March 13, 1934. H. RUBIN 1,950,905

REFRIGERATING UNIT

Filed May 6, 1932

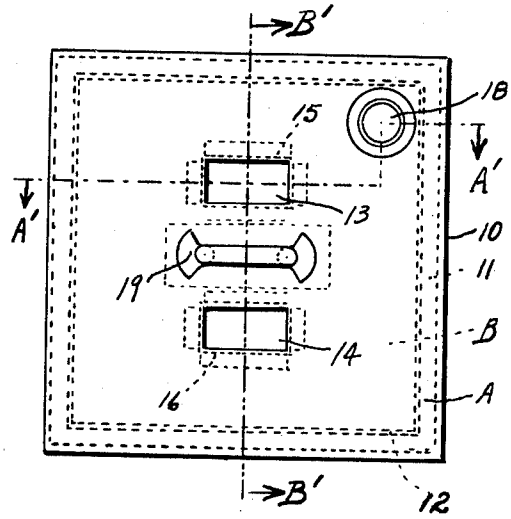


FIG. 1.

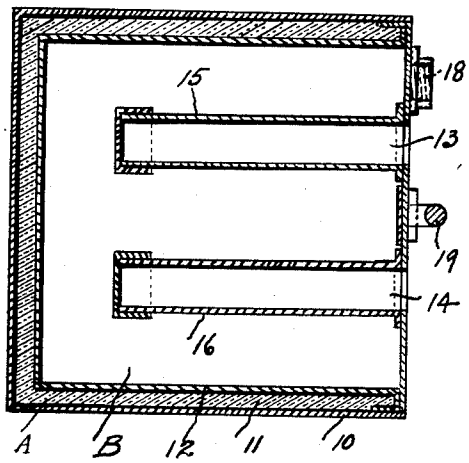


FIG. 2.

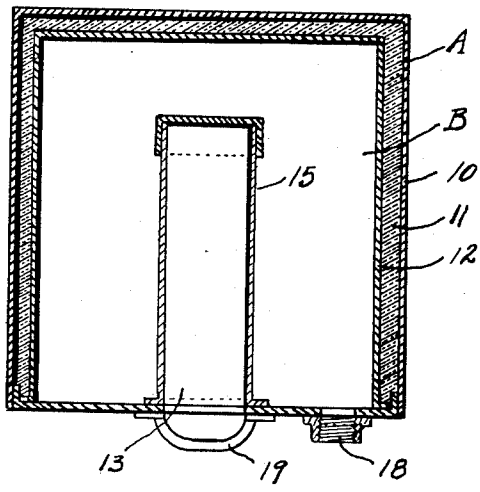


FIG. 3.

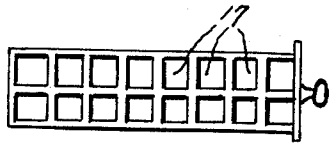


FIG. 4.

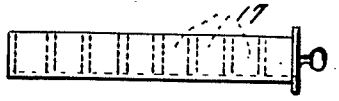


FIG. 5.



FIG. 6.

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UNITED STATES PATENT OFFICE

1,950,905

REFRIGERATING UNIT

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Application May 6, 1932, Serial No. 609,655

3 Claims. (Cl. 62—94)

This invention relates generically to refrigerating units, and more specifically to removable units for use in connection with ice boxes or the like, and is especially adaptable for use in connection with common refrigerating devices such as ice boxes now in use.

The object of the invention is to provide means which are simple, economical and efficient for reicing refrigerators with an ice substitute.

Various further and also various more specific objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawing, which forms a part of this specification.

The invention consists in such novel features, arrangement and combination of parts and methods as may be shown, described and claimed in connection with embodiments of the instrumentalities herein shown and described by way of example only.

Constructional examples of the invention are illustrated in the figures, in which:—

Figure 1 is an elevation of an icing unit made in accordance with my improvement, the trays or drawers being removed therefrom.

Figure 2 is a section on line B'—B' in Fig. 1.

Figure 3 is a section on line A'—A' in Fig. 1.

Figure 4 is a plan view of a tray or drawer showing the same having a number of compartments in which ice cubes may be made.

Figure 5 is a side view of the tray.

Figure 6 is a front view of the tray.

Refrigeration is the art of removing heat from a confined space or substance for the purpose of reducing its temperature and maintaining it below that of its surroundings.

Refrigerating apparatus may be broadly classed under two main heads, chemical and mechanical.

The change of the physical condition of a substance, say, when it is in the act of passing from a solid to a liquid form, necessitates the expenditure of energy in the form of heat in order to overcome its cohesive force. This may be effected without change in sensible temperature; if the heat be absorbed as fast as it is supplied from the exterior, as, for instance, in the case of melting ice which remains constant at a temperature of 32 deg. Fah., any increase or decrease in the supply of heat merely hastening or retarding the rate of melting without in any way affecting the temperature.

Certain mixtures, however, composed of some salts with water or acids, and of certain salts with ice, have the property of producing liquids which have freezing points lower than the original temperatures of the mixtures, and act in a different manner from that above mentioned, the tendency in this case to pass into a liquid form being so powerful, that the absorption of heat which takes place is more rapid than can be supplied from the exterior, with the result that a consumption of the store of the melting substances themselves takes place. As a natural sequence to this action, the temperature of the melting substances falls until the rate of melting and the rate of heat supply from without become balanced.

The state of hydration of the salt and the percentage of it present in the mixture govern to a certain extent the degree to which the temperature can be lowered. The salts used in ordinary freezing mixtures are usually those of certain alkalies which are almost the only ones possessing the requisite solubility at low temperatures.

A frigorific mixture, which can be depended upon to give good results, consists of sodium sulphate six parts, ammonium nitrate five parts, and nitric acid diluted four parts. This mixture will produce a reduction of temperature of from plus 50 deg. to minus 40 deg. Fah. Other mixtures are as follows:—

	Parts	
Sodium nitrate	3	Reduction of temperature, deg. Fah., from plus 50° to —3°.
Nitric acid, diluted	2	
Ammonium nitrate	1	Reduction of temperature, deg. Fah., from plus 40° to plus 4°.
Water	1	
Sodium sulphate	6	Reduction of temperature, deg. Fah., from plus 50° to —10°.
Ammonium chloride	4	
Potassium nitrate	2	
Nitric acid, diluted	4	
Sodium phosphate	9	Reduction of temperature, deg. Fah., from plus 50° to —12°.
Nitric acid, diluted	4	
Ammonium nitrate	1	Reduction of temperature, deg. Fah., from plus 50° to — 7°.
Sodium carbonate	1	
Water	1	

It may be difficult to conceive the idea of removing heat from a space which is already cold, such as an ice box and the like. "Cold," however, is a purely relative term. Substances are hot or cold only as they differ from our usual experience, for we must remember that heat exists at all temperatures above absolute zero (minus 460° Fah.)

Similar characters of reference designate corresponding parts throughout the several views.

The precise nature of my invention will be best understood by reference to the accompanying

drawing, which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of its various parts without departing from the spirit and scope of my invention, as defined in the appended claims.

In the device shown in the drawing, the reference character A designates a casing of suitable configuration in which is formed a chamber B for the reception and retention of a frigorific mixture that may be placed therein. The casing consists of an outer element 10 of sheet metal, the said sheet metal is resistive to corrosion. In the interior of the outer casing there is provided dependable insulating material 11 such as mineral wool, pure sheet cork, or corkboard. If corkboard or sheet cork is used the joints formed by the meeting edges of the corkboards or sheets may be sealed with hydrolene cement or other suitable sealing cement.

An inner casing 12 of noncorrosive and acid resisting sheet metal is mounted in the casing and shields the insulating material from the chemical action of the frigorific mixture or refrigerant that may be used in the device. The inner casing is provided with two or more compartments 13 and 14. The compartments are not provided with insulating material, and the outer walls 15 and 16 thereof are in direct contact with the refrigerant or frigorific mixture that may be used in the device.

The compartments are provided with removable trays, which may be suitably divided into smaller compartments as at 17, and wherein ice or frozen fruit cubes may be made if desired. It will be understood that the trays may be free from the smaller compartments, and that the trays may be used for suitable storage purposes.

The casing is provided with an inlet 18, closed by a proper cap or plug, (the cap or plug not shown but understood in the art).

The unit is preferably provided with a handle 19, as shown, which facilitates the handling of the unit with ease and despatch.

The icer may be charged with a refrigerant at a central plant and delivered to the user.

While I have herein shown and described a preferred arrangement, it will be readily understood that changes and modifications therein may be found desirable or essential in meeting the various exigencies of use, and I desire to be understood as reserving the right to make any and all such changes or modifications as may be found desirable or essential, in so far as the same may fall within the spirit and scope of the invention as expressed in the accompanying claims when broadly construed.

Having thus described my invention, what I claim is:—

1. In a portable refrigerating apparatus of the character described, the combination of a suitable outer casing, of an inner casing, of an insulating element within the outer casing and surrounding the inner casing, an endothermic type of refrigerant in the inner casing, noninsulated compartments in the inner casing and immersed in the endothermic refrigerant, a removable tray in each of the said noninsulated compartments, an inlet having a small area in the casing and a closure for the inlet.

2. In a portable refrigerating unit as defined in claim 1 further characterized in having the trays divided by transverse and longitudinal partitions to provide a number of chambers.

3. In a portable refrigerating unit of the character described, comprising, in combination, an outer casing, an inner casing therein but separated from the outer casing and forming therewith a surrounding space, a composite insulating material infilling the space thus formed, a filling orifice of small area for introducing an endothermic type of refrigerant into the unit, a closure for the orifice, a pair of similarly characterized noninsulated compartments in juxtaposition in the inner casing in the unit, and complemental trays removably fitted in the compartments.

HARRY RUBIN.