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REFRIGERANT TREATING ELEMENT AND METHOD OF REFRIGERANT TREATMENT

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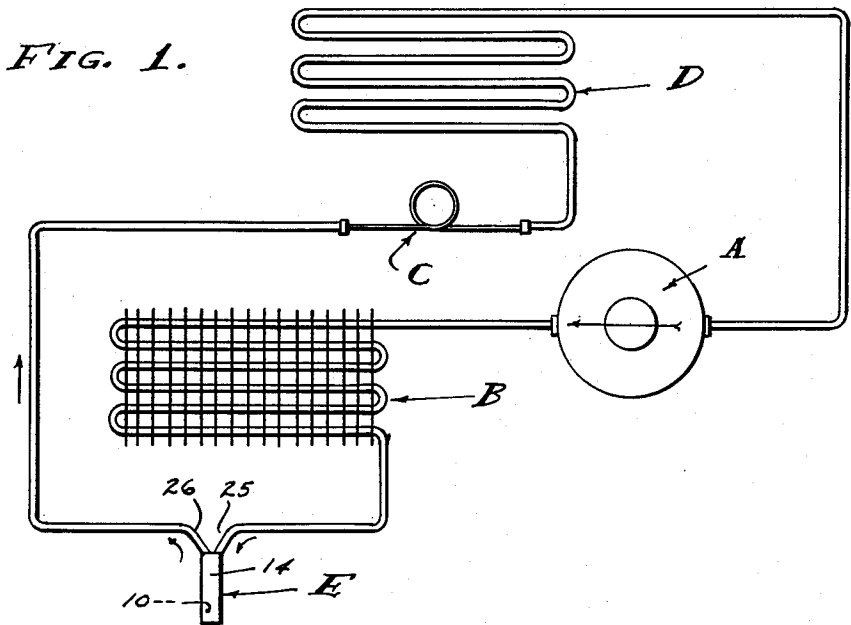


FIG. 2.

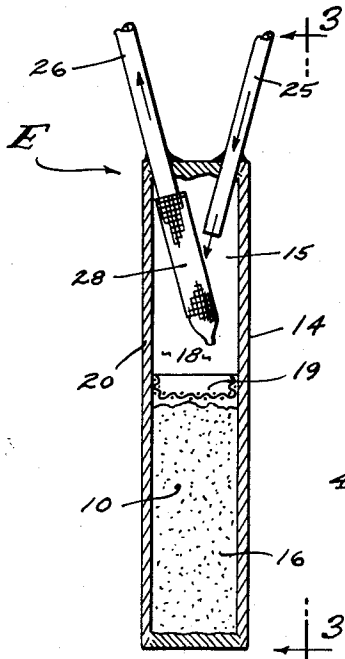


FIG. 3.

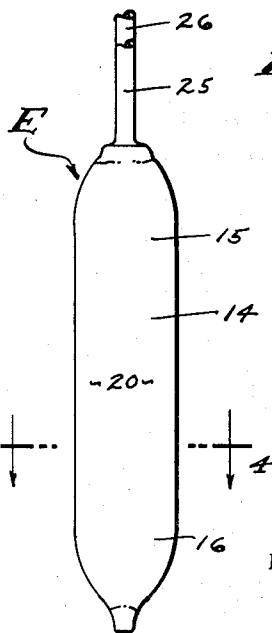
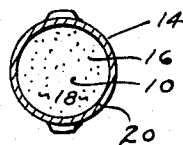


FIG. 4.



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REFRIGERANT TREATING ELEMENT AND METHOD OF REFRIGERANT TREATMENT

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1 Claim. (Cl. 62-474)

This invention relates to refrigeration systems and is concerned with an element for use in such a system and for treatment of the refrigerant that circulates therein, it being a general object of this invention to provide a practical and inexpensive element for treating refrigerant in a working system and to provide a method whereby moisture is absorbed and resulting acids eliminated from the refrigerant in a working system.

Refrigerators of all sizes and types are employed and which are characterized, generally, by circulation of a refrigerant gas that is compressible into a liquid and which is then expanded for absorption of heat. An important factor in the manufacture and assembly of a refrigerator system is the dehydration process involved when said system is charged with refrigerant. In actual practice, great precautions are practiced in the charging of a refrigeration system with refrigerant, in order to be sure that the least amount of moisture is captured therein and to eliminate any other contaminants. However, in spite of all precautions, a certain amount of moisture, even though small, is invariably trapped within the system and even the refrigerant itself in many cases contains a measurable percentage of moisture. In any case, at least small amounts of moisture are entrapped within refrigeration systems, even when practicing measures to prevent the same.

It is significant that moisture is entrapped in refrigeration systems because some failures of the system can be attributed directly to the presence of moisture therein. As a matter of fact, only laborately equipped facilities can conduct the assembly and charging of refrigerator systems and properly exclude moisture. As a result of the presence of moisture in a refrigeration system an acid or acids are immediately formed with and in the refrigerant fluid. A major factor contributing to the formation of acids is that the structure of the refrigeration system comprises various different materials including steel, copper and copper alloys, aluminum, various synthetic seals and terminals and insulators, etc, to say nothing of the various impurities that may be present. Further, the lubricants for the motor drive are exposed and acids develop especially when moisture is present. In other words, chemical processes take place wherein acid or acids are formed, all of which is simulated when temperatures are increased.

As above set forth, acids are formed when moisture is allowed to be present, and as a practical matter it is impossible to absolutely eliminate moisture. Although the presence of moisture and resulting acids is known, the complexity of said acids is unknown and not important, it being sufficient knowledge that said formation is detrimental, establishing an electrolyte, thereby permitting and stimulating electrolysis, and simply acting chemically in an adverse fashion on all of the parts involved, particularly delicate parts. For example, necessary return springs of the system become eaten away, and mere presence of acid at the expansion orifice will clog the same. There are, in fact, many adverse reactions that take place as a result of moisture being entrapped and resulting in the formation of acids and electrolytes.

An object of this invention is to provide an element for insertion and installation in a refrigeration system to handle any moisture that may be entrapped therein,

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and to neutralize and/or absorb any acids formed as a result of the presence of moisture in the system.

Another object of this invention is to provide an element for the purposes above referred to and which treats the refrigerant involved without danger of clogging the system and whereby moisture and acids are absorbed from the refrigerant and virtually eliminated from circulation through the system.

An object of this invention is to provide a method whereby moisture and/or acids are absorbed from the refrigerant in a refrigeration system, all to the end that the workings of the system are not adversely affected by the presence of entrapped moisture and/or acids.

The various objects and features of this invention will be fully understood from the following detailed description of the typical preferred form and application thereof, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a diagrammatic view of a typical refrigeration system and showing the inclusion of the element provided by the present invention.

FIG. 2 is an enlarged sectional view taken through the element of the present invention.

FIG. 3 is a side view of the element and taken as indicated by line 3-3 on FIG. 2.

FIG. 4 is a cross section taken as indicated by line 4-4 on FIG. 3.

This invention relates to all refrigeration systems wherein a refrigerant is circulated through a closed circuit, and in the drawings I have shown a diagram of a typical refrigeration system comprising, generally, a compressor A, a condenser B, a capillary tube or "cap-tube" C, and an evaporator D. The various parts and elements of the refrigerator system can vary widely as circumstances require, and in a typical system, as shown, the compressor A is a hermetically sealed construction with an electrically powered motor operating a pump therein, to receive and compress the refrigerant fluid. The condenser B receives and cools the compressed fluid and is characterized by its radiator type of construction. From the condenser B the fluid, now in liquid form, flows through the cap-tube C which is an expansion or orifice device. Finally, the expanding refrigerant passes through the evaporator D where heat is absorbed due to the expansion taking place therein. The closed system is completed by discharge of the evaporator D into the intake of the compressor A.

In accordance with the present invention I have provided a refrigerant treating element E for the purpose of carrying out the refrigerant treating method of the present invention. The method involves the provision of neutralizing means for acids that are formed as a result of the presence of moisture, and the element E is a structure comprising features to carry out said method.

The method of the present invention resides in the provision of means to neutralize any acids in the system. By system, I mean to include the elements A through D as above described and all tubing connections, or the like. More specifically, the said acid neutralizing means is a body of soda 10 over which the refrigerant is passed in order to come into contact therewith. The body of soda 10 is simply sodium bicarbonate and is well known as an acid neutralizer, and it will be readily combined with and absorb acids to neutralize the same. Thus, acids as they develop in the refrigerant are immediately combined with and neutralized by and in the soda 10 where said acid is absorbed from the refrigeration system.

The refrigerant, for example can be Freon-12, or dichlorodifluoromethane, or the like.

The refrigerant treating element E that I provide is a single unitary device that can be installed in a refriger-

ation system to carry out the method above referred to, it being apparent that various structures can be resorted to in subjecting the refrigerant to treatment with the body of soda 10. As shown in the preferred form of the invention the element E is a capsule 14 and preferably 5 formed on an elongate and substantially upright or vertical axis. That is, the capsule 14 has a top portion 15 and a bottom portion 16, it being contemplated that the said capsule 14 be installed in an erect position. As clearly shown, the capsule 14 has a tubular shell 20 10 closed at its top and bottom terminal ends, as by welding or brazing, the shell 20 being round in cross-section and pinched together at said terminal ends. Thus, a chamber 13 is established within the capsule 14.

The refrigerant treating element E is a series or through 15 flow fitting, in that fluid moving through the system enters into and discharges from the chamber 13. In carrying out the invention, there is an inlet tube 25 entering the chamber 13 at the top of the capsule 14 and there is an outlet tube 26 entering into the chamber 20 18 at the top of the capsule. It is significant that the tubes 25 and 26 enter and project into the chamber 13, and in accordance with the invention a strainer 23 is carried by the outlet tube 26 and the inlet tube 25 is 25 disposed so as to play inlet fluid onto the strainer. As a result of the tubes arranged as described, foreign particles are confined to the chamber 13 outside of the strainer 23 and the washing effect of inlet fluid tends to remove particles from the strainer 23 to keep it clean. In the case illustrated, the strainer 23 is a tube-shaped 30 screen extending from the tube 26 and closed at its innermost end, while the tube 25 plays inlet fluid angularly onto the side of the tube 26 and/or screen of the strainer 23. This simple arrangement maintains the collecting of foreign particles within the chamber 13, 35 and thus particles readily precipitate to the lower end of the capsule 14 with the aid of the washing action afforded by the angular and downward disposition of the tube 25.

The body of soda 10 is deposited in the lower portion 40 of the chamber 13 and in sufficient quantity to chemically react with all acids that may be formed within the particular system involved. It will be apparent that this quantity can vary widely as circumstances require. 45 The said body 10 is characteristically of powder or granular form and is simply reserved in the lowermost end of the chamber 13 which is in effect a sump or trap. Any acids that may be formed are heavy in nature and thereby precipitate readily to lowermost portion of the capsule 14, thereby commingling with the soda body 10. In 50 order to prevent floatation or stirring up of the soda body 10, a screen partition 19 is placed intermediate the top and bottom portions of the capsule 14. Thus, displacement of the body of soda 10 is prevented even 55 when abnormal attitudes are encountered, before or during operation.

From the foregoing it will be apparent that I have provided an extremely simple and easily manufactured element for insertion in the circuit of a refrigeration system. Furthermore, the acid neutralizing material is inexpensive and easily maintained in the portion of the capsule where it receives the heavier acids that precipitate. The said capsule 14 that forms the element E, with its inlet and outlet tubes 25 and 26, is preferably installed at the discharge end of the condenser B, as clearly illustrated in the drawings. It will be seen that the element E with its body of soda 10 will neutralize any acids that are formed and will prevent continuation of flow of said acids and/or foreign substances or particles to the cap-tube C. As a result, the refrigerant that flows through the cap-tube is cleaned so as to be virtually uncontaminated.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claim.

Having described my invention, I claim:

In a closed loop refrigeration system wherein a refrigerant is circulated, a capsule having a closed chamber therein, inlet and outlet tubes passing refrigerant into and out of the upper portion of said chamber, a body of acid neutralizing material deposited in the lower portion of said chamber and over which the refrigerant passes, there being a strainer on the outlet tube, said inlet tube being disposed to play inlet fluid onto the said strainer in order to wash the same, whereby acids formed in the system precipitate into the neutralizing material and particles are worked from the strainer to precipitate and be retained in the chamber.

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