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APPARATUS FOR STORING AND DISPENSING REFRIGERANT GAS

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Fig. 1.

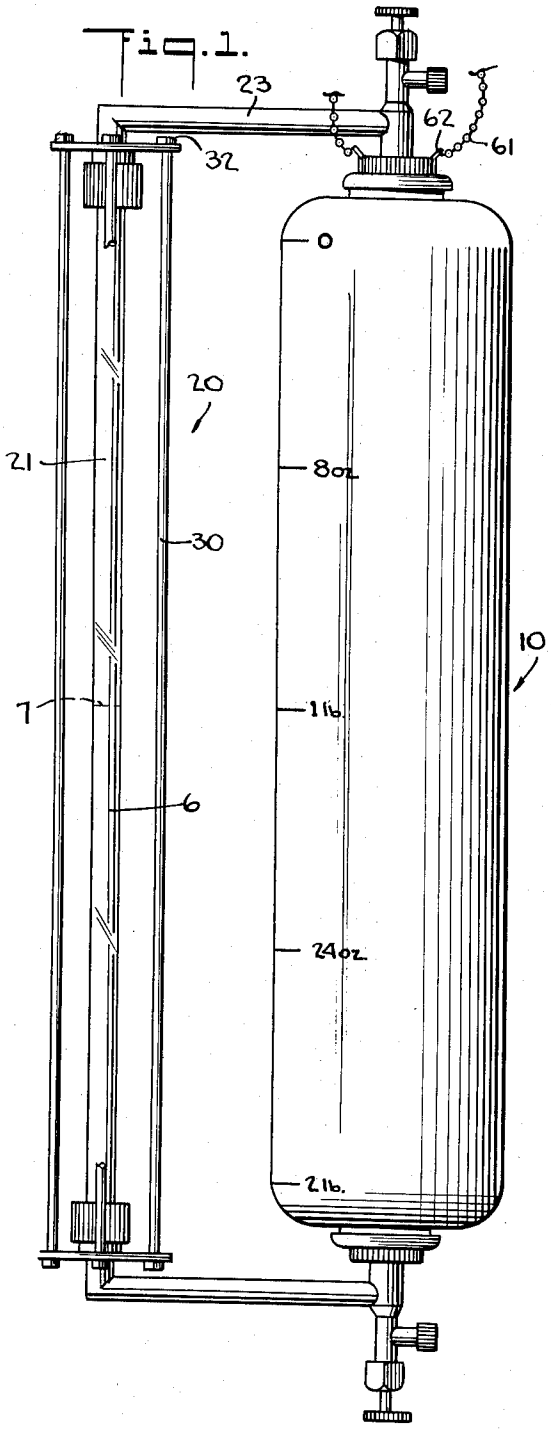



Fig. 2.

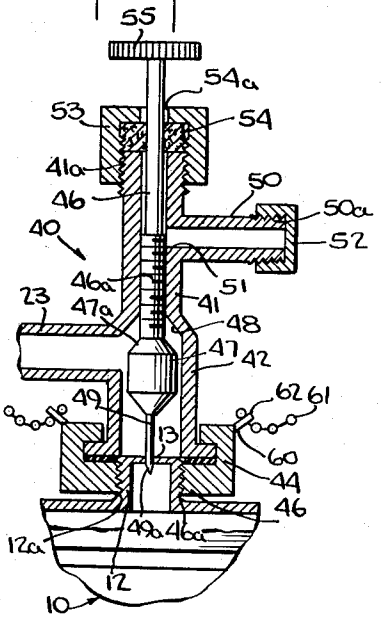
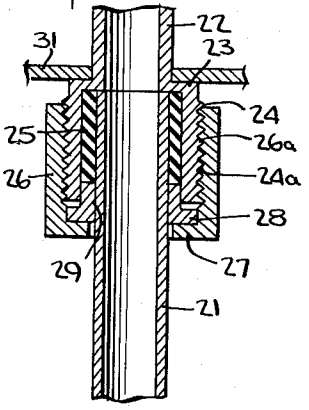



Fig. 3.




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# APPARATUS FOR STORING AND DISPENSING REFRIGERANT GAS

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7 Claims. (Cl. 62—292)

This invention relates to improved apparatus for storing and dispensing refrigerant gas and the like.

The invention has particular application to field use in supplying Freon and other refrigerant gases to the compressor units of refrigerators and the like, in the field. In the servicing of refrigerators and the like, it frequently is necessary to replenish the Freon gas or other refrigerant gas used in the compressor system. In servicing in the field, it has been the practice to use a portable container of the gas (in liquid phase), having an outlet valve, for supplying of such gas to the compressor of the refrigerator or the like. No accurate means has existed for weighing the amount of gas to be dispensed. This has presented a serious problem, because different manufacturers design their equipment to take different amounts by weight of refrigerant gas, and the amount of gas supplied to the system is often relatively critical.

One object of this invention is to provide a kit including a throw-away or disposable container and a support for the container, this support incorporating means for determining visually the amount of gas dispensed from the container and also including valve means for controlling the dispensing of such gas from such container.

In accordance with a preferred embodiment of the invention, the container is provided at both ends with hollow attachment nipples and with pierceable seals for said nipples, in contrast with the present practice in which the container is commonly provided with only one attachment nipple. The container is filled with refrigerant gas in liquid phase in the usual way before it is sealed. The support comprises a hollow sight glass and transverse opposing tubes connected to the opposite ends of the sight glass in communication therewith. Respective valve assemblies are mounted on the free ends of these tubes, these valve assemblies including means for releasably mounting the valve assemblies on the nipples and for piercing the seals to establish communication between both ends of the sight glass and both ends of the container. The valve assemblies both have outlets and valve means for said outlets.

The support has means so that it may readily be hung with the container extending vertically. The sight glass than also extends vertically and opposes the peripheral wall of the container. As a result, the level of the refrigerant may be determined by examining the sight glass. Through the provision of a suitable scale, calibrated by weight in accordance with the particular refrigerant and with the particular ambient temperature at which the kit is to be used, it is possible to determine with a high degree of accuracy, the amount of refrigerant which is withdrawn from the container.

The provision of the two valve assemblies with outlets is of particular importance. Ordinarily, the outlet of the lower valve assembly is connected to a tube and hence to the device which is to be filled with refrigerant. The upper valve assembly outlet is normally open to the atmosphere. Prior to the dispensing of refrigerant gas from the container the upper valve is briefly opened so as to bleed out vapor or gas through the upper valve assembly outlet, thereby insuring that the level of liquid in the sight glass will be the same as the level of liquid in the container. A further advantage is that under conditions when a very small amount of refrigerant is to be dispensed, it is possible to connect the upper valve assembly outlet to the device to be filled and pass a small amount of the refrigerant in gas phase into the device.



As further advantages of the invention, the kit is lightweight and economical to construct, as well as easy to use. The replacement of the throw-away container in the kit assembly is a simple operation.

Other objects and advantages of this invention will become apparent from the following description, in conjunction with the annexed drawing, in which a preferred embodiment of the invention is disclosed.

In the drawing, FIG. 1 is a front elevational view of the kit with the disposable container mounted therein.

FIG. 2 is a vertical section of one of the valve assemblies.

FIG. 3 is a vertical section through one end of the sight glass, showing the manner in which it is assembled in place in the support.

Upon reference to the drawings in detail, it will be noted that they show a kit comprising a container **10** and a support assembly **20** for said container **10**.

Container **10** is shown in vertical position, this being its preferred position while its contents are being dispensed. Said container **10** is generally cylindrical and is elongated in the direction of its axis, or vertically elongated in the position shown in the drawing. Preferably, said container **10** is made of metal, so as to be capable of withstanding the pressure of the refrigerant stored therein.

At each end, container **10** has an end wall **11**. Cylindrical nipple **12** extends axially from wall **11**, away from container **10**, said nipple **12** being integral with wall **11**. Only one nipple **12** is shown in FIG. 2, but it will be understood that the other end of container **10** is identical with that shown in FIG. 2. Nipple **12** has a hollow through bore which extends to the interior of container **10**. Nipple **12** is externally screw-threaded, as indicated by the reference numeral **12***a*.

A pierceable seal **13** is formed upon the free end of nipple **12** so as to close the bore of nipple **12**, this seal **13** being formed conventionally.

It will be apparent that prior to the formation of one or both of the seals **13**, container **10** may be filled with a refrigerant gas under pressure and in the liquid phase, in the usual manner. By way of illustration, said gas may be one of the freon gases widely used as a refrigerant. Container **10** may be filled with a gas other than a refrigerant. Container **10** is preferably a throw-away or disposable container, but may optionally be suitable for refilling, resealing and reuse.

Support **20** includes an elongated sight glass **21** which will be considered in the description as extending vertically as shown in FIG. 1, this being the position of sight glass **20** when container **10** is assembled with support **20** and the kit is suspended with container **10** in vertical position.

A vertically extending metal tube **22** is assembled with sight glass **21** at each end thereof, the tubes **22** and **21** being in axial alignment and preferably having bores of the same diameter. FIG. 3 shows one such assembly, the other assembly not being shown in detail but being identical.

Said tube **22** abuts the end of tube **21** and has a transverse, outwardly extending annular end flange **23** adjacent sight glass **21**. A cylindrical collar **24**, of the same outer diameter as flange **23**, extends axially therefrom around and spaced from sight glass **21**. This collar **24** is externally threaded, as indicated by the reference numreal **24***a*. A cylindrical gasket **25** is interposed between collar **24** and sight glass **21** and extends around sight glass **21**.

Cylindrical sleeve **26**, which is internally threaded as indicated by the reference numeral **26***a*, is screwed upon collar **24**. Said sleeve **26** has an inturned annular end flange **27** at its end which is remote from flange **23**, and

sight glass 21 extends turnably through the inner opening of flange 27. An annular washer 28 is extended around sight glass 21 adjacent flange 27 and on the side of flange 27 which is proximate to collar 24. Said washer 28 has a cylindrical flange 29 integral with the inner opening thereof, this flange 29 extending frictionally slidably around sight glass 21 and extending between collar 24 and sight glass 21.

By turning sleeve 26, upon collar 24, flange 23 of tube 22 is drawn against the end of sight glass 21, and flange 29 places gasket 25 under compression so as to seal the gap between sight glass 21 and the end of tube 22.

Optionally, in order to protect sight glass 21, a plurality of elongated rods 30 are extended parallel to the axis of sight glass 21 and spaced therefrom, with the ends of rods 30 extending through apertures in annular discs 31. These discs 31 are extended over tube 22 against flange 23, as shown in FIG. 3. The ends of rods 30 are appropriately threaded (not shown) and are held in discs 31 by means of nuts 32 screwed on the ends of rods 30.

At the remote ends of tube 22, further tubes 23 are connected integrally and at right angles thereto and extend transversely from said tubes 22 and sight glass 21. These further tubes 23 oppose and are parallel to each other.

A valve assembly 40 is mounted upon the free end of each tube 23, one of said valve assemblies 40 being shown in detail in FIG. 2. The other valve assembly is identical and accordingly is not shown in detail. Said valve assembly 40 includes a valve body 41 which extends in the direction of the axis of container 10, or vertically in the position of the parts shown in the drawing. Tube 23 is connected to valve body 41 intermediate the ends thereof, by welding, brazing or any other suitable means. At the level of and below tube 23, valve body 41 has a generally cylindrical and hollow portion 42 of increased diameter. The lower end of valve body portion 42 has an out-turned annular peripheral flange 43 which rests against the outer end of nipple 12. The diameter of the bore of valve body portion 42 is preferably greater than the diameter of the bore of nipple 12. Collar 44 extends turnably around flange 43 and has an upper inturned annular flange which extends turnably around valve body portion 42 and opposes flange 43. The lower end of collar 44 has an inturned annular flange 46 which is internally screw threaded at 46*a*, whereby flange 46 may be screwed onto nipple 12 so as to attach the valve assembly 40 to said nipple 12, with flange 43 abutting and resting upon the lip of nipple 12.

The upper portion of valve body 41 is generally cylindrical and has a through bore which communicates with the bore of body portion 42 and which is of smaller diameter. Valve stem 46 extends through the bore of valve body 41 and extends above and below said bore. Said stem 46 is formed (reference numeral 46*a*) so as to extend axially slidably and turnably on the bore of valve body 41 and thereby permit the valve stem to be raised or lowered by turning it in the appropriate direction.

A back seating valve 47 is fixed to the lower end of valve stem 46 and is positioned within the interior space of valve body portion 42. The outer periphery of valve body portion 47 clears the wall of the bore of valve body portion 42.

The conical valve seat 48 is located at the upper end of valve body portion 42, as shown in FIG. 2. Valve 47 has an appropriate upper conical portion 47*a* which may be seated against seat 48 in the usual way.

An axially extending pin 49 is fixed to the lower end of valve 47.

An outlet tube 50 extends radially from valve body 41 above seat 48, and communicates with the bore of valve body 41 through a radial port 51 in valve body 41. Said output tube 50 is externally screw threaded as designated by the reference numeral 50*a*, so that an internally threaded cap 52 may be screwed onto the outer end of pipe 50. This cap 52 may be removed when the assembly is in operation, and further tubing may be connected to pipe 50 when desired.

The upper end of valve body 41 is externally screw threaded as designated by the reference numeral 41*a*. A further cap 53 may be screwed upon the threaded portion 41*a* of valve body 41, with packing 54 being interposed between the upper end of valve body 41 and the upper end wall 54*b* of cap 53. The valve stem 46 extends through the packing 54 and through an opening 54*a* in cap wall 54*b*. Knob 55 is mounted upon the upper end of stem 46, above cap 53.

Each of the collars 44 is provided with diametrically opposed fittings 60 on the upper end thereof, to which chains 61 may be attached by means of alligator clips 62 or the like. Accordingly, by means of chains 61, or by any other suitable means, the assembly may be supported with container 10 in generally vertically extending position.

The sight glass 21 and associated tubing of support 20 are pre-assembled and are retained in assembled condition. In operation, a container 10 is mounted upon the support 20 by means of the fittings 44 of the two valve assemblies 40 screwed onto the two nipples 12. Valve stems 46 are then turned until their tips 49*a* pierce the respective seal 13. Valve stems 46 are then turned so as to seat the valve portions 47*a* against seats 48. Sight glass 21 is then in communication with both ends of container 10, and the liquid gas filling of the container flows into the sight glass.

The chains 61 or other supporting devices may then be attached to one of the valve assemblies 40 and suspended from a hook or other support (not shown) so that the assembly hangs vertically (as shown in FIG. 1).

Prior to dispensing the refrigerant from the lower outlet tube 50, the upper cap 52 may be loosened or withdrawn, and valve 47 opened slightly so as to vent air from the upper portion of sight glass 21. This insures that the level of liquid in sight glass 21 will be the same as in container 10. The upper valve 47 is then closed, the lower cap 52 removed and any suitable tubing connected to the lower outlet tube 50. Thus, outlet tube 50 may be connected to the device which is to be filled with refrigerant. The lower valve 47 is then opened, so as to dispense refrigerant from container 10, thereby lowering the level of the refrigerant in both container 10 and sight glass 21. Illustratively, container 10 is shown as provided with a scale 8 which is graduated in eight ounce amounts up to a total of two pounds, this being the capacity of the particular container 10 illustratively shown. It will be apparent that additional graduations may be provided if desired. The graduations are preferably calibrated in terms of weight, rather than volume.

FIG. 1 shows the level 7 of the refrigerant 6 in sight glass 21 as being opposite the one pound graduation of scale 8, thereby showing that one pound by weight of refrigerant has been withdrawn from container 10. It will be apparent that the spacing between sight glass 21 and container 10 may be any appropriate amount to permit convenient reading of the level 7 against scale 8, the spacing being exaggerated in the drawing for purposes of illustration.

It will be apparent that the scale may be suitably calibrated to allow for the varying amount of space of the container and sight glass which are filled with vapor as the contents are withdrawn. Furthermore, if necessary, additional scales may be marked on container 10, each being calibrated in accordance with the particular ambient temperature. Also, scales may be provided for different refrigerant gases which may differ in weight. These scales may be marked directly upon the container, or they may be removable and replaceable.

In some instances, it is desirable to dispense only a small amount of the contents of container 10, at a slow rate. In that case, the upper tube 50 may be used as the outlet

for the system, with the lower valve remaining closed. In this way, the refrigerant in its gas phase, is dispensed through the upper tube 50, which may be connected by any further desired tubing to the device to which the gas is to be supplied.

While a preferred embodiment of the invention has been disclosed, and various changes, omissions and additions have been indicated, it will be apparent that various other changes, omissions and additions may be made in the invention without departing from the scope and spirit thereof.

We claim:

1. A kit for storing and dispensing refrigerant gas and the like, comprising a container and a support for said container, said container having an axis and axially opposed ends which have respective hollow attachment nipples, said nipples having pierceable seals, said container being filled with said refrigerant gas in liquid phase under pressures, said support comprising a hollow sight glass, transverse opposing tubes connected to the opposite ends of said sight glass in communication therewith, and respective valve assemblies on the free ends of said tubes, said valve assemblies respectively including means for releasably mounting said valve assemblies on said nipples and for piercing said seals to establish communication between both ends of said sight glass and both ends of said container, said valve assemblies respectively having outlets and valve means for said outlets, said outlets communicating between said valve means and the atmosphere to permit discharge of said refrigerant from said container and to permit venting of air from said sight glass prior to said discharge to insure said communication whereby the levels of liquid refrigerant in said container and in said sight glass correspond.

2. A kit in accordance with claim 1, said container having a scale on the outer face thereof and graduated in the direction of length thereof, said sight glass opposing said scale and being positioned relative thereto so that the level of liquid refrigerant in said sight glass may be read against said scale, said scale being calibrated to indicate the weight of refrigerant removed from said container in accordance with the level of the refrigerant liquid in said sight glass.

3. A kit in accordance with claim 2, at least one of said valve assemblies having means associated therewith for suspension from a support so that said container then extends vertically.

4. A kit for storing and dispensing refrigerant gases and the like comprising a container and a support for said container, said container having an axis and axially opposed ends which have respective hollow attachment nipples, said nipples having pierceable seals, said container being filled with said refrigerant in liquid phase under pressure, said support comprising a hollow sight glass, transverse opposing tubes connected to the opposite ends of said sight glass in communication therewith, and respective valve assemblies on the free ends of said tubes, each said valve assembly having an axially extending hollow valve body, means for releasably mounting one end of said valve body on one of said nipples, said valve body having a valve seat formed in the interior thereof and facing and spaced from said nipple, said transverse tube being connected to said valve body in fluid communication therewith between said valve seat and said nipple, said valve assembly having an axially extending valve stem extending through said valve body and out of the free end thereof, a valve on the end of said stem within said valve body and between said valve seat and said nipple and adapted to be moved away from and also sealingly against said valve seat by manipulation of said stem, an axially extending pin on said valve directed toward said nipple and positioned and adapted to pierce said seal by manipulation of said valve stem, and an outlet positioned between said seat and said free end of said valve body and communicating between the interior of said valve body and the atmosphere, said outlet permitting the venting of air from said sight glass when said valve body is spaced from said valve seat prior to the piercing of said seals, said outlet permitting the discharge of said refrigerant from said container when said valve body is spaced from said valve seat subsequent to the piercing of said seal, said venting insuring a communication between said container and said sight glass subsequent to the piercing of said seals whereby the level of liquid refrigerant in said container and in said sight glass correspond.

5. A kit in accordance with claim 4, said container having a scale on the outer face thereof and graduated in the direction of length thereof, said sight glass opposing said scale and being positioned relative thereto so that the level of liquid refrigerant in said sight glass may be read against said scale, said scale being calibrated to indicate the weight of refrigerant removed from said container in accordance with the level of the refrigerant liquid in said sight glass.

6. A kit in accordance with claim 5, at least one of said valve assemblies having means associated therewith for suspension from a support so that said container then extends vertically.

7. A kit for storing and dispersing refrigerant gas and the like, comprising a container, a support for said container, said container having an axis and axially opposed ends which have respective hollow attachment nipples, said nipples having pierceable seals, said container being adapted to be filled with said refrigerant gas in liquid phase under pressure, said support comprising a rigid frame having an axis and transverse opposing tubes fixed to the respective ends of said frame, and a sight glass tube axially mounted on said frame and connected at its respective ends to said respective transverse tubes, and respective valve assemblies on the free ends of said transverse tubes remote from said sight glass tubes, said valve assemblies being provided with means for releasably receiving said container by mounting said valve assemblies on said nipples, said assemblies being further provided with means for piercing said seals to establish communication between both ends of said containers, said sight glass tube being spaced from and parallel to said container upon its reception by said support, said valve assemblies respectively having outlets and valve means for said outlets, said outlets communicating between said valve means and the atmosphere to permit discharge of said refrigerant from said container and to permit venting of air from said sight glass prior to said discharge to insure said communication whereby the levels of liquid refrigerant in said container and in said sight glass correspond.

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