April 10, 1951 R. O. BALOGH 2,548,335

REFRIGERATION ACCUMULATOR AND DEHYDRATOR

Filed April 24, 1947

Fig. 3

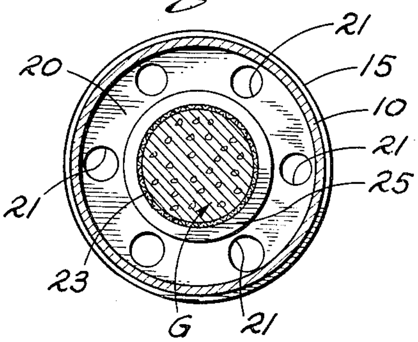
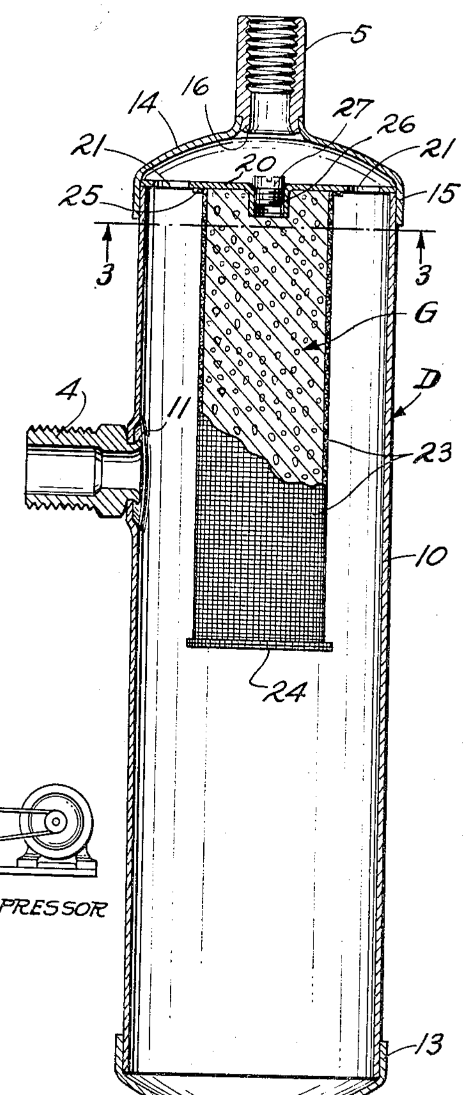


Fig. 2



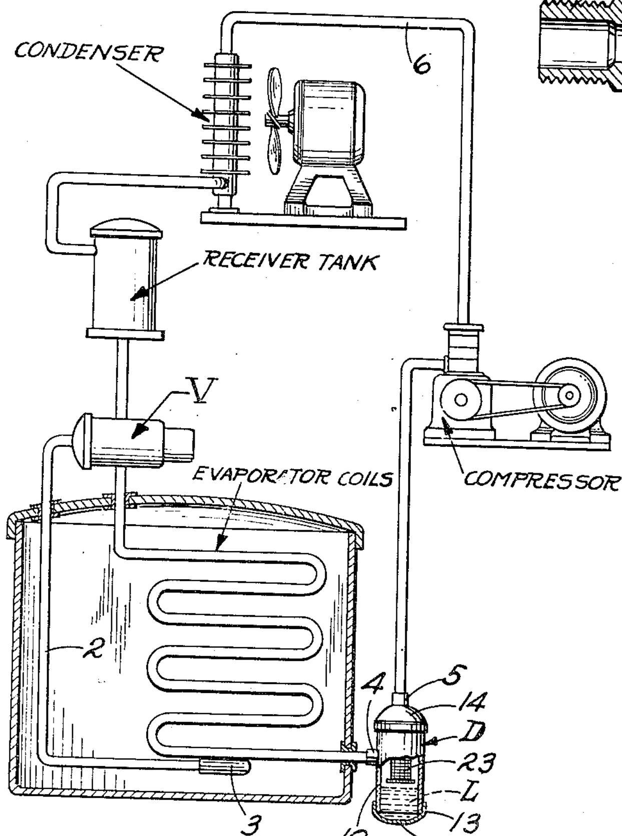


Fig. 1

INVENTOR.
ROY O. BALOGH
BY Richey & Watts
ATTORNEYS

Patented Apr. 10, 1951

2,548,335

UNITED STATES PATENT OFFICE

2,548,335

REFRIGERATION ACCUMULATOR AND DEHYDRATOR

Roy O. Balogh, Cleveland, Ohio, assignor to The Weatherhead Company, Cleveland, Ohio, a corporation of Ohio

Application April 24, 1947, Serial No. 743,509

9 Claims. (Cl. 183—4.4)

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This invention relates to dryers or dehydrators or similar fluid treating devices where it is desirable to remove moisture from a gas. Although my dehydrator may be of general application, it is particularly useful in refrigeration systems wherein it has an unexpected and novel cooperation with other elements in the system.

It has been the practice heretofore to employ a dehydrator cartridge in circulatory systems filled with silica gel or other moisture absorbing material for the purpose of removing moisture from the gas or fluid, but such units have required a relatively large amount of absorbent material in order to effectively dehydrate the refrigerant in refrigeration systems. I have found that in such systems, if the dehydrator is positioned so that it is maintained relatively cool and subjected to the flow of gases immediately after they leave the evaporator, the effectiveness of the efficiency of the absorbing medium employed, such as silica gel, is greatly increased.

Accordingly, it is an object of my invention to increase the efficiency of the dehydrator without affecting circulation in the system by connecting and positioning a novel dehydrator near the evaporator in a refrigeration system so that it will be kept relatively cool and will receive and dry gases that leave the evaporator before they are compressed.

However, it has been found that gases leaving the evaporator may contain quantities of unevaporated or liquid refrigerant so that if the dehydrators disclosed in the prior art were disposed in the position referred to, they would have to pass liquid which would restrict and seriously unbalance the circulation in the system. Accordingly, another object of my invention resides in providing a dehydrator that may receive wet gases without offering resistance to the flow of the gases therethrough and so upsetting the circulation of the system. This is accomplished by mounting the absorbing material in the dehydrating unit in such a manner that a liquid trap is provided, so that any gas entrained liquid may separate from the gas and not obstruct the absorbing material. With this arrangement, if the unit receives liquid refrigerant, the same is trapped, and further evaporation of the trapped liquid refrigerant tends to cool the absorbing material and increase the efficiency thereof. This, coupled with the fact that the unit may be physically positioned adjacent to the evaporator, insures that it will always be at a relatively low temperature with which it will operate at increased efficiency.

Another object resides in the provision of an

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effective dryer and fluid trap which is so readily and inexpensively manufactured that it can be employed as an integral unit in refrigerating systems sold at a low cost.

These and other objects will be apparent to those skilled in the art as the following detailed description proceeds.

Referring to the drawings:

Fig. 1 is a diagrammatic view of a refrigeration system showing how my novel unit is connected into the circulatory system; and

Fig. 2 is a longitudinal section through the dehydrator unit.

Fig. 3 is a transverse section through Fig. 2 on section line 3—3.

Referring to Fig. 1, there is illustrated schematically a typical refrigeration system with which my unit may be employed. The compressor supplies compressed gaseous refrigerant to the condenser, where the gas is liquified and the liquid flows to a receiver tank and hence to the expansion valve V. A thermostat control line 2 and thermostat 3 sensitive to the temperature of the evaporating coil may also be provided. Refrigerant leaves the expansion valve V and enters the evaporator coils at reduced pressure. It is generally considered desirable to have conditions in the system such that there is no flashing at the valve as the liquid flows through the expansion valve V into the evaporator, with which the evaporator coils are substantially full of liquid refrigerant. Liquid will be boiled away or evaporated at the outlet of the evaporator coils at about the same rate that additional liquid enters the coils from the expansion valve V. The gaseous refrigerant flows from the evaporator coils and through inlet 4 into my novel dehydrator unit D. The gaseous refrigerant has not been compressed at this point and will still be relatively cool as compared to its heat content in the line 6 leading from the pump, so that the dehydrator is kept cool and is rendered more efficient than if it were placed in line 6 leading from the pump. However, with the dehydrator in the position shown, it may receive liquid entrained or contained in the gas but due to the construction of the dehydrator such liquid tends to separate from the gas as it flows through the dehydrator D and out the outlet 5 to the compressor. For example, in Fig. 1 a body of liquid refrigerant L has been separated from the gases as they pass through the dehydrator D. Thus, when mounted as shown in Fig. 1, not only is the dehydrator cooled by its proximity to the evaporator, but it is further cooled by the evaporation of liquid refrigerant trapped therein. This increases the efficiency and effectiveness of the silica gel or other absorbing medium and advantage may be taken of this by using a smaller volume of absorbent material than has been previously required to produce the same absorbing action.

In construction the dehydrator preferably includes a tubular casing element 10 to which is attached the inlet nipple 4 by suitable means indicated at 11. A bottom cap 12 is preferably brazed or silver soldered to the element 10 as at 13, and an upper or outlet cap 14 is similarly attached as at 15. The outlet nipple 5 is expanded as at 16 and silver soldered or brazed to the cap. In order to support the silica gel in place in the dehydrator casing a supporting plate 20 is fitted before the cap 14 is permanently brazed in place. Plate 20 has relatively large apertures 21 formed therein to permit gases to pass from the inlet 4 through the outlet 5 without causing such a restriction of flow as to cause precipitation of the lubricating oil entrained in the gases. The silica gel or other absorbent material G is supported within a cylindrical screen member 23 to which is soldered or brazed a bottom plate 24. The upper end of the screen 23 is flanged as at 25 and soldered to the supporting plate 20. In order to provide for filling the screen container with absorbent material, plate 20 is punched as at 26 to provide a nipple which may be threaded to receive a plug 27. Before the unit is installed, the plug 27 is removed and the interior of the screen is filled with the desired absorbent material.

In operation, the gases enter inlet nipple 4 to impinge the silica gel G in the container 23 and sweep upward through apertures 21 and out nipple 5 to the pump. However, due to the appreciable space that is provided between the silica gel container 23 and the wall and bottom of the dehydrator, any liquid refrigerant carried over into the dehydrator tends to drop under the force of gravity and finds its way to the bottom, or accumulator portion thereof as indicated by L in Fig. 1. Such liquid refrigerant continues to evaporate and by so doing cools the metallic body of the dehydrator, the absorber unit, and the gases passing through the dehydrator. All of this assists in cooling the absorbent material G within the dehydrator to an extent not attained in prior installations. Thus, if desired, an amount of absorbent material G may be employed to produce the same drying action as formerly attained with a larger quantity; or the same quantity of absorbent material G may be employed to produce a more effective drying action.

Although I have described by dehydrator as being particularly useful in connection with refrigeration installations, it will be recognized that it is also useful where employed in any installation where gases are to be dried having entrained therein liquid that is volatile at the gas pressures existing within the dehydrating unit. Furthermore, various modifications may be made in the structural details of the dehydrating unit without departing from the spirit and scope of the invention. Therefore, I contemplate that the foregoing description of a preferred embodiment is given only by way of example and that my invention is not to be limited by such description other than by the scope of the appended claims, when given the range of equivalents to which my patent may be entitled.

What is claimed is:

1. A dehydrator unit comprising a casing having an inlet and an outlet above said inlet, screen means for containing moisture absorbent material mounted in said casing, means to suspend said screen means in said casing, said screen means being spaced from said inlet and outlets to provide an unobstructed flow of gas through the unit, said inlet being above the lower portion of said casing by a substantial distance to provide a fluid trap.

2. A dehydrator unit comprising a casing, the wall of said casing having an inlet in the side thereof and an outlet in the top thereof, screen means for containing moisture absorbent material mounted in said casing, means to suspend said screen means in said casing, said screen means being spaced from said inlet and outlets to provide an unobstructed flow of gas through the unit, said inlet being above the lower portion of said casing to provide a fluid trap.

3. A dehydrator unit comprising a casing, the wall of said casing having an inlet in the side thereof and an outlet in the top thereof, screen means for containing moisture absorbent material mounted in said casing, means to suspend said screen means in said casing, said screen means being spaced from said inlet and outlets to provide an unobstructed flow of gas through the unit, said screen means being spaced from the bottom of said casing by a substantial distance, said inlet being above the lower portion of said casing and of said screen means to provide a fluid trap below the inlet and screen means.

4. A dehydrator unit comprising a casing having top, bottom and side wall portions, the side wall thereof having an inlet and an outlet above said inlet in the top wall, screen means for containing moisture absorbent material, mounting means for said screen means, said screen means being spaced from said casing side wall and top wall, said inlet and screen means being above the bottom wall of said casing to provide a fluid trap.

5. A dehydrator unit comprising a generally cylindrical elongated casing with closed ends, said casing being normally disposed with its axis upright, said casing having an inlet in the side wall and an outlet in the upper end thereof, a screen-like container suspended in said casing in spaced relation to said inlet and outlets and the bottom of the casing, said inlet being above the bottom of the casing to form a fluid trap.

6. A dehydrator unit comprising a generally cylindrical elongated casing with closed ends, said casing being normally disposed with its axis upright, said casing having an inlet in the side wall and an outlet in the upper end thereof, an apertured plate mounted adjacent to but spaced from the upper end of said casing, a screen-like container suspended in said casing from said plate in spaced relation to the side wall, the upper end, and to the bottom of the casing, said inlet being above the bottom of the casing to form a fluid trap, said screen-like container also being spaced from said inlet and said outlet within the casing.

7. A dehydrator unit comprising a generally cylindrical elongated casing with closed ends, said casing having inlet and outlet openings, an apertured plate bridging said cylindrical casing between said openings, a screen-like container suspended in said casing from said plate in spaced relation to the cylindrical side wall and both ends of the casing, and a desiccant in said container, said inlet and outlet openings being in fluid communication within said casing around and exteriorly of said container.

8. A refrigeration accumulator and dehydrator

comprising a casing having inlet and outlet openings, a foraminous container container absorbent material disposed within said casing, supporting means within said casing fixed thereto and to said container and supporting said container with a foraminous wall portion thereof spaced from the interior walls of said casing, the inlet and outlet openings of said casing being in fluid communication with each other around and exteriorly of said foraminous wall portion of said container, said container having a filling opening therein aligned with one of the openings in said casing and a closure in said filling opening insertable through the aligned opening in said casing.

9. A dehydrator unit comprising a casing, a foraminous container containing absorbent material within said casing, said casing having an inlet opening adapted to be connected to the evaporator of a refrigerator and an outlet opening adapted to be connected to the low pressure side of a compressor for such refrigerator, said inlet opening being disposed intermediate said outlet opening and the bottom wall of the casing, said inlet and outlet openings being in fluid communication within said casing around and exteriorly of said container and said casing being closed except for said openings.

RAY O. BALOGH.

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