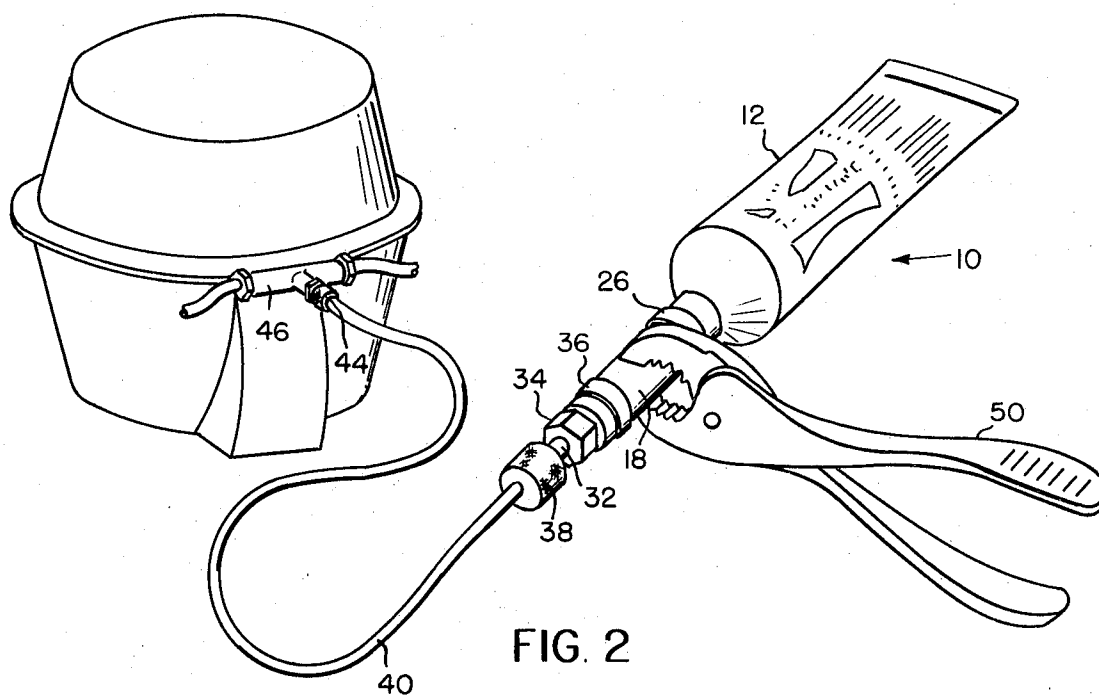
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[57] **ABSTRACT**

Apparatus and method is disclosed for introducing a fluid dehydrant into a high pressure refrigeration system. The fluid dehydrant is packaged in a squeeze bottle or tube having a short dispensing section fixed to the discharge opening of the squeeze bottle, the dispensing section being flexible but sufficiently rigid to withstand the pressure in the refrigeration system. Each end of the dispensing section is provided with a check valve so the portion between the check valves acts as a pump. The discharge end of the dispensing section, in addition, is provided with a threaded flair fitting adapted to mate with the standard fitting of a refrigeration system charging hose. With the flair fitting connected to the charging hose, the bottle is manually squeezed to force the fluid dehydrant through the dispensing section between the check valves and through the charging hose until it appears at the open end of the charging hose. This purges the dispensing section and charging hose of air and primes the pump portion between the check valves. The charging hose is then connected to the compressor charging valve. Any suitable means such as a pliers is then used to squeeze the dispensing section between the check valves, i.e., the pump portion, for injecting the dehydrant directly into the refrigeration system.

10 Claims, 2 Drawing Figures





DISPENSING DEVICE AND METHOD FOR INTRODUCING FLUID INTO HIGH PRESSURE LINES

BACKGROUND OF THE INVENTION

The present invention relates generally to a dispensing device and method for introducing fluids into high pressure systems and more particularly to such a device and method for introducing a fluid dehydrant into high pressure refrigeration systems for chemically drying and deicing the refrigerant.

In refrigeration systems using methyl chloride, methylene chloride, isobutane, or a standard fluorine refrigerant, excess moisture in the refrigerant will form ice particles at the expansion device causing the refrigeration system to "freeze up." In order to free the system, one practice is to introduce a fluid dehydrant directly into the refrigeration lines to chemically "dry" the refrigerant and prevent it from precipitating ice particles.

There are several methods for introducing such a fluid dehydrant into a high pressure refrigeration system. For example, in one method the appropriate valves are closed and the refrigeration system pumped from its normal pressure of up to 300 psi down to a pressure of 2 to 3 psi. The flair connection at the expansion valve is then broken and the fluid dehydrant introduced directly into the refrigeration line from a squeeze bottle container. In another method, the system is pumped down until the compressor acts as a vacuum pump on the evaporator portion of the system. The fluid dehydrant is then drawn into the system under the vacuum pulled by the compressor. The main disadvantage of such methods is that the system must be pumped down to a relatively low psi and time is lost on restarting the refrigeration system and bringing it up to operating pressure. Further, there is always the danger of introducing air into the system when such methods are employed.

Another method which does not require that the system be pumped down, uses a container which is strong enough to withstand the high pressure of the refrigeration system. The container has two openings, one being attached to the charging valve of the refrigeration system through a charging hose and the other being attached through another charging hose to a charging cylinder filled with refrigerant under pressure. The pressure of the refrigerant in the charging cylinder is used to force the fluid dehydrant from the container into the refrigeration system. This method is not entirely satisfactory in that either the dehydrant must be packaged in a container able to withstand the pressures of the refrigeration system or the maintenance personnel must carry a container of the dehydrant and a special, high pressure container into which he places the amount of dehydrant he wishes to introduce into the refrigeration system.

In the present invention, the fluid dehydrant is packaged in a squeeze bottle container. The container is itself not able to withstand the pressure of the refrigeration system, however, the container is provided with a dispensing section which is able to withstand such pressure and is equipped with check valves to prevent the pressure from reaching the container. A flair fitting on the discharge section allows the container to be attached through a charging hose to the charging valve

of the refrigeration system. The discharge section is then squeezed with pliers or other suitable device to inject the fluid dehydrant directly into the refrigeration system.

SUMMARY OF THE INVENTION

The method and apparatus of the present invention may be characterized in one aspect thereof by the provision of a squeeze bottle container of the fluid to be introduced into the refrigeration system. The squeeze bottle includes a discharge section made of a material sufficiently strong to withstand the pressure of the refrigeration system, at least a portion of the discharge section being flexible yet resilient enough to return to its original shape when released; a pair of one-way check valves in the discharge section to permit flow of fluid from the bottle and through the discharge section, one valve being adjacent the squeeze bottle outlet and the second valve being adjacent the outlet of the discharge; and a threaded fitting on the discharge section adapted to connect to the charging fitting of the refrigeration system or as preferred, to a standard charging hose.

The method of use includes the steps of connecting the squeeze bottle to a charging hose by threading the flair fitting to the charging hose; manually squeezing the bottle to force a quantity of fluid from the bottle into the discharge section between the valves and through the hose to purge air from the bottle, dispensing section and charging hose; connecting the open end of the charging hose to the charging valve of the system, and, thereafter squeezing the flexible portion of the discharge section with pliers or other suitable device to exert sufficient pressure to overcome the pressure of the refrigeration system and inject the fluid in the dispensing section directly into the refrigeration line.

OBJECTS OF THE INVENTION

One object of the present invention is to provide a container and method for injecting fluid directly into the refrigeration lines of a high pressure refrigeration system.

Another object of the present invention is to provide a squeeze bottle container which can be mated directly to the refrigeration system for injecting a fluid dehydrant directly into the refrigeration lines.

Still another object of the present invention is to provide a squeeze bottle container having an integral dispensing section adapted to connect to the charging valve of a refrigeration system through a standard charging hose, the dispensing section being the only portion of the container capable of withstanding the pressure of the refrigeration system.

Yet another object of the present invention is to provide a method for introducing a measured amount of fluid dehydrant directly into a refrigeration system without the need for reducing the pressure of the system or stopping the operation of the system.

These and other objects, advantages and characterizing features of the present invention will become more apparent upon consideration of the following detailed description thereof when taken in connection with accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a new partly in section and broken away showing the container of the present invention; and

FIG. 2 is a schematic view showing the manner in which the apparatus of the invention may be utilized.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, FIG. 1 shows the container of the present invention generally indicated at 10 to include a relatively thin walled flexible body portion 12. The body portion forms what is generally known as a "squeeze bottle" or squeeze tube and contains the fluid dehydrant which is to be introduced into the refrigeration system. The body portion has a spout 14 to which is attached the dispensing section 16 of the container. The dispensing section includes a length of hose 18 which, preferably is shorter than the body of the container. The material of the hose is relatively stiff and strong enough to withstand the pressure of the refrigeration system, yet sufficiently flexible so that it may be deformed by a force applied with pliers or other suitable instruments and resilient enough to return to original shape when released.

One end 20 of the hose is designed to fit over spout 14. The hose is attached to the spout simply by pushing or rotating the hose on to the spout to force the spout and hose together. End 20 of the hose is provided with a check valve 22 fixedly held in the hose by a clamping member such as a crimped metal ring 26. The check valve has a stem portion 24 which fits snugly into spout 14. Engagement of hose over the spout plus the snug fit of valve stem 24 into the spout insures that the attachment of the hose to the squeeze bottle 12 is fluid and pressure tight. Metal ring 26 which tightly embraces valve 22 also insures that the container body portion 12 is not subjected to high pressure when the container is attached to a refrigeration system as set out herein below.

The forward end 28 of hose 18 is provided with a flair fitting which includes a check valve 30, a threaded discharge nozzle 32 and a head portion 34. A second metal clamp, such as a crimped band 36 fixes the forward end of the hose about the flair fitting.

Preferably, the male threads on the discharge nozzle 32 are adapted to mate with a female fitting 38 on one end of standard charging hose 40. The use of charging hoses is well known in the art. Briefly, such hoses are used because the charging valve of the refrigeration system is usually located in a relatively inaccessible spot which makes it difficult to attach any sort of container directly to the valve. Also such valves are usually provided with a male fitting. Thus the usual practice is to attach one end of a flexible charging hose to the charging valve and then snake the other end of the hose around the refrigeration equipment to a more convenient location to permit introduction of fluid into the system according to one of the methods set out above under *Background of The Invention*. Accordingly while the dispenser of the present invention can be made to attach directly to the male fitting of the charging valve, this is not preferred. First, because the usually inaccessible location of the charging valve makes it difficult to connect a container to the valve and second because a container according to the present invention only with

a discharge nozzle 32 having internal or female threads, is less economical to manufacture.

In operation the entire container 10 is attached to a standard charging hose 40 by threading discharge nozzle 32 to female fitting 38 on one end of the hose as shown in FIG. 2. Container 12 is then squeezed normally to force a small quantity of the dehydrant fluid into a chamber 42 between check valves 22 and 30 and out through the other end 44 of the charging hose. This purges the container, the dispenser and the charging hose of air. The other end 44 of the charging hose with its female fitting then is connected to the male fitting of the refrigeration system charging valve 46. Thereafter any suitable means is applied to the center portion of dispensing hose 18 to exert a pressure on the hose in the direction shown by arrows 48 (FIG. 1). This deforms the hose to the position shown in dotted line to force fluid from chamber 42 and out through check valve 30. Since the refrigeration system may be under a relatively high pressure, say 300 psi, and the material of hose 18 is relatively stiff, some tool, such as a pliers 50 (FIG. 2), is required for exerting the force necessary to deform the hose. The operation of manually squeezing container 12 and then squeezing dispensing hose 18 with the pliers may be repeated several times until sufficient dehydrant fluid has been injected into the refrigeration system. In this respect, if the volume of chamber 42 is known, the user is provided with a convenient means to measure the amount of fluid being introduced into the system.

Thus, dispenser portion 16, particularly that portion of hose 18 between check valves 22 and 30, forms a pump which can be used to force fluid into the refrigeration system and at the same time, provide a relatively accurate measurement of fluid being introduced into the system. The construction of dispenser portion 16 is considerably more rugged than the squeeze bottle container 12 so that the dispenser portion is able to withstand the relatively large forces required to push fluid into the refrigeration system. The use of the metal band 26 about the hose and check valve 22 in particular isolate any pressures generated in chamber 42 from the squeeze bottle.

When attaching container 10 to the refrigeration charging hose it may be sufficient merely to grasp the squeeze bottle and rotate it to mate the flair fitting with the charging hose female fitting 38. However, in order to insure that the torque created would not damage spout 14, the tightening of threaded discharge nozzle 32 and female fitting 38 can be accomplished by applying a wrench or other suitable tool to the head 34 of the flair fitting.

While the invention has been described, with respect to apparatus and method for introducing a fluid dehydrant into a refrigeration system, it should be appreciated that other fluids such as an internal tracer type leak detector may be introduced into refrigeration system in a similar manner.

Thus it should be appreciated that the present invention accomplishes its attended objects in providing a method and apparatus for introducing fluid, particularly fluid dehydrants into a refrigeration system without the need for reducing the pressure of the system or stopping or opening the system.

Having thus described the invention in detail, what is claimed as new is:

1. A container for charging fluid into a pressurized refrigeration system comprising:
 - a. a flexible body portion containing a supply of the fluid to be charged into the pressurized refrigeration system and being of the type which is squeezed by hand to express fluid through a spout, said body portion having insufficient strength to withstand the pressure of the refrigeration system;
 - b. a dispenser portion capable of withstanding the pressure of the refrigeration system, said dispenser portion having a section defining a pump chamber between a first end disposed in fluid tight relationship about said spout and a second end, at least part of said section being flexible;
 - c. means carried by said first end including a check valve for isolating said body portion from the pressure of the refrigeration system; and
 - d. means carried by said second end for attaching said dispenser portion to a refrigeration system charging valve whereby said body portion is manually squeezed to transfer a quantity of fluid into said pump chamber and thereafter said flexible part of said dispenser section is squeezed to force fluid from said pump chamber and into the refrigeration system against the pressure of the system.
2. A container as set forth in claim 1 including a check valve in said second end, said pump chamber being defined by the section of said dispenser between said check valves.
3. A container as set forth in claim 1 wherein said check valve includes a stem portion extending into said spout and said first end is disposed over said spout.
4. A container as set forth in claim 3 wherein said means carried by said first end includes a metal band embracing said first end at said check valve for clamping said check valve and dispenser portion together in a fluid tight relationship.
5. A container as set forth in claim 1 wherein said means carried by said second end comprises:
 - a. a flair fitting having a portion disposed in said second end and a threaded nozzle portion adapted to connect said container to a refrigeration system charging valve;
 - b. a check valve in said second end; and
 - c. a metal band embracing said first end at said flair fitting and check valve for clamping the same and said dispenser portion together in a fluid tight relationship.
6. A container as set forth in claim 5 wherein the nozzle portion of said flare fitting is provided with external threads for connecting said dispenser portion to one end of a charging hose, said hose having its other end adapted to connect to a refrigeration system charging valve.
7. A dispenser for charging fluid into a pressurized refrigeration system comprising:
 - a. a flexible body portion containing a supply of the fluid to be charged into the system, said body portion having a strength insufficient to withstand the pressure of the system and being of a type which is manually squeezed to express fluid through a container spout;
 - b. a section of hose having a first end disposed in fluid tight relationship about said spout, said hose being

- flexible and having a strength sufficient to withstand the pressure of the system;
- c. first and second spaced check valves in said hose arranged to permit one-way flow of fluid from said body portion and through said hose, said spaced check valves and a section of said hose therebetween defining a pump chamber;
- d. a flair fitting carried by the second end of said hose, said fitting having a portion, which includes said second check valve, extending into said hose, and an externally threaded discharge portion for connecting said fitting to a refrigeration system charging valve; and
- e. a metal band about each end of said hose, one band embracing said flair fitting and one band embracing said first check valve wherein said metal bands clamp said hose in a fluid tight relationship against said flair fitting and first check valve respectively, said first check valve and its embracing metal band acting to isolate said body portion from pressures generated in said pump chamber; whereby manually squeezing said body portion expresses fluid through said spout and into said pump chamber and thereafter squeezing said hose section forces fluid from said pump chamber and through said threaded discharge portion.
8. A dispenser as set forth in claim 7 wherein the volume of said pump chamber is known and provides means for measuring the amount of fluid introduced into the refrigeration system.
9. A method for introducing a quantity of fluid into a pressurized refrigeration system comprising the steps of:
 - a. providing a squeeze bottle containing a supply of said fluid, said bottle being incapable of withstanding the pressure in the system, said bottle having a flexible dispenser portion fixed thereto capable of withstanding such pressure, a pair of spaced check valves defining a pump chamber in said dispenser portion, and a threaded flair fitting;
 - b. threadably connecting the dispenser portion of said squeeze bottle to the charging valve of the refrigeration system;
 - c. manually squeezing said bottle to force a quantity of fluid into said pump chamber between said check valves; and
 - d. squeezing said dispenser portion with force multiplying means to create sufficient force to overcome the pressure of the system and pump at least a portion of the fluid from said pump chamber and into the refrigeration system.
10. A method as set forth in claim 9 wherein steps (c) and (d) are performed in sequence after the steps of:
 - a. threadably connecting said threaded flair fitting to one end of a standard charging hose the second end of said hose being open;
 - b. purging air from said bottle dispenser portion and charging hose by manually squeezing said bottle until fluid from said container appears at the open second end of said hose; and
 - c. threadably connecting the second end of said hose to said refrigeration system charging valve.

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