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F. C. FRARY

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REFRIGERATING UNIT

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Fig. 1.

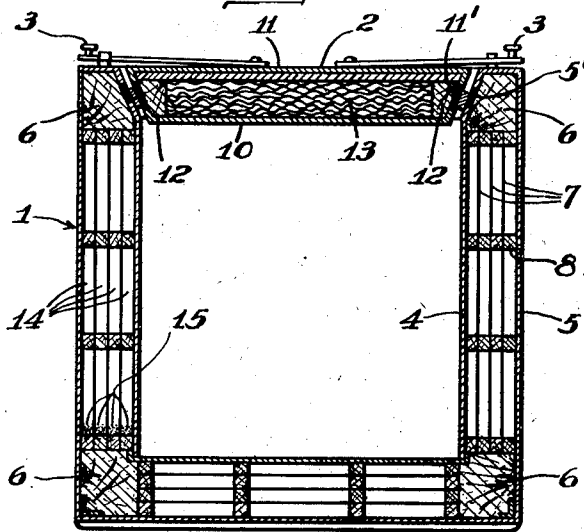
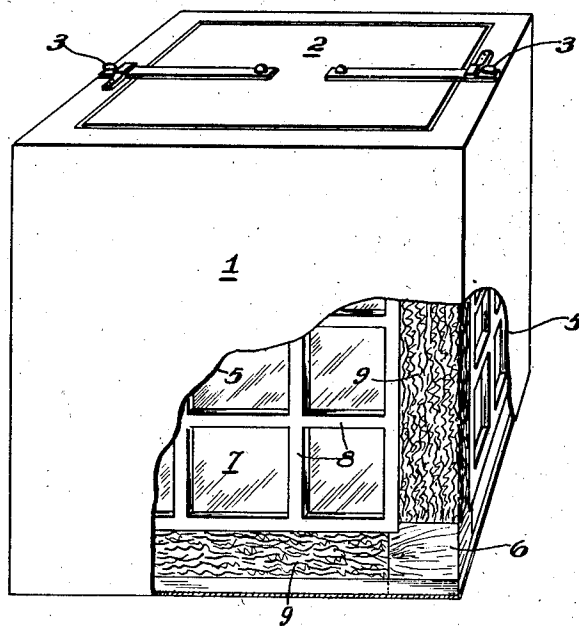


Fig. 2.



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REFRIGERATING UNIT

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6 Claims. (Cl. 154—45)

The invention relates to heat insulators and heat-insulated receptacles of the sort which are particularly adapted to refrigeration, notably in the preservation of low temperature refrigerants such as solid carbon dioxide, known as dry ice.

The importance and value of bright reflecting metal surfaces in the form of thin sheets or foil as heat insulators is a matter of common knowledge. The bright reflecting surface of the metal reflects radiant heat and thus insulates objects placed behind it with respect to the source of heat. The use of metal reflectors has been largely confined, however, to the insulation of hot bodies such as steam pipes and risers. In such use, the reflecting metal is interposed between such hot body and an atmosphere of which the temperature may be that ordinarily referred to as "room temperature".

When it is attempted to apply metal sheets or foil insulation to the needs of refrigeration, an obstacle is encountered which militates against the efficiency of a bright metal insulation. This is the formation of frost on the metallic surface which appreciably diminishes its efficiency as an insulator.

It is an object of my invention to provide a heat insulator or heat-insulated receptacle in which bright metal foil is employed, wherein the difficulty aforementioned is obviated and the formation of frost on the heat-reflecting surfaces is prevented.

More particularly, the object of my invention is the provision of an insulating unit of the character described which is adapted to use under low temperature conditions such as encountered in refrigeration. A specific object is to provide an insulating receptacle for the preservation of refrigerants such as solid carbon dioxide.

My invention consists in enclosing the bright metallic foil in an air-tight container, as between the walls of a double-walled receptacle. The moisture content of the air or space within the container should be as low as possible and this desideratum may be achieved in a number of different ways, such as sealing the container in an atmosphere of low relative humidity such as obtains on a dry winter day; or by passing dry air through the container just before it is sealed; or by creating a partial vacuum and sealing the container to exclude air which may contain water vapor; or by placing within the container a quantity of an adsorbent sufficient to dry the air contained therein. The object in every case is to preclude the condensation of water vapor in the form of frost on the foil. As a convenient meth-

od of accomplishing this purpose I prefer the last-mentioned expedient, namely the use of an adsorbent. The foil and the adsorbent material are hermetically sealed up in the container. The unit thus constructed may be in the form of a double-walled container, or it may be one of a number of simpler forms which go together to build up an insulating wall or container.

As illustrative of what I consider to be a preferred form of the invention it is suggested that the insulating metal be a bright-surfaced aluminum foil, hermetically sealed in a container with a small quantity of activated alumina. The container itself may be made of aluminum, or of any other material desired, such as bakelite. Obviously, the foil may be mounted in the container in any one of a variety of ways. For example, it may be mounted in spaced layers with suitable supporting structure or it may be loosely packed into the container without support. The exact structural form of the unit is not considered to form an essential part of the present invention.

The specific embodiment shown in the drawing has been selected solely for the purpose of illustration.

In the drawing, Fig. 1 is a vertical sectional view of a refrigerating container of the type which is particularly suited to the preservation and transportation of solid carbon dioxide, commonly known as "dry ice".

Fig. 2 is a perspective view of the container shown in Fig. 1, a portion of the outer wall of the container having been broken away to show the interior construction thereof.

The container consists essentially of a box-shaped receptacle 1 provided with a closure member or cover 2. The cover may be provided with suitable clamping or securing means, as indicated generally by the reference numeral 3. The receptacle 1 is built up of an inner shell 4 and an outer shell 5 which I prefer to construct of aluminum sheet. These inner and outer shells are built up around and secured to a suitable framework, indicated generally by the reference numeral 6. The inner and outer shells 4 and 5 are sealed at their meeting edges with pitch, asphalt, or some other suitable material of relatively low conductivity which will serve to effect an air-tight seal, thus forming an hermetically-sealed compartment between the inner and outer shells. This seal is indicated at 5' in Fig. 1.

Between the inner and outer shells 4, 5 there are placed one or a plurality of layers of bright-surfaced metallic foil 7, mounted upon and spaced apart by suitable lattices or frameworks 8. This

type of insulating structure may conveniently be applied to the four sides and bottom of the receptacle. The respective insulating structures may be so constructed as to meet at the corners of the receptacle, or the corners may be packed with suitable insulating material in loose form, such as the crumpled foil indicated at 9 in Fig. 2.

The cover 2 may likewise be formed of inner and outer metallic shells 10 and 11 respectively, mounted upon a suitable framework 12 and sealed at 11¹ with pitch, asphalt, or other suitable material. The space between the inner and outer shells of the cover may conveniently be filled with crumpled foil, as indicated at 13. The crumpled surface of the layers of foil serves to space apart the adjacent layers thereof and thus increase the insulating efficiency. The receptacle 1 and cover 2 are each hermetically sealed in a perfectly dry atmosphere, or with a small quantity of an adsorbent material sifted into each of the cells 14 formed by the insulator structures, as indicated at 15 in Fig. 1. A quantity of the adsorbent powder may also be placed between the layers of crumpled foil in the cover, or in the foil compartment thereof. Any form of adsorbent may be used, as for example activated carbon or activated alumina, although I prefer to use the latter. Aluminum foil is to be preferred, but tin foil or other metallic foils may be employed if it is so desired.

Among the other adsorbents which may be employed, if so desired, are silica gel and activated carbon. I further contemplate the use of adsorbents in the form of a salt capable of absorbing water, but which upon hydrolysis will not form an acid corrosive with respect to aluminum, or with respect to the metal which is to be employed as the insulating substance or container. It should therefore be noted that wherever the term "adsorbent" is used throughout the specification and claims, it is intended to include as equivalents both adsorbents and absorbents to the extent that they are capable of substitution one for the other in order to realize the benefits of my invention, the essence of which is the prevention of the accumulation of frost on the foil.

Likewise, I wish it to be understood that in the use of the term "foil" it is intended to include bright metal sheets of a thickness which may in some instances exceed that of the material ordinarily referred to as foil.

While I have described certain specific forms of insulating units by which the advantages incident to my invention may be obtained. I have no

intention of limiting the invention to such specific embodiments, and it will be obvious that variations may be made without departing from the invention as defined in the appended claims, the essence thereof being the provision of a heat insulating receptacle within which is disposed metallic foil, the receptacle being hermetically sealed to exclude moisture and thereby prevent the formation of frost on the foil.

I claim:

1. A refrigerator comprising an hermetically sealed unit within which is disposed bright metallic foil and a quantity of activated alumina adapted to prevent impairment of the heat reflecting efficiency of the bright metallic foil when said unit is utilized for maintaining a temperature at or below ordinary room temperature.

2. A refrigerator comprising an hermetically sealed unit within which is disposed a bright heat-reflecting metallic foil and an adsorbent whereby moisture is prevented from condensing on the foil in the form of frost and the efficiency of the bright heat-reflecting surface of the foil remains unimpaired.

3. A refrigerator comprising an hermetically sealed unit within which is disposed a bright heat-reflecting aluminum foil and a quantity of activated alumina, the activated alumina serving to prevent the condensation of moisture on the foil in the form of frost whereby the efficiency of the bright heat-reflecting surface of the foil remains unimpaired.

4. A heat-insulating receptacle for the preservation of solid carbon dioxide or the like comprising an hermetically sealed compartment within which is disposed a plurality of spaced layers of bright metallic foil, and containing an adsorbent whereby the space between the layers of foil is maintained substantially free from moisture.

5. A heat-insulating receptacle for the preservation of solid carbon dioxide or the like comprising an hermetically sealed compartment within which is disposed a plurality of spaced layers of aluminum foil, and containing a quantity of activated alumina, whereby the space between the layers of foil is maintained substantially free from moisture.

6. As a refrigerating unit, bright metallic foil hermetically sealed in a container together with a quantity of a substance capable of producing a dry atmosphere therein, whereby moisture is prevented from condensing on the surface of the foil.

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