

[54] **REFRIGERANT DRIER**

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[51] Int. Cl. **B01d 53/04**

[58] Field of Search..... 55/74, 387, 388;
210/266, 282

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[57] **ABSTRACT**

A refrigerant receiver-drier comprising a metallic cartridge or cylinder having therein a desiccant-containing bag made of fabric and through which liquid refrigerant may flow. One portion of the bag occupies an end of the tank sealed by the welding of a cap thereon during manufacture of the receiver-drier. The bag and its contents are protected against the heat of such a welding operation by a sheet of metal foil secured to the bag and forming a heat shield.

3 Claims, 4 Drawing Figures

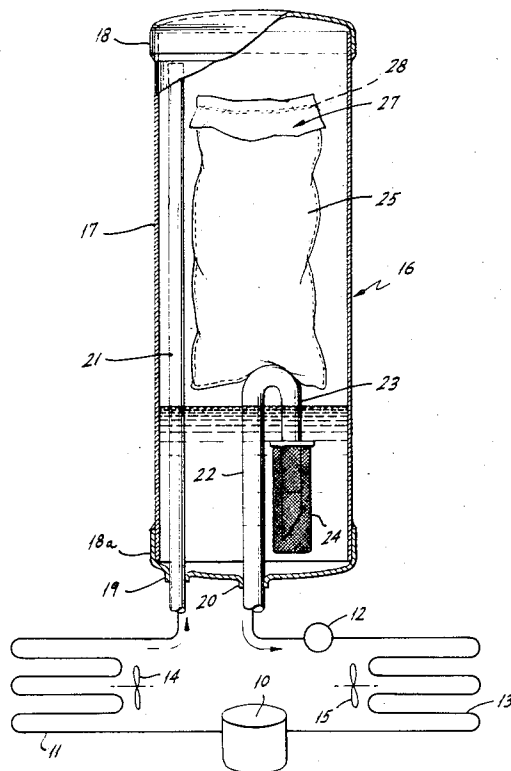


FIG. 1.

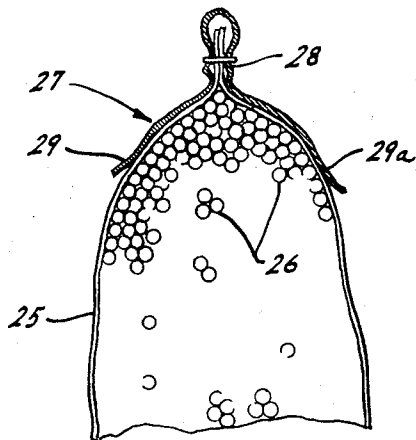
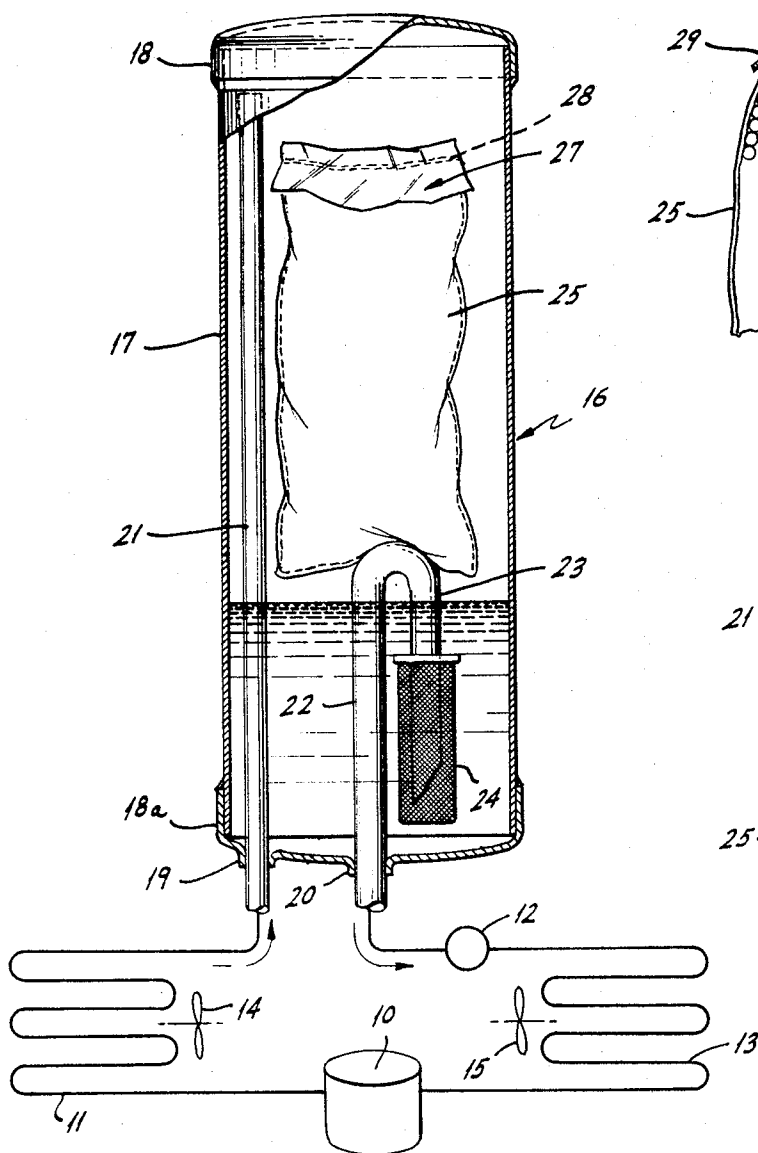


FIG. 2.

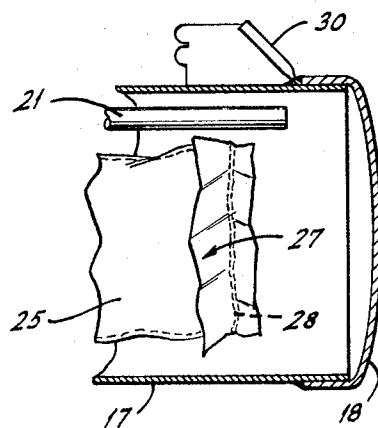


FIG. 4.

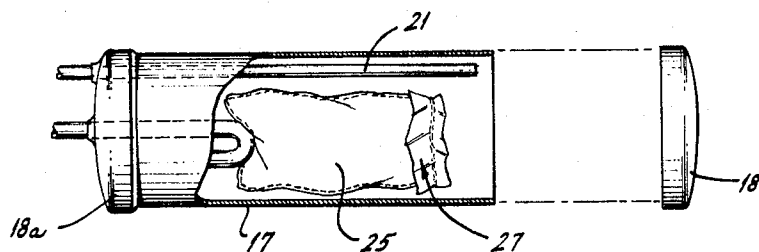


FIG. 3.

REFRIGERANT DRIER

BACKGROUND OF THE INVENTION

Refrigerating systems, particularly automotive air conditioning systems frequently utilize in their drier assemblies desiccant bags of fabric, for example woven wool or polypropylene felt. Such bags are subject to a difficulty in that the bags may become scorched during a final drier assembly operation in which a cap is welded to one end of the cylindrical cartridge which contains the bag. Intense heat is generated during the welding process and there may be such deterioration of the bag as to cause failure of the drier during subsequent use.

Attempts have been made to overcome this difficulty by various means, including the provision of relatively heavy mesh screens, for example screens of Monel metal, which are inherently expensive and also complicate the assembly operation. In some cases it has even been thought necessary to avoid the use of inexpensive fabric bags, and to employ a bag comprising Monel screening. As will be appreciated, these previously known expedients have not been fully satisfactory, principally because of the expense and complications which they entail.

SUMMARY OF THE INVENTION

It is a general objective of this invention to provide a receiver-drier which overcomes these difficulties in very simple manner by the provision of a desiccant bag which is preferably fabricated of woven wool through which refrigerant readily flows, and by providing a thin, inexpensive, shield secured to the bag at that end thereof which is subjected to the heat of the welding operation. In achievement of this general objective I provide a sheet of metal foil, for example aluminum foil, folded over one end of the bag and fastened thereto. It is a feature of the invention that the foil is applied during the stitching operation in which the desiccant is sealed within the bag. Experience has shown that this simple solution to a long standing problem adds only about one cent, or less, to the cost of the bag.

In final assembly of the receiver-drier, the bag is inserted into the tubular metal cylinder with the foil facing the open end of the cylinder. The cap is then welded onto the open end of the cylinder, and the foil shields the bag against overheating which would otherwise occur during the welding operation, particularly if the bag were close to or in contact with the cap during welding.

The objectives and advantages of the invention will be more fully understood from a consideration of the following description taken in light of the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a vertical sectional view taken through a receiver-drier assembly embodying the invention, the assembly being shown diagrammatically as associated with the elements of a refrigerating system;

FIG. 2 is a cross-sectional view of the desiccant-containing bag, taken transverse the direction of stitching;

FIG. 3 is a partially sectional view of a receiver-drier of the kind shown in FIG. 1, and illustrating the apparatus on a smaller scale, during a step in the assembly thereof; and

FIG. 4 is a fragmentary view of the receiver-drier of FIG. 3 and illustrating the welding operation.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

With more detailed reference to the drawing and first to FIG. 1 thereof, there are shown the essential elements of a system, adapted to be used in an automotive air conditioner. This system includes, in series circuit, a refrigerant drier embodying the features of my invention. As illustrated, the drier serves also as a refrigerant receiver. However it will be understood that the principles of the invention are equally applicable to a simple through-flow drier. The illustrated system includes a motor compressor 10, a condenser 11, a restrictor 12 — preferably an expansion valve device — an evaporator 13 and means, including a pair of fans 14 and 15 for moving air in heat exchange relation with the condenser and evaporator.

A receiver-drier 16 embodying the invention is interposed between the condenser 14 and the expansion device 12, and comprises a fluid-impervious metallic cylinder 17 having upper and lower end caps 18 and 18a, respectively. The lower cap is apertured at 19 and 20 to provide ports within which are received, in fluid tight relation, a refrigerant inlet conduit 21 and an outlet conduit 22, which latter is provided with a looped and downwardly turned portion 23 capped with a filter screen 24. Because of the relatively high pressure at which such a system operates and in accordance with known practice, the cylinder, its end caps, and its conduits would normally be fabricated of steel.

There is provided in an upper portion of the cylinder a bag 25 containing a suitable desiccant which may, for example, comprise an active crystalline zeolitic molecular sieve of a type now well known in the art. The desiccant takes the form of a great number of small individual particles or beads, some of which are shown in the drawing and have been designated by the reference numeral 26 applied to FIG. 2. It should be understood that, in practice, the bag would be substantially entirely filled with such beads.

It is an important feature of the invention that the bag is of fabric material, for example woven wool, and that it includes along its upper edge, as shown to best advantage in FIG. 2, a sheet of aluminum foil 27 stitched along its mid-portion, as at 28, to the end of the bag and including portions which straddle the bag end and extend a short distance along the lateral portions of the bag, as shown at 29 and 29a. It is preferable that the stitching be sufficiently tight to ensure that the thread becomes somewhat recessed in the surface of the foil. In this way the stitching is protected from the heat of the welding.

With particular reference to FIG. 3, it will be seen that in the subassembly fabrication of the receiver-drier, the cap 18a through which the conduits pass is first secured to one end of the cylindrical tank 17. Thereafter the desiccant bag is inserted into the open opposite end of the cylinder, the right hand end as it is viewed in FIG. 3, with its foil-bearing portion facing the open end. The end cap 18 is then fitted over the adjacent open end of the tank 17 and welded in the manner shown more or less diagrammatically at 30 in FIG. 4. During such welding, the very considerable heat generated during the operation, and radiated toward the bag 25, is prevented from damaging the bag by the action

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of the interposed foil sheet 27 which shields the material of the bag from the applied heat.

As brought out above, this invention enables use of the inexpensive and desirable fabric bag, since it provides the requisite thermal protection at a cost which is a small fraction of that involved in use of the previous metallic heat shields. As will be appreciated the foil is easily applied to the bag during the usual process of bag stitching.

I claim:

1. A refrigerant drier, comprising: a fluid-impervious, pressure-resistant metallic cartridge having means for ingress of refrigerant thereto and egress of refrigerant therefrom; cover means adapted to be secured to the cartridge by a welding operation; a desiccant-containing bag disposed within said cartridge and made

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of a fabric material of a type which can be deleteriously affected by the application of heat thereto during the welding operation; and means for protecting said bag against excessive heating during welding, said means comprising a thin sheet of metallic foil material fastened to the bag and covering that portion of the bag which would be subject to the heat of welding.

2. A drier in accordance with claim 1, and further characterized in that said sheet comprises aluminum foil.

3. A drier in accordance with claim 1 and further characterized in that said bag is stitched along one end thereof to retain the desiccant therein, and said sheet of foil is folded over said end of the bag and secured thereto by the stitches which seal the bag.

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