Nov. 21, 1933. R. G. THOKE 1,935,923

CONTAINER

Filed Aug. 8, 1931

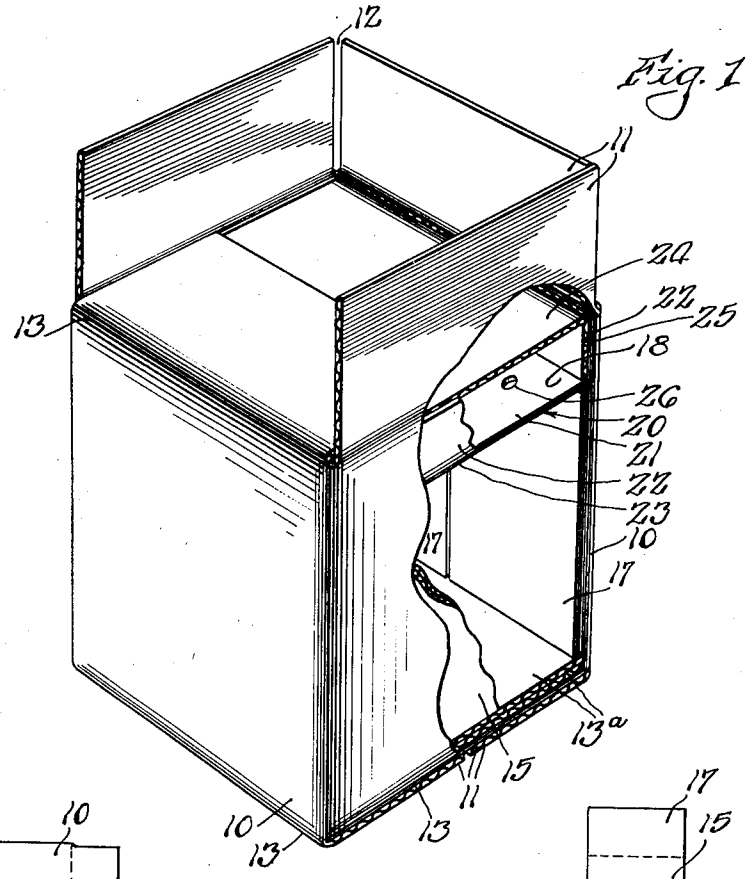



Fig. 1

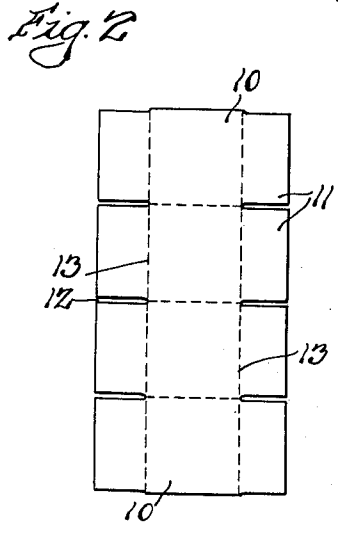



Fig. 2

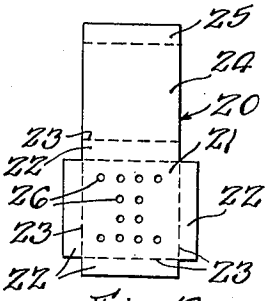



Fig. 3

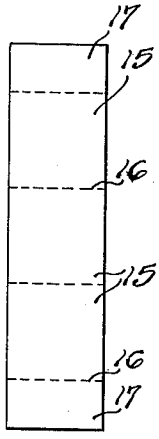



Fig. 4

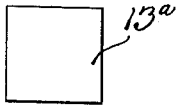



Fig. 5

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# UNITED STATES PATENT OFFICE

1,935,923

## CONTAINER

Rudolph G. Thoke, La Grange, Ill.

Application August 8, 1931. Serial No. 555,945

1 Claim. (Cl. 62—91.5)

This invention relates to a refrigerating package in which some form of solid material, preferably frozen carbon dioxide, serves as a refrigerant, and particularly it relates to a device supplying a compartment for a refrigerant within a package, separating the refrigerant and the material to be refrigerated, whereby overfreezing, which commonly results from the use of solidified carbon dioxide and similar refrigerants, is avoided.

Already a number of containers for solidified carbon dioxide have been proposed, and experience therewith has developed a wide knowledge of the behavior of this product as a refrigerant. That solid carbon dioxide maintains a temperature of approximately 110 degrees or more below zero, that it passes directly from a solid state into a gaseous state upon heating and that the temperature of the gas immediately after release from the solid form is of a very low degree, are commonly known facts. The utility of a refrigerant which upon a rise in its temperature does not assume a liquid state and does not, therefore, soften cardboard containers, is well known. Efficient packaging of solidified carbon dioxide in a container is, however, a problem which has not received a great deal of attention.

Dry ice packages now are generally used only where the article to be refrigerated may be overfrozen with safety. The prior art has generally shown that solidified carbon dioxide directly or almost contacting with the material to be refrigerated freezes it to great solidity. Thus, upon a metal container of ice cream is placed a cake of solidified carbon dioxide. The side of the cake rests against the container (a metal or paper can), and is in substantial contact with a portion of the material to be refrigerated. The contacting face of the cake of solidified carbon dioxide will draw heat directly from the refrigerated object while the remaining sides or faces of the cake refrigerate by convection only. There is a great difference between the heat and cold conductivity of a gas and of a solid. This difference is due to the difference in density of the two.

The temperature of the wall of the container in contact with the solidified carbon dioxide will very quickly fall to approximately that of the solid carbon dioxide. Anything in contact with the refrigerated walls will be reduced to a correspondingly low temperature.

The reduction in temperature in this manner in respect to the refrigerated item is undesirable in two respects: In the first place, the metal container and the frozen product are reduced to a temperature 100 degrees lower than is necessary for proper refrigeration; and, in the second place, such excessive reduction in temperature being nothing but wasted effort, there is a loss of energy which is costly to the user of the solid carbon dioxide who must supply enough of such refrigerant to meet the waste of such a system of refrigeration.

The primary object of the present invention is, therefore, to provide means to avoid refrigeration by direct contact with the carbon dioxide cake. Expressed differently, the object of the present invention is to suspend a carbon dioxide cake within a refrigerating package so that it will be surrounded by its own gaseous discharge and be away from close contact with the refrigerated items. A further object of the invention is to reduce the evaporation of the solidified refrigerant and to prevent the temperature of the article to be refrigerated from falling to an undesirable lowness.

Another object of this invention is to provide a simple cardboard container, formed entirely from blanks of material, novelly folded to obtain the desired structure.

A further object of the invention is to provide the interior of a cardboard package with a section to admit an independently-formed cardboard compartment or container, to be used therein to hold the caked solidified carbon dioxide.

These and such other objects as will hereinafter appear are embodied in the invention described below and illustrated in the accompanying drawing, in which:

Figure 1 is a perspective view of a carton embodying the invention;

Figure 2 is a plan view of a blank of which the carton shown in Figure 1 is formed;

Figure 3 is a plan view of a blank, shaped and scored, to form the internal compartment or container used in the device;

Figure 4 is a plan view of a blank scored to form an inside wall sheathing;

Figure 5 is a plan view of an insulating blank, one or more of which may be used at the top and bottom of the carton.

Like reference characters are used to designate the similar parts in the drawing and in the description of the invention which follows:

The carton illustrated has contiguous sides 10 each of the same size and each side has flaps 11 at each end. As may be understood from Figure 2, said carton consists of a single cardboard blank

having slots 12 to divide the flaps 11 one from another and scores 13 at the end of said slots to divide the flaps 11 from the body 10. Said blank when articulated forms, when the end edges of the body sections 10 are brought together and secured by a binding strip, a carton, either cubical or a parallelepiped.

The bottom of said carton is sealed by adhesive tape in strips a part of which is secured on the body sections 10 and the remainder on the two outer flaps 11. The other two flaps 11 at that end are within the container and rest upon the outer flap. Two or three layers of the squares of insulating material 13*a* may be placed at the bottom. Ordinarily, these consist of the same heavy cardboard that forms the side walls. One of these is illustrated in Figure 5.

The blank shown in Figure 4, consists of three duplicate members 15, having at each side thereof scores 16 and end members 17 half the width of the sections 15. By bending the blank upon the scores 16 a rectangularly shaped sleeve results. Said rectangularly shaped blank when so articulated may be telescoped inside the carton shown in Figures 1 and 2 to leave therein a section at the top to receive a compartment for the solidified carbon dioxide and also form an additional insulating wall within the main carton. The height of this sleeve may be regulated to accommodate the use of insulating material 13*a* in the bottom of the package as well as to create a recess 18 to receive the container for the solidified carbon dioxide. Into this recess is telescoped or seated an independently formed compartment 20, now to be described, the blank for which is shown in Figure 3.

This compartment 20 is formed from a single blank which has a perforate section 21 forming the base of the compartment. Said base 21 is separated from wings 22 at each edge thereof by scores 23. Said wings are folded upwardly to form the side walls of the compartment. The base 21 may then be fitted into recess 18 of the carton and extending from one of the wings 22 is an extension comprising a section 24 of the same size as section 21, and from one edge thereof is a tongue or flap extension 25. When solidified carbon dioxide is placed upon base 21 the top 24 is bent across the base 21 and flap 25 is pushed into position intermediate the wing 22 with which it comes into contact. It may be disposed between wing 22 and wall 10 if desired. The solidified carbon dioxide compartment is easily removed from the carton to permit of the insertion of the article to be refrigerated, if preferred. Usually the material to be refrigerated is disposed in the carton before the solidified carbon dioxide compartment is articulated.

In the bottom 21 of the solidified carbon dioxide compartment 20 are apertures 26 which permit of the escape of carbon dioxide gas from a carbon dioxide cake disposed in the solidified carbon dioxide compartment to the storage compartment below. Refrigeration is by convection only.

The merits of this package are readily apparent. First and foremost, is the novel means of supporting very cold solid refrigerant away from the refrigerated items.

The utility of the device for refrigerating purposes is two-fold. The articles to be refrigerated are placed below the solidified carbon dioxide so that advantage is taken of the natural downward flow of a cold gas. Additionally, inasmuch as the package ordinarily is not completely filled in respect to the storage compartment, there is no contact between the carbon dioxide cake and the articles to be refrigerated. The holes 26 in the bottom of compartment 20 are quite large to allow the rapid escape of gas and to reduce the amount of solidified carbon dioxide in direct contact with solid material. This retards evaporation of the cake because the cake evaporates more slowly when free from contact and surrounded by recently released gas than it does when in contact with any solid substance.

In actual use the carton has been tremendously useful by making it possible to use dry ice for articles which should not be overfrozen, overfreezing of ice cream and the like being impossible in the illustrated device, and by maintaining the material within the device at a temperature sufficiently high as to render it edible without waiting for it to thaw out. The previous custom of placing a cake of dry ice on a can of ice cream necessarily resulted in the ice cream being so solid or hard that it was incapable of use until thawed out. These former packages reduced the ice cream to the rigidity of a metal and the ice cream was so cold as to be dangerous to eat as well as unpalatable.

I claim:

A carton comprising three blanks, all of insulating sheet material, one of said blanks forming the outer shell thereof and being in an elongated strip with flaps at its edges, such strip forming one lamination of the four sides of the carton with the flaps turned in to provide two laminations of material at the top and bottom thereof, a second strip of less width than the side forming strip and being disposed about the sides of said carton to provide a second lamination over the major part of the sides thereof and concurrently to provide a continuous shoulder about the interior of said carton, and a third blank having a foraminous transverse section, a second transverse section of the same area, and a plurality of narrow sections, said third blank providing a box for dry ice or the like disposable on the shoulder in said carton with the foraminous section traversing the carton and opening to the interior thereof, the small sections of the third blank providing a second lamination for the upper section of said side forming blank in said carton and the other transverse section of said third blank providing a third lamination for the top of said carton.

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