

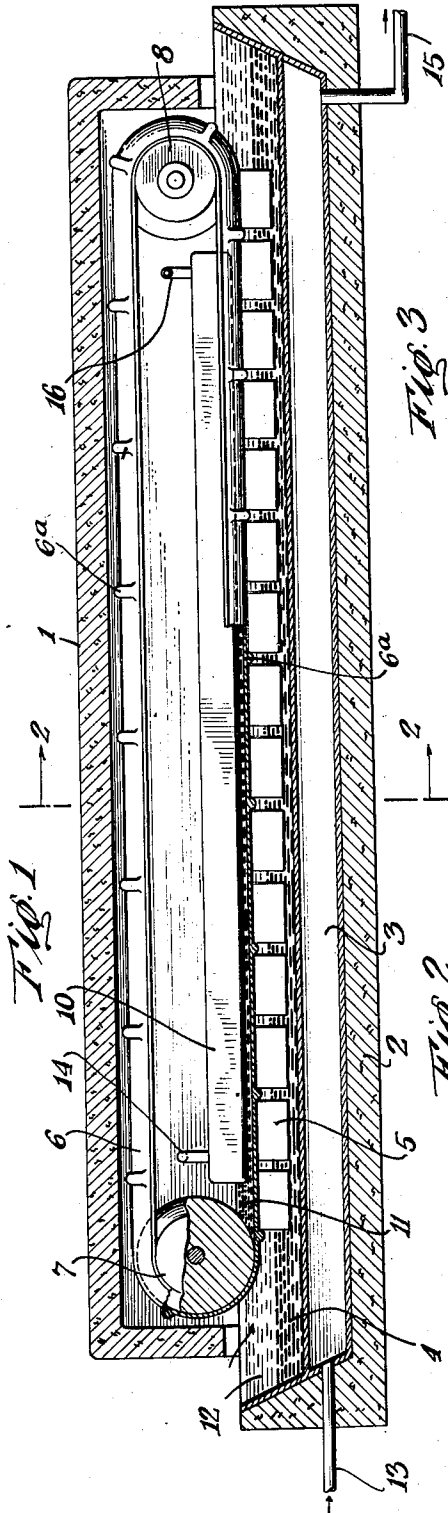
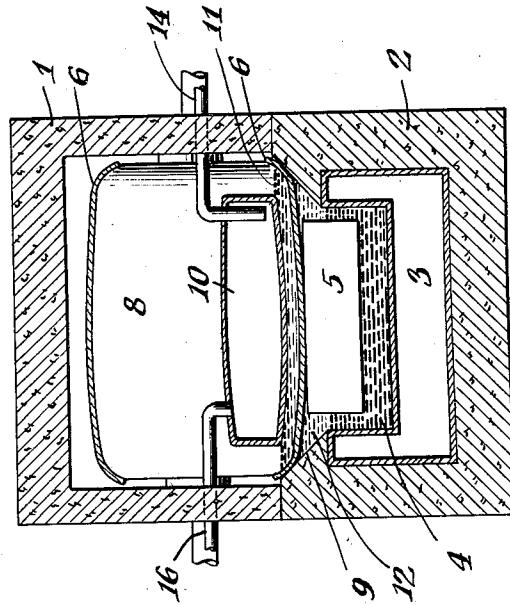
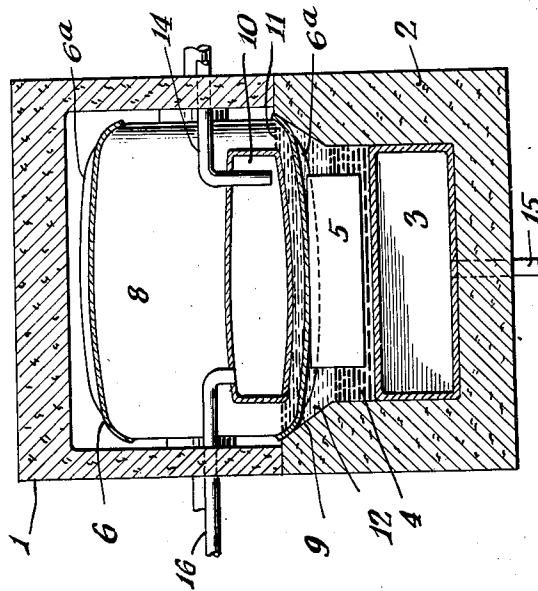
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REFRIGERATION

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REFRIGERATION

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14 Claims. (Cl. 62—104)

This invention relates, in general, to the art of refrigeration, and more particularly to that phase of refrigeration known as "quick freezing"; the objects to be frozen being, usually, either articles subject to rapid deterioration in the absence of low temperatures or articles which would suffer disintegration, chemically or physically, if frozen by a prolonged process. Processes intimately related to the one disclosed in this application have been disclosed in my co-pending applications, Serial Number 542,503, filed June 6, 1931; Serial Number 561,456, filed Sept. 5, 1931; Serial Number 561,457, filed Sept. 5, 1931 and Serial Number 544,802, filed June 16, 1931.

This application is concerned, primarily, with a novel means for providing for the successive freezing of a plurality of articles and with an improved refrigeration means.

It is the prime object of this invention to provide a method of and a means for the improved refrigeration of a plurality of articles.

It is a further object of this invention to provide a novel conveyor means for insuring the successive passage of a plurality of articles to be frozen through the refrigerating chamber.

It is still a further object of this invention to provide a system which will include a novel means for refrigerating my conveyor.

It is an especial object of this invention to provide a maximum of heat exchange between the refrigerant and the article to be refrigerated, the same being manifested in this application in the means for cooling the conveyor belt and the liquids employed for floating the article through my refrigerating chamber.

Other objects of my invention will appear in the accompanying specification and claims and will be disclosed in the accompanying drawing, in which:

Figure 1 is a central vertical longitudinal section through a schematic showing of my device.

Figure 2 is a cross section on the line 2—2 of Figure 1.

Figure 3 is a view, similar to that shown in Figure 2, of a modification of my device.

Referring now with greater particularity to the drawing, it will be seen that my device is comprised, as follows:

My refrigeration chamber is comprised of upper and lower portions 1 and 2 respectively. These two chamber members are of some suitable heat insulation material, such as cork, and are shaped to fit tightly. They may be secured to each other by any suitable means (not shown). The member 2 is of substantially U-shaped configuration and has one or more refrigerant tubes 3 running longitudinally therethrough. In the disclosure I have shown a tube 3 substantially fitting the area between the forks of the U of the U-shaped member 2. A fluid 4, of relatively

high heat conductivity and of high specific gravity, is provided, as shown, covering the top of the tube 3. This liquid is supplied in sufficient quantity to insure flotation of the articles 5 to be frozen and to insure contact of the packages to be frozen with a belt carrier 6. The fluid 4 contemplated for use is mercury, though this application is not limited to this particular fluid. The belt carrier 6 is preferably of metal and is of dished or crowned form, as is indicated in Figure 2. The belt carrier passes over crowned driving rollers 7 and 8.

The metal belt will be, ordinarily, of sufficient thickness to maintain its dished form between the rollers. However, if the space between the rollers is great, I prefer to arrange my apparatus in such a manner that the belt, on its lower travel, may rest on the curved upper edges of the member 2, as shown at 9.

One or more refrigerating tubes 10 are provided, extending longitudinally of my apparatus, and immediately above the upper surface of the belt 6 in its lower travel. The dished upper surface of the belt is filled with a liquid 11 of high heat conductive properties, such liquid being provided in quantity sufficient to fill the space between the tubes 10 and the belt to provide for intimate heat exchange between the tubes and the belt. The use of such a liquid as mercury is contemplated.

The space between the liquid 4 and the lower surface of the belt 6 may be filled with a fluid 12 of relatively high heat conductivity but of low specific gravity. This will provide for a better heat transfer to the walls of package to be refrigerated.

The refrigerant may be of any suitable nature. However, in the apparatus disclosed, I propose using the ammonia expansion system. Suitable inlet pipes 13 and 14 and outlet pipes 15 and 16 are provided for leading refrigerant to and from the refrigerating tubes 3 and 10, respectively.

The parts of my apparatus having been disclosed, its operation will now be seen to be, as follows:

The fluid 11 provides for an intimate heat exchange between the tube 10 and the belt 6. The packages to be refrigerated are floated on the liquid 4 and are pressed thereby into firm contact with the belt 6. The belt 6, in its movement, thus carries the packages through the refrigerating chamber. The liquid 4 and the liquid 12 provide for a heat exchange between the tube 3 and the package, while the liquid 11 serves to provide an intimate heat exchange between the article 5 and the tube 10 through the belt 6. The proportions of the fluids 4 and 12 are so arranged as to provide the necessary degree of flotation and to insure the rise of the lighter fluid 12 around the walls of the packages.

It will be seen that I have provided a novel type of carrier means and a novel means for providing an intimate thermal bond between my refrigerating tubes and the articles to be frozen.

5 In the modification shown in Figure 3, I have shown the tubes 3 as substantially U-shaped, to provide for a greater amount of contact of the liquid with the walls of the tube. It is to be understood that the space between the belt and the tube is not to be greatly in excess of that of the package to be frozen, sufficient space being left to provide for the necessary fluid for at least partial flotation.

At 6a I have disclosed protuberances on the belt 6 to engage the articles and force the same through the chamber, in the event of any stoppage which might occur.

Having thus described my invention, I claim:

1. In a refrigeration apparatus, means to submerge an article and propel the same through a refrigerated fluid, means for refrigerating said fluid and separate means for refrigerating said propelling means.

2. In a refrigeration apparatus, a carrier for progressively conducting a plurality of articles to be refrigerated through said apparatus, means for refrigerating said articles; and separate means for refrigerating said carrier said means being separate from that refrigerating said articles.

3. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier and means separate from that refrigerating said article for refrigerating said carrier.

4. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier, and means for refrigerating said carrier.

5. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid of high heat conductive properties providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier and means separately refrigerating said carrier.

6. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid of high specific gravity and of high heat conductive properties providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier and means separately refrigerating said carrier.

7. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid of high heat conductive properties providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier, and means for refrigerating said carrier.

8. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid of high specific gravity and high heat conductive properties providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier, and means for refrigerating said carrier.

9. In a refrigeration apparatus, a refrigerating chamber, means for conducting refrigerant into said chamber, a fluid of high specific gravity and high heat conductive properties providing flotation means for the articles to be refrigerated, a carrier for conveying the said articles through said chamber, said fluid forcing said articles into operative contact with said carrier, and means for refrigerating said carrier, said last named means including a refrigeration device and a fluid means providing heat exchange contact between said device and said carrier.

10. In a refrigeration apparatus, a refrigeration chamber comprised of upper and lower members of heat insulation material, a refrigeration tube in each of said members, a carrier for progressively feeding articles to be refrigerated through said apparatus, fluid means in said lower member contacting with one of said tubes and of such specific gravity as to float the said articles and force the same into operative contact with said carrier.

11. In a refrigeration apparatus, a refrigeration chamber comprised of upper and lower members of heat insulation material, a refrigeration tube in each of said members, a carrier for progressively feeding articles to be refrigerated through said apparatus, fluid means in said lower member contacting with one of said tubes and of such specific gravity as to float the said articles and force the same into operative contact with said carrier, and fluid means carried by said carrier and contacting with the other of said tubes.

12. In a refrigeration apparatus, a refrigeration chamber comprised of upper and lower members of heat insulation material, a refrigeration tube in each of said members, a carrier for progressively feeding articles to be refrigerated through said apparatus, and substantially static fluid means providing for heat exchange between said tubes and said articles.

13. In a refrigeration apparatus, a refrigeration chamber comprised of upper and lower members of heat insulation material, a refrigeration tube in each of said members, a carrier for progressively feeding articles to be refrigerated through said apparatus, and substantially static fluid means in said lower member contacting with one of said tubes and of such specific gravity as to float the said articles and force the same into operative contact with said carrier.

14. In a refrigeration apparatus, a refrigeration chamber comprised of upper and lower members of heat insulation material, a refrigeration tube in each of said members, a carrier for progressively feeding articles to be refrigerated through said apparatus, substantially static fluid means in said lower member contacting with one of said tubes and of such specific gravity as to float the said articles and force the same into operative contact with said carrier, and fluid means carried by said carrier and contacting with the other of said tubes.