United States Patent [19]

Mullins

[11] **3,916,642**

[45] **Nov. 4, 1975**

[54] **REFRIGERANT DRYER SERVICE VALVE**

[76] Inventor: **John W. Mullins,** P.O. Box 20524, Oklahoma City, Okla. 73120

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[52] **U.S. Cl.** **62/292;** 137/318

[51] **Int. Cl.**[2] **F25B 45/00**

[58] **Field of Search** 137/317, 318; 62/292

[56] **References Cited**

UNITED STATES PATENTS

3,448,758 6/1969 Mullins 137/318

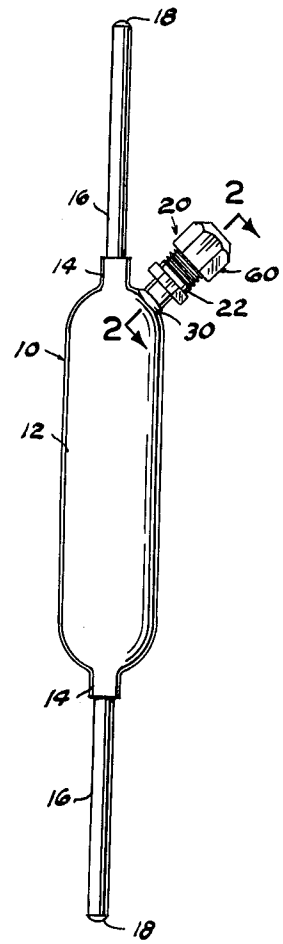
Primary Examiner—Henry T. Klinksiek

Attorney, Agent, or Firm—Robert K. Rhea

[57] **ABSTRACT**

A generally cylindrical centrally bored housing is connected, at one end, with the converging end wall of an evacuated refrigerant dryer. A valve equipped tubular core, having a length slightly greater than the length of the housing, is coaxially received therein with a line piercing tip formed on the core end contacting the housing surrounded dryer surface. A cap, threadedly engaged with the other end of the housing, forces the line piercing tip through the dryer wall for communication with the interior of the dryer.

1 Claim, 4 Drawing Figures



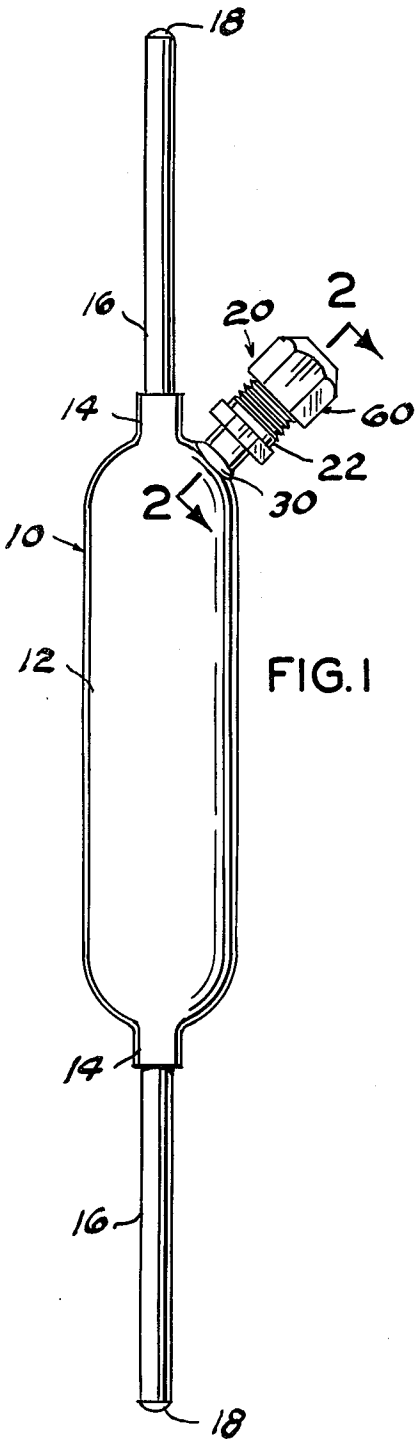


FIG. 1

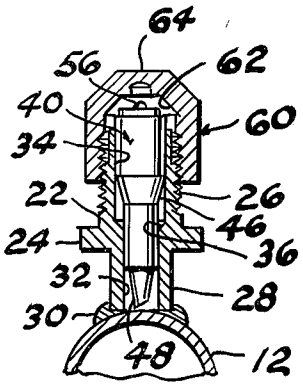


FIG. 2

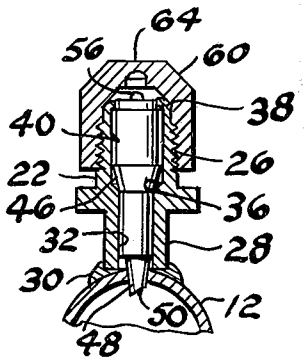


FIG. 3

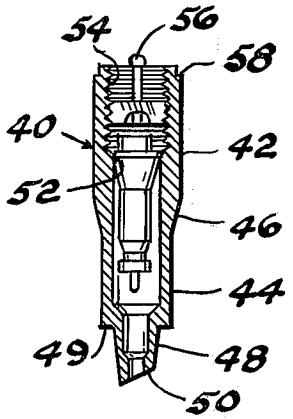


FIG. 4

REFRIGERANT DRYER SERVICE VALVE

CROSS REFERENCE TO RELATED APPLICATION

The present invention is an improvement over my copending application Ser. No. **424,986,** filed Dec. **14, 1973** for COPPER TUBE SERVICE VALVE.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to sealed refrigerant systems and more particularly to a service valve for connection with a refrigerant dryer.

As is well known in the art, it is necessary, to maintain a sealed refrigerant system free of moisture. This is accomplished by a tubular unit containing a desiccant which is interposed in a refrigerant line. However, the capacity of the desiccant is sometimes exceeded and it becomes necessary to check the dryer to determine if it contains moisture and to evacuate the refrigerant system and recharge it with refrigerant gas and possibly replace the dryer. Further, it is important that the dryer remain sealed and free of moisture throughout its shelf life so that when interposed in a refrigerant line the dryer will be capable of absorbing moisture in the refrigerant system. This is accomplished in the present invention by the access valve connected with the dryer remaining dormant until operated by the serviceman to pierce the wall of the dryer to communicate with the interior thereof.

2. Description of the Prior Art

The most pertinent prior art is my U.S. Pat. No. **3,448,758,** which discloses a centrally bored housing secured to a refrigerant line by a substantially C-shaped member partially surrounding the line and entering an annular groove in the housing. The housing bore coaxially receives a gas passing valve equipped tubular core having a line piercing tip at one end which is sealed within the housing during the line piercing action by a cap threadedly engaging the housing end portion opposite the line and forcing the housing wall over the adjacent edge of the tubular core. The tubular core and housing bore are provided with cooperating transverse shoulders which are intended to form a fluid tight seal between the periphery of the core and housing bore, however, this seal is difficult to attain where the shoulders are perpendicular to the axes of the housing and core. The housing and tubular core of this invention are provided with cooperating tapered seats which form a gas tight seal in a wedging action of the core seat against the housing seat when the core is forced through the wall of the dryer.

A further feature of this invention is that the tubular core remains inactive until actuated by a service man to pierce the refrigerant wall, therefore, insuring that a refrigerant dryer remains dry throughout its shelf life and in trouble-free refrigerating system operating life until such time communication with the bore of the dryer or refrigerant system lines is necessary.

SUMMARY OF THE INVENTION

A generally cylindrical centrally bored housing, having wrench flats intermediate its ends, is externally threaded adjacent one end portion and diametrically reduced at its other end portion. The housing is counterbored from its threaded end to form a tapered annular shoulder intermediate its ends and define a thin wall portion outwardly of the threads. A generally cylindrical centrally bored core is provided with an annular tapered shoulder intermediate its ends and a line piercing tip projecting coaxially beyond a smaller end portion. The overall length of the core is slightly greater than the axial length of the housing a distance at least slightly greater than the thickness of the dryer wall. The end of the core opposite its line piercing tip is internally threaded for receiving an air valve core opening and closing the bore of the core. The core is normally axially received by the housing and maintained therein by a cap engaging the housing threads with the core piercing tip in contact with the dryer wall. When communication with the dryer is required the cap is further threadedly engaged with the housing thus forcing the piercing tip through the dryer wall and forcing a portion of the housing wall in overlapping sealing relation with respect to the end of the core opposite its piercing tip in response to the core piercing the dryer wall and simultaneously seating on the housing seat.

The principal object of this invention is to provide a service valve containing housing which is attached to a refrigerant dryer arcuate end wall at the time of manufacture to provide communication with the bore of the dryer at a selected time.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view of a conventional dryer having the service valve connected therewith;

FIG. **2** is a fragmentary cross sectional view, to a larger scale, taken substantially along the line **2—2** of FIG. **1** illustrating the line piercing core in a position of repose;

FIG. **3** is a cross sectional view similar to FIG. **2** illustrating the line piercing core when forced through the refrigerent dryer wall; and,

FIG. **4** is a longitudinal sectional view, to a larger scale, of the line piercing core, per se.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Like characters of reference designate like parts in those figures of the drawings in which they occur.

In the drawings:

The reference numeral **10** indicates the conventional refrigerant dryer comprising a cylindrical body or wall portion **12** having its opposing end portions arcuately curved inwardly in converging relation and terminating in diametrically reduced end portions **14** coaxially connected with tubes **16** having their opposite ends closed, as by soldering **18.** The dryer contains a desiccant, not shown, and the dryer is evacuated before sealing the tubes **16.** One of the dryers **10** is interposed in a refrigerant conductor line of a closed refrigerant system at the time of manufacture. When it is necessary to replace the dryer in a refrigerant system a new dryer, as just described, is placed therein in the well known manner.

The reference numeral **20** indicates the dryer service valve, as a whole, which comprises a rigid, preferably brass, valve housing **22** having wrench flats **24** intermediate its ends and external threads **26,** at one end portion. The other end portion of the housing is diametrically reduced, as at **28,** and abuts and is secured to the wall **12** of the dryer, as by brazing **30.** The housing is centrally bored, as at **32,** and counterbored, as at **34,** from its threaded end to form a tapered shoulder **36** intermediate its ends. The end portion of the housing out-

wardly of the threads is diametrically reduced to form a free end thin wall portion **38** for the purposes presently explained.

A generally cylindrical core **40,** preferably formed of steel, and longitudinally slightly greater than the spacing between the ends of the housing by a distance at least as great as the thickness of the refrigerant wall **12** is coaxially received by the housing **22.** The core **40** is characterized by a larger end portion **42** slidably received by the counterbore **34** and a smaller end portion **44** slidably received by the housing bore **32** and defining a tapered shoulder **46** facing toward the housing shoulder **36.** The reduced end portion of the core **40** is provided with a diametrically reduced tapered end portion forming a wall piercing tip **48** projecting beyond an annular shoulder **49** and having a beveled end surface **50** for piercing the dryer wall **12,** as hereinafter explained.

The core **40** is bored and counterbored from its larger end in step diameter fashion to define a valve seat **52** and is internally threaded, as at **54,** for receiving a conventional air valve **56** for opening and closing the bore of the core **40.** The wall of the core **40,** adjacent its threaded end, is diametrically reduced to form an annular shoulder **58** for the purposes presently explained.

A dust cap **60** is internally threaded for engaging the housing threads **26** and is provided with a tapered wall surface **62** at the inner limit of its threads converging toward the axis of its closed end **64.**

OPERATION

In operation the service valve **20** is connected with the dryer body wall **12,** as described hereinabove, at the time of manufacture and evacuation of the dryer **10.** The core **40** is manually positioned within the valve housing **22** and the cap **60** hand tightened on the housing threads **26.** THe valve components remain in the position illustrated in FIG. **2** until communication with the bore of the dryer is needed. The serviceman then tightens the cap **60** by using a wrench on the cap and a back-up wrench on the housing shoulders **24** which forces the line piercing tip **48** through the dryer body wall **12** while simultaneously the tapered surface **62** of the cap forces the body thin wall portion **38** inwardly against and in overlapping relation with respect to the core shoulder **58** while the core shoulder **46,** being impinged against the housing shoulder **36,** forms a seal therewith and a positive stop against axial movement of the core **40** into the housing while pressure is being applied thereto by the cap in sealing the housing thin wall **38** with the core. Thereafter the cap **60** may be removed and communication obtained with the dryer core through the air valve **56.**

Obviously the invention is susceptible to changes or alterations without defeating its practicability, therefore, I do not wish to be confined to the preferred embodiment shown in the drawings and described herein.

I claim:

1. A service valve in combination with a refrigerating system dryer, said dryer having arcuate converging end wall surfaces, the improvement comprising:

a generally cylindrical centally bored housing having wrench flats intermediate its ends and a diametrically reduced periphery forming a relatively thin wall having a free end surface at one end portion,

said housing being counterbored from its thin wall end to form an annular tapered shoulder intermediate its ends facing toward said thin wall portion,

said housing having external threads extending between said wrench flats and said thin wall portion,

the other end portion of said housing being diametrically reduced and connected in end abutting relation with one arcuate end wall of said dryer by brazing;

a tubular core, having a length slightly greater than the spacing between the free end surface of said housing thin wall portion and said other end of said housing, cooperatively received coaxially by the bore of said housing,

said core having a diametrically reduced tapered end portion converging toward the tubular member wall to be pierced,

said tapered end portion terminating in a beveled end surface forming a wall piercing tip,

said core having an external beveled surface intermediate its ends forming an annular shoulder facing toward the wall piercing tip,

said core having a diametrically reduced peripheral portion adjacent its end opposite said line piercing tip forming an annular shoulder adjacent the housing thin wall portion, said core having internal threads at its end portion opposite said wall piercing tip and having a seat formed on its inner wall surface at the inner limit of the threads;

an air valve sealing with the seat in said core; and,

a cap engaging the threads on said housing and axially moving said core toward said tubular member wall in a wall piercing action while simultaneously seating and sealing said core within said housing.

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