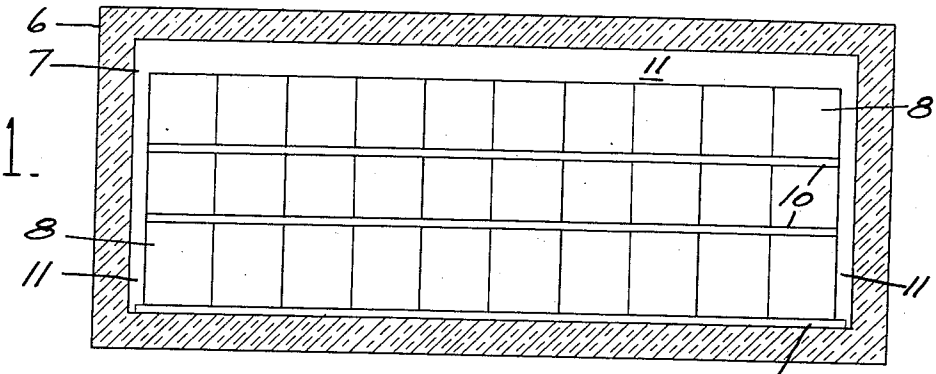
July 19, 1938. F. W. BRADY 2,123,878

METHOD FOR ICING CONTAINERS

Filed Aug. 31, 1932

FIG. 1.



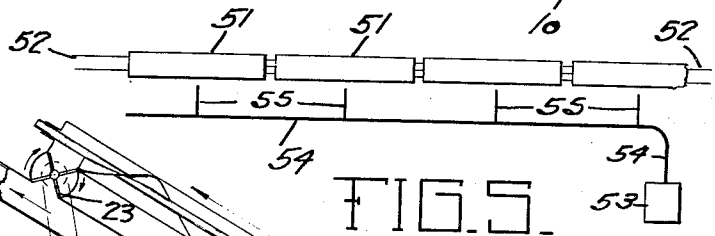


FIG. 5.

FIG. 2.

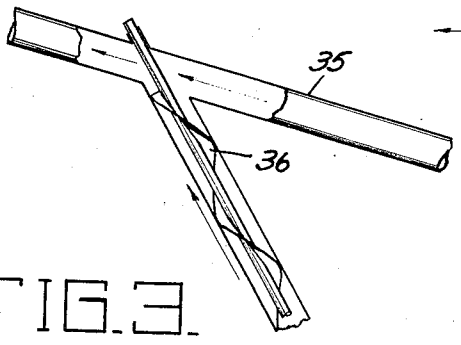


FIG. 3.

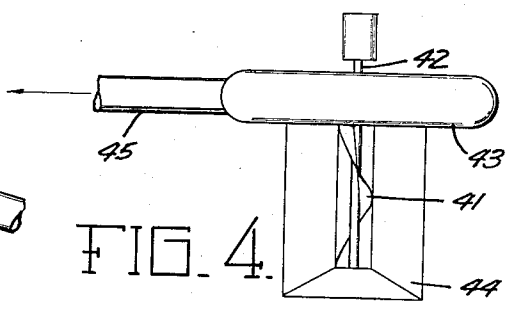


FIG. 4.

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METHOD FOR ICING CONTAINERS

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3 Claims. (Cl. 62—1)

This invention relates to a method of icing containers for products to be refrigerated. Such containers include refrigerator trucks, refrigerator cars and other receptacles for products.

The present practice of refrigerating containers involves the use of special cars and trucks having bunkers for ice. In a shipment of products across the Continent, according to the present practice, reicing is necessary at various points, as many as four icings being required. By my invention the necessity of reicings is obviated and the total quantity of ice required for a shipment is reduced, although a slightly greater quantity is used initially. Further, my invention reduces the hazard of shipping perishable commodities, particularly fresh vegetables, since a more thorough and effective refrigeration is secured. With present icing methods, and the large number of reicings required, a delay in reicing usually proves disastrous and spoilage losses are considerable. My invention enables the commodities to be refrigerated in such a manner that reicings are unnecessary usually while the refrigeration is more effective, less ice per ton mile of commodity refrigerated being required over a given shipping route under the same conditions.

In practicing my invention I utilize a refrigerant material such as water ice, in the form of relatively small pieces. The ice particles are placed in and around the commodities shipped and between the commodities and the interior surfaces of the shipping container. The ice particles freeze and the commodities are thus in effect shielded from the relatively hot exterior atmosphere about the container by an intervening wall of ice.

The intervening ice wall is formed and placed by conducting the ice in the form of fine particles into the spaces about and between the packages of commodities and the container and then allowing the particles to freeze together. A solid ice wall is thus formed directly about the commodities. This wall is quickly placed and replenished when reicing is necessary.

While the ice can be placed directly with a shovel, or other manual tool means, I have found this method of operation slow and expensive. In addition, the men are apt to under-ice, due to the exertion required to ice thoroughly. Accordingly, I have devised mechanical means to carry the ice into place so that the only manual effort required of the operator is to direct the discharge of the stream of ice about and between the commodities in the container.

In connection with the handling of the ice particle stream, I have found it advantageous, if the ice stream is to be of a considerable length, twelve or fifteen feet or more, to mix the ice with a gas and conduct the mixed gas-ice stream to or adjacent to the point of discharge. A stream of ice particles alone is apt to freeze so that a solid mass if ice is being moved. If this mass does not clog in the conveying machine it at least is not as free flowing as compared to the stream of gas and ice. The power consumption is therefore greater.

In the drawing accompanying and forming a part of this specification, I have shown, more or less diagrammatically, several forms of apparatus which can successfully be used to practice my invention and to attain the foregoing objects and advantages as well as those which will appear in the following wherein the details of operation of the process and apparatus are set forth in accordance with my present preference.

In said drawing, Figure 1 is a diagrammatic section through a shipping container.

Figure 2 is a diagrammatic view partly in section of a form of apparatus successfully employed.

Figures 3 and 4 are showings of other apparatus.

Figure 5 is a diagrammatic showing of an icing system.

In Figure 1, I have shown a shipping container 6 having an insulated interior 7 wherein products 8 can be placed through suitable openings. This container can be of any size; thus, it can be the body of a refrigerated railway car, a refrigerated truck body, a stationary storage container or other container used for the refrigeration of products.

The container is usually nearly filled with products and then the crushed ice, pieces of about an inch in size, the "snow-ice" of the trade, is placed about the products. Thus, in packing vegetables such as crated lettuce, the crates are placed in the container, the crates being spaced from each other by slats 10. Circulation of the atmosphere in the container can thus take place and the cold atmosphere can reach all parts of the products in the container from the ice sheath placed in space 11 and surrounding the products in the container.

To facilitate the icing operation, I have devised various apparatus. In the form shown in Figure 2, ice in finely divided form from an ice crusher (not shown) is discharged into hopper 21. From the hopper, screw conveyor 22 conveys the ice for discharge into a gas stream. As before mentioned a gas stream is employed in conjunc-

tion with the ice stream, the gas stream serving to keep the ice from freezing together and assisting in its transportation. The gas stream blowing over the fine ice produces an additional and rapid melting of ice which results in supercooling of ice. This hastens and enhances the freezing together of the ice when it is free of the gas and results in quick formation of the ice shield while the gas, which has been cooled during the period when it is conveying the ice, circulates to cool space remaining uniced as well as uniced products.

Adjacent the discharge of screw conveyor **22**, an auxiliary conveyor **23**, in the form of a paddle wheel, is placed to facilitate introduction of the ice into the gas stream by knocking ice down into the gas stream. The size of the column of ice in the screw conveyor is usually sufficient to prevent the gas from flowing back therethrough instead of carrying the ice.

The ice-gas stream passes into outlet tube **24** extending from the gas source. In the form shown this is an air blower **25**. Instead of air other gases can be used, such as SO_2, ethylene or CO_2, depending upon the product being handled and the treatment to which it is to be subjected. The air stream can also include some percentage of a product treatment gas or auxiliary gas, the icing and treatment or addition of the gas thus being carried on simultaneously.

From the outlet tube, the ice-gas stream passes into a flexible discharge conduit **26** fastened to the tube **24** by clamps **27**. The conduit is handled by the operator who directs the discharge therefrom about the products. In icing refrigerator cars the car is usually filled nearly to capacity, sufficient space being left for a man to manipulate the discharge nozzle within the refrigerator car at the doorway. The products are usually spaced from each other, to permit free circulation of the cold atmosphere, and from the top sides and ends of the car into which spaces the ice is discharged. The gas stream carries the ice into place where it quickly freezes into a solid sheet or wall since the ice is super-cooled by the gas stream.

The screw conveyor, paddle wheel and air blower are mounted on a small truck **28** so that they can be readily moved from car to car. An electric motor **29** and an auxiliary drive mechanism **31** are also mounted on the truck, the motor being supplied with power through an insulated, flexible cable. Chains **32** connect the drive mechanism **31** to the several units to rotate them at the desired speeds.

In the modification shown in Figure 3, the gas stream in tube **35** is directed across the discharge of screw conveyor **36**. The stream of gas picks off the ice as it is discharged and moves it along for discharge at the desired point. The air stream prevents freezing of the moving ice column in the conduit so that jamming is avoided.

In the modification shown in Figure 4, a screw conveyor **41** is included in shaft **42** of blower **43**. The conveyor, upon rotation of the blower, moves ice from hopper **44** into the blower while the blower discharges a stream of air and ice particles for discharge from conduit **45**.

It is to be noted that the apparatus shown in Figure 4 should be operated so as to mix ice and air and not sling out ice alone. This practice is more effective than throwing or slinging out ice alone with a blower. When only the latter practice is followed, not only is the pre-cooling effect lost, but the hose usually jams with ice which freezes solid therein. To avoid this, the conveyor **41** and hopper **44** should never be filled with ice so as to create an ice seal on blower **43**.

If desired, and if required, salt may be included with the ice so that the final mass is very cold. In place of ice other refrigerants can be used as solid CO_2. The term "ice" is used in the claims as including such other refrigerants or refrigerant mixtures and the term "air" refers generally to suitable gas conveying mediums.

In Figure 5, I have shown a system for icing a plurality of refrigerator cars **51** comprising a train standing on track **52**. The ice-air mixture is discharged into conduit **54** from apparatus **53** for producing such a mixture, usually an ice crusher discharging directly into an air blower outlet stream. The conduit **54** is placed parallel to the track. From this conduit outlets **55** extend for the icing of the individual cars comprising the train. In this way a simple and effective means is provided for transportation of the ice to the cars and for effectively placing the ice.

I claim:

1. The method of icing products in a container and of cooling unoccupied space in said container which comprises maintaining a confined flowing air stream, introducing into said air stream substantially continuously ice particles to be deposited in said container whereby said air is cooled and said ice is carried by said stream, directing said flowing but confined ice-air stream into said container, and releasing said confined ice-air stream in said container to deposit said ice and release said cooled air to cool unoccupied space in said container and uniced products therein.

2. The method of icing products in a container and of cooling unoccupied space in said container which comprises discharging ice particles into a confined, flowing air stream whereby the particles are conveyed and said air is cooled, and thereafter releasing said stream to deposit said conveyed ice particles in said space and about said products and to permit said cooled air to circulate to cool uniced products and unoccupied space.

3. The method of icing a container and of cooling unoccupied space in said container which comprises discharging ice particles into a confined, flowing air stream whereby said particles are conveyed and said air is cooled, and thereafter releasing said stream in said container to deposit said conveyed ice particles in unoccupied space in said container and to permit said cooled air to circulate to cool uniced and unoccupied space.

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