

April 15, 1941.

M. J. ULINE

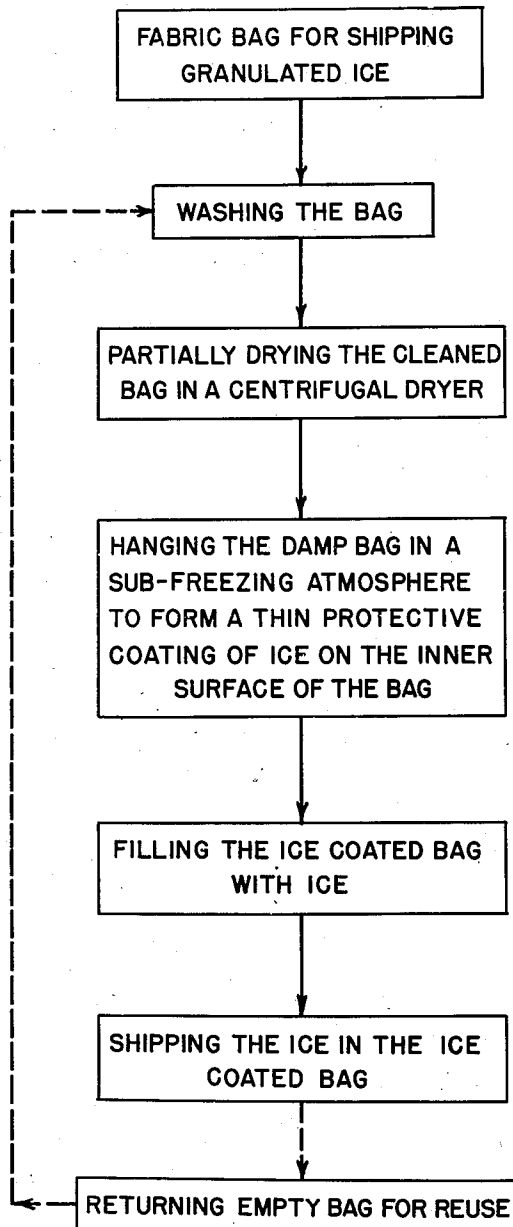
2,238,512

METHOD OF REFRIGERATION

Filed Jan. 27, 1940

2 Sheets-Sheet 1

FIG. 1.



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2 Sheets-Sheet 2

FIG. 2.

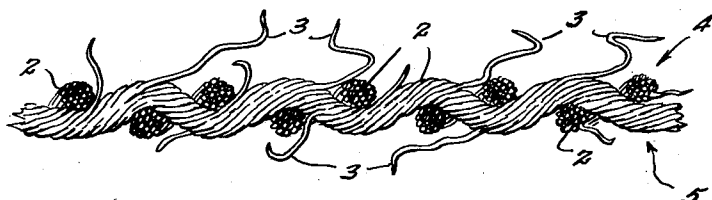


FIG. 3.

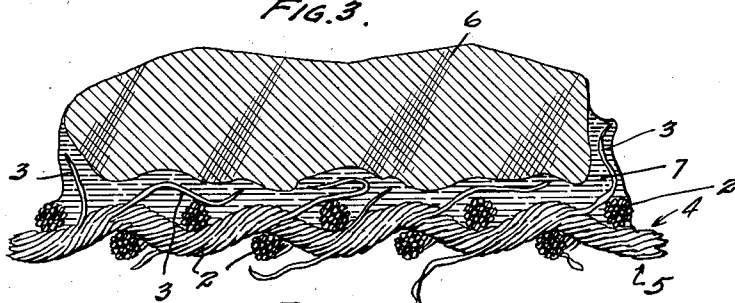


FIG. 4.

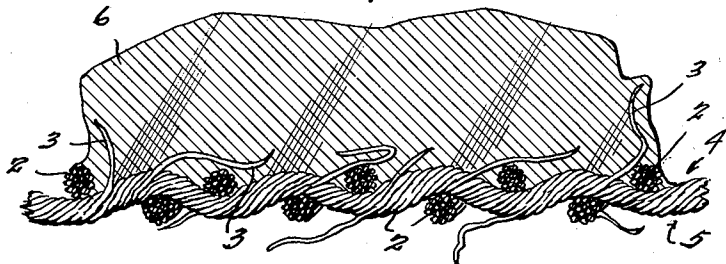
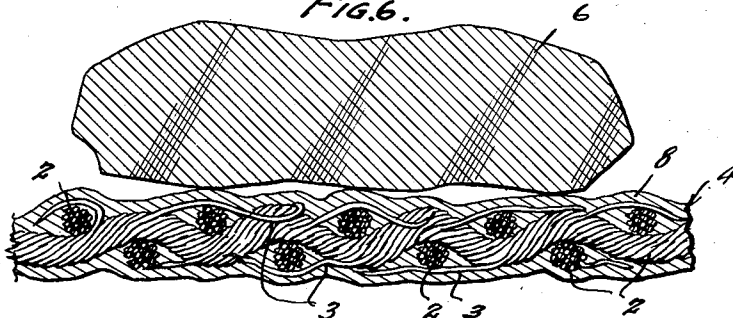


FIG. 5.



FIG. 6.



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UNITED STATES PATENT OFFICE

2,238,512

METHOD OF REFRIGERATION

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a corporation of Maryland

Application January 27, 1940, Serial No. 316,057

5 Claims. (Cl. 62-170)

My invention relates to a method of refrigeration and to a shipping container, which method and container are adapted to ship frozen products.

The method has particular utility in the shipping of ice in containers, but other frozen products may similarly be shipped.

The method is adaptable for shipping frozen products, such as, ice in heavy containers, as well as light containers. In certain aspects there are great economies to be effected in shipping ice in light fabric containers though the process is not limited to the use of this type of container solely.

Where heavy containers such as heavy canvas fabric containers are used to ship ice, ordinarily the container is built with a metallic bottom. The containers often are large enough to contain approximately 110 pounds of ice, and the loss or destruction of such containers, or their becoming unfit for use, constitutes a considerable economic loss to the shipper. Such containers are sometimes used by the recipient consignee for many purposes such as for holding stale bread, garbage, or carrying fish on fishing trips. Thereafter the containers are rendered unfit for use and the ice shipped in them thereafter becomes contaminated.

One use of the present method and product is to permit light fabric bags to be employed for shipping the ice. The ice may be any of the various sizes such as rice, chestnut, nut, egg, coarse crushed, fine crushed or cubes. Where light fabric containers, such as empty salt bags, are employed, the cost of the containers is relatively small. The bags can be filled and tied with a wire tie which is easily and cheaply fixed in place. Even if the bags are destroyed by the consignee, there is no great economic loss incurred. However, the bags can be returned to the shipper thoroughly washed and cleansed and reused. The light fabric bags lend themselves to a thorough cleansing operation and are thus reconditioned for reuse in aseptic condition.

In general, my method consists in covering the interior surface of the container with a coating of ice to prevent the ice being shipped from adhering to the container. This may be accomplished by dampening the container such as, light fabric, and freezing the thus dampened fabric container. Where containers are sent back to the shipper, they may be thoroughly washed and sterilized, partially dried and then frozen in the damp condition. There is formed on the interior of the container a protective

layer of ice. This prevents lint ravelings and the loose threads of the fabric from freezing to the ice which is being shipped. A two-fold advantage is accomplished—first, the ice shipped does not have imbedded in it this foreign matter which causes the ice to be unfit for many uses, and secondly, the bags themselves have their life prolonged by not being subjected to the wear occasioned by having their interior stripped of loose threads or fibers in each shipping operation.

An object of the invention is to provide a container which will prevent deleterious adherence of the frozen product such as ice to the interior of the container during shipment.

Another object of the invention is to provide a process of shipping ice and other frozen products which is simple, inexpensive, efficient and which delivers the ice or frozen products in condition for use without adversely affecting their desirable characteristics.

Other objects will be apparent from the ensuing description, in which

Figure 1 is a flow sheet showing one form of my process.

Figure 2 is a cross sectional view taken through a dry fabric wall of a fragment of a shipping container.

Figure 3 is a view similar to Figure 2 showing how ice melts on coming in contact with the fabric.

Figure 4 is a view similar to Figure 3 showing the condition of the fabric threads and of the ice after the ice has frozen to the interior surface of the container.

Figure 5 is a cross sectional view of my improved container showing the loose fibers matted to the fabric threads and covered with a sheeting of ice.

Figure 6 shows how the ice rests against the frozen interior surface of the fabric container depicted in Figure 5.

Fabric bags, such as salt bags of light material, are washed and thoroughly cleansed and may even be sterilized. These bags are then taken from the washing machine and partially dried in, for instance, a centrifugal drier, such as is used in laundries for partially drying garments.

The damp bags are then stored at a freezing temperature so that the moisture in the bags and especially on the interior surface thereof, is congealed. The bags may be hung in a sub-freezing atmosphere, and a thin protective coating of ice is formed on the inner surface of the bags. The bags thus coated with a thin coating of ice are

filled with the ice which the shipper desires to place in them, such as various types of small ice, as, rice, chestnut, nut, egg, coarse crushed, fine crushed, or cubes.

The bags are then shipped to the user, emptied, and may be returned for reuse passing through the same cycle just described.

Referring to Figures 2 and 6, it will be apparent from an inspection of Figure 2 that a dry fabric will have free ends of fibers on its surface. I have shown an enlarged cross sectional view of a bag in Figure 2 in which the threads of the fabric are indicated by the numeral 2, and the loose fibers composing the threads by the numeral 3. The surface of the bag indicated by the numeral 4 is the interior of the bag, the surface of the bag indicated by the numeral 5 is the exterior of the bag.

Referring particularly to Figure 3, it will be seen that when a piece of ice 6 contacts the inner surface 4 of the untreated bag, the bag gives off heat and causes water 7 to form on the surface of the ice 6 in contact with the bag. By reason of capillary action, the loose threads 3 are drawn up against the adjacent surface of the ice 6, and if the interior of the bag again reaches freezing temperature, are frozen in place as indicated in Figure 4.

Because the fabric of which the bags are made has poor heat conducting qualities, and because the ice 6 is considerably below a freezing temperature, it will absorb the heat of the water 7 containing the fiber ends 3, causing them to adhere to the ice 6. The bag itself will have its temperature reduced to approximately the temperature of the ice 6 and maintain this temperature over a considerable period of time. This condition is shown in Figure 4 where the fiber ends and other loose material 3 are frozen in place in the piece of ice 6. When the ice is shipped and taken from the bag, the pieces of ice 6 frozen to the bag will carry with them the fibers 3, thus injuring the bag and rendering the ice unfit for certain uses.

As opposed to this, the condition of a bag which has been frozen when damp is shown in Figure 5. Here the inner surface 4 of the bag is covered with a protective layer of ice 8. By reason of capillary action and liquid surface tension, the loose particles 3 are matted down

against the inner surface 4 of the bag and there is less tendency for them to adhere to a lump of ice 6 which is placed in contact with them as shown in Figure 6. If excessive pressure is not brought against the ice 6 in contact with the inner surface 4 of the bag depicted in Figure 6, there will be no objectionable sticking of the piece of ice 6 to the inner surface 4 of the bag. The danger of loose threads being imbedded in the ice 6 and being torn away with the removal of the piece 6 when the contents of the bag are removed by the consignee is greatly minimized by the process which I have described.

I desire that my invention be limited only by the scope of the appended claims and the showing of the prior art.

I claim:

1. In the shipping of ice, the method of washing a flexible container, then partially drying the container, then freezing the damp container to form on the inner surface protective ice crystals, then filling the thus treated container while still having the protective ice crystals on its inner surface with ice for shipment.

2. In the shipping of ice, the method of washing a flexible container, freezing the dampened container to form on the inner surface protective ice crystals and then filling the thus treated container while still having the protective ice crystals on its inner surface for ice shipment.

3. In the shipping of frozen material, the method of freezing a damp flexible container to form on the inner surface protective ice crystals, and then filling for shipment the thus treated container while still having the protective ice crystals on its inner surface.

4. In the shipping of ice, the method of freezing a dampened flexible container to form on the inner surface protective ice crystals, and then filling the thus treated container while still having the protective ice crystals on its inner surface for ice shipment.

5. In the shipping of ice, the method of dampening a flexible container, freezing the dampened container to form on the inner surface protective ice crystals, and then filling the container while still having the protective ice crystals on its inner surface for ice shipment.

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