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REFRIGERATING SYSTEM

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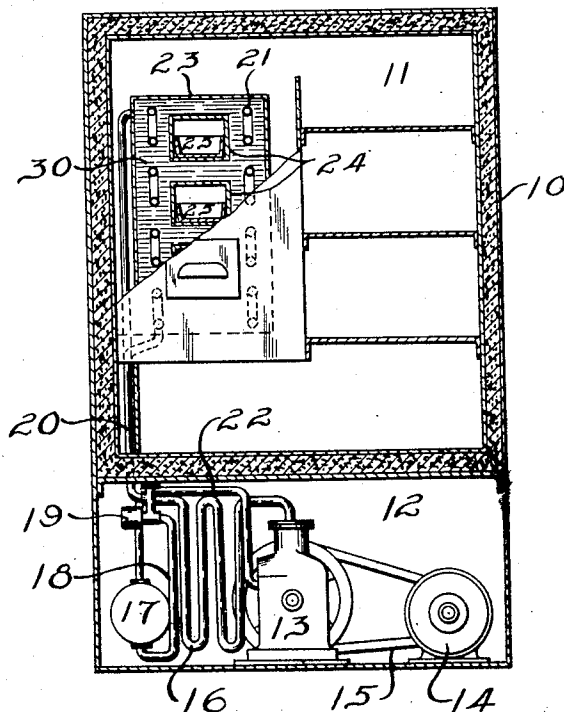


FIG. 1.

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REFRIGERATING SYSTEM

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This invention relates to refrigerating systems of the mechanical type, and particularly to the brine solution commonly employed therewith, the principal object being the provision of a new and novel type of eutectic brine solution that will not expand when it freezes.

Another object is the provision of a new and novel type of brine for use in connection with mechanical refrigerating systems of the household type and which solution will freeze within the ordinary range of operating temperatures of such systems and will not materially expand when it freezes.

Another object is to provide a non-aqueous brine for mechanical refrigerating systems.

Another object is to provide a brine for use in connection with mechanical refrigerating systems of the household type which will freeze within the usual range of operating temperatures commonly employed in such systems and will contract in freezing.

Another object is to provide a mechanical refrigerating system having a brine tank filled with a solution which will freeze within the ordinary operating range of temperatures of such systems and in freezing will not expand.

Further objects will be apparent in the following specification, reference being had to the accompanying drawing in which:

The single figure shown is a more or less diagrammatic, partially broken, vertical sectional view taken through a refrigerating cabinet in a plane parallel to the front face thereof and immediately behind such front face.

In mechanical refrigerating systems of the household type it is conventional practice to surround the evaporator or evaporating coils with a tank which is filled with a brine. This brine is employed in order that a relatively large body of material may be provided from which the heat may be abstracted by the evaporator, and which in turn will absorb the heat from the interior of the refrigerating cabinet. In other words, the brine acts as a storage means which will absorb the heat from the interior of the refrigerating cabinet over a relatively long

period of time. The reason for storing up this energy in the brine is that by so doing it will be unnecessary to cause operation of the compressor mechanism at the relatively frequent intervals that would otherwise be necessary were the brine not provided, thus not only eliminating a certain amount of wear and tear on the starting and stopping mechanism for the refrigerating system, but also to cut down the noise of starting and stopping, which is annoying to many people.

By the word "brine" is commonly meant a solution of water and calcium chloride, and although this is the solution commonly employed in connection with a brine tank of mechanical refrigerating systems, it is not to be understood that the word "brine" is to be so limited, for it is well understood in the refrigeration art that by the word brine is meant any liquid which, having been cooled by a refrigerating system, is used for the absorption of heat, and in the following specification and claims this interpretation of the word "brine" is to be kept in mind and applied where necessary.

I am aware that it has heretofore been suggested that water be employed as a brine, so that during operation of the system the water would be frozen and the frozen water in melting, due to absorption of heat, would absorb, due to its latent heat of fusion, a much greater amount of heat for its volume than a corresponding volume of brine which had not been frozen. I am also aware that it has been suggested to employ a water solution for the brine which would freeze at a lower temperature than water, for instance, in the neighborhood of 16 to 18 degrees Fahrenheit, thus obtaining the advantages of greater heat absorption per volume of brine and at the same time obtaining the desirable low temperature commonly required for optimum operation in such systems.

While such brines have been suggested, they have not, to my knowledge, ever been commercially employed, and the reason they have not been commercially employed is that such solutions in freezing expand beyond the elastic limits of the containers provided for them and consequently cause a rupture of

the container with consequent loss of brine. It may well be possible that a tank or container could be provided which would withstand or allow such expansion of the brine without rupture of the container, but such a construction must necessarily involve an expense not commensurate with the advantages resulting from the increased heat absorbing qualities of the brine.

10 In accordance with the present invention I provide a brine which will freeze at the low temperature usually desired in refrigerating systems of the type under discussion whereby the advantages of the freezing solution may be obtained and which brine, in
15 freezing, will expand, if at all, such a small amount that it may be safely employed in connection with brine tanks of conventional construction. The system with which this
20 brine may be employed may be of any conventional construction as indicated in the accompanying drawing in which the numeral 10 indicates a cabinet of the usual construction having a cooling compartment 11 and a
25 unit compartment 12. In the compartment 12 may be provided the usual compressor 13 driven by a motor 14 suitably connected thereto as by the belt 15. The discharge side of the compressor 13 is connected to the condenser 16 which discharges into the receiver 17. The discharge side of the receiver 17 is
30 connected by the tubing 18 to a conventional form of expansion valve 19, which in turn is connected by the tubing 20 to an evaporator 21 positioned in the cooling compartment 11 and shown as being of the conventional coiled tube type. The discharge side of the evaporator 21 is connected by the tubing 22 to the
35 intake side of the compressor 13. Surrounding the evaporating coils 21 is a tank 23 which serves as the brine tank. The tank 23 is shown as being provided with the usual pockets 24 in which freezing trays 25 are provided in accordance with conventional practice. I have shown the brine tank 23 of a
45 relatively large size, but it will be apparent that it may, in fact, be made of a size smaller than is conventionally employed and still obtain as long intervals between periods of
50 compressor operation as in conventional sizes of tanks employing the conventional type of brine. It will be obvious that by providing a relatively larger brine tank I am able to still further increase the period of time between
55 operation of the compressor than in conventional constructions.

In accordance with the present invention I show the brine tank as being filled with a brine 30. This brine 30, in accordance with
60 the present invention, may be a single liquid only or may be a mixture or solution of two or more liquids. Where a single liquid is employed in accordance with the present invention such liquid is of a non-aqueous character and such that when it freezes no expansion

will occur. Likewise, when two or more liquids are employed for the brine 30 their respective proportions and characters must be such that in freezing they will either not expand at all or will expand to such a small extent collectively as not to impose upon the tank 23 a stress greater than the elastic limits of the material from which the tank 23 is made, or the elastic limit employed for making the various joints of the tank. In other words, while I prefer to provide a solution or brine comprising one or more liquids of non-aqueous character, I do not mean to limit my invention in its broader aspects exclusively to a non-aqueous solution, as it may be possible to include a small amount of water in the solution if the other liquid is of such a character that in freezing it will contract sufficiently to offset the injurious expanding characteristics of the water in freezing, and thus prevent the freezing of the solution from exerting injurious expansive forces on the brine tank 23.

Where a single liquid only is to be employed in the brine tank 23 as the brine 30, the temperature desired in the cabinet will control to a great extent the particular liquid employed. Where the low temperature in the system desired is below the freezing point of water and yet relatively high, a liquid such as rapeseed oil may be employed. This particular oil freezes at approximately 25.7 degrees Fahrenheit. If a slightly lower minimum temperature is desired aniline may be employed which freezes at approximately 21.2 degrees Fahrenheit. If a still lower temperature is desired turpentine may be employed which freezes at approximately 14 degrees Fahrenheit. If a relatively low temperature is desired glycerine may be employed, which freezes at a minus 4 degrees Fahrenheit. For other temperatures mixtures of these or other liquids may be employed, thereby enabling substantially any temperature desired to be obtained in the system. For instance, a mixture of turpentine and glycerine may be employed in varying proportions to suit the particular freezing point of the solution desired. On the other hand, a mixture of rapeseed oil and glycerine, turpentine and rapeseed oil, or glycerine and aniline may be employed for the same purpose. Glycerine and water may even be employed if sufficient care is taken to so limit the proportions of the same so that substantially no expansion of the mixture when freezing will occur.

From the above it will be apparent that there are a great number of non-aqueous, or substantially non-aqueous solutions that may be employed in connection with the present invention, and which have not been specifically named, and it will be apparent that in the broader aspects of the present invention any body of liquid whose freezing point is

within the working range of temperatures commonly employed in connection with refrigerating systems of the type described so that it will be frozen during normal operation of the system, and which, in freezing, will not expand, is within the scope of the present invention.

These and other formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claim.

What I claim is:

A refrigerator system having a brine tank filled with a liquid selected from a class comprising turpentine, rapeseed oil and aniline, the brine being capable of freezing without substantial expansion, in the normal operating range of the system.

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