June 2, 1953 D. E. MYERS 2,640,328

CAR AND PRODUCE CHILLING SYSTEM

Filed Feb. 12, 1952

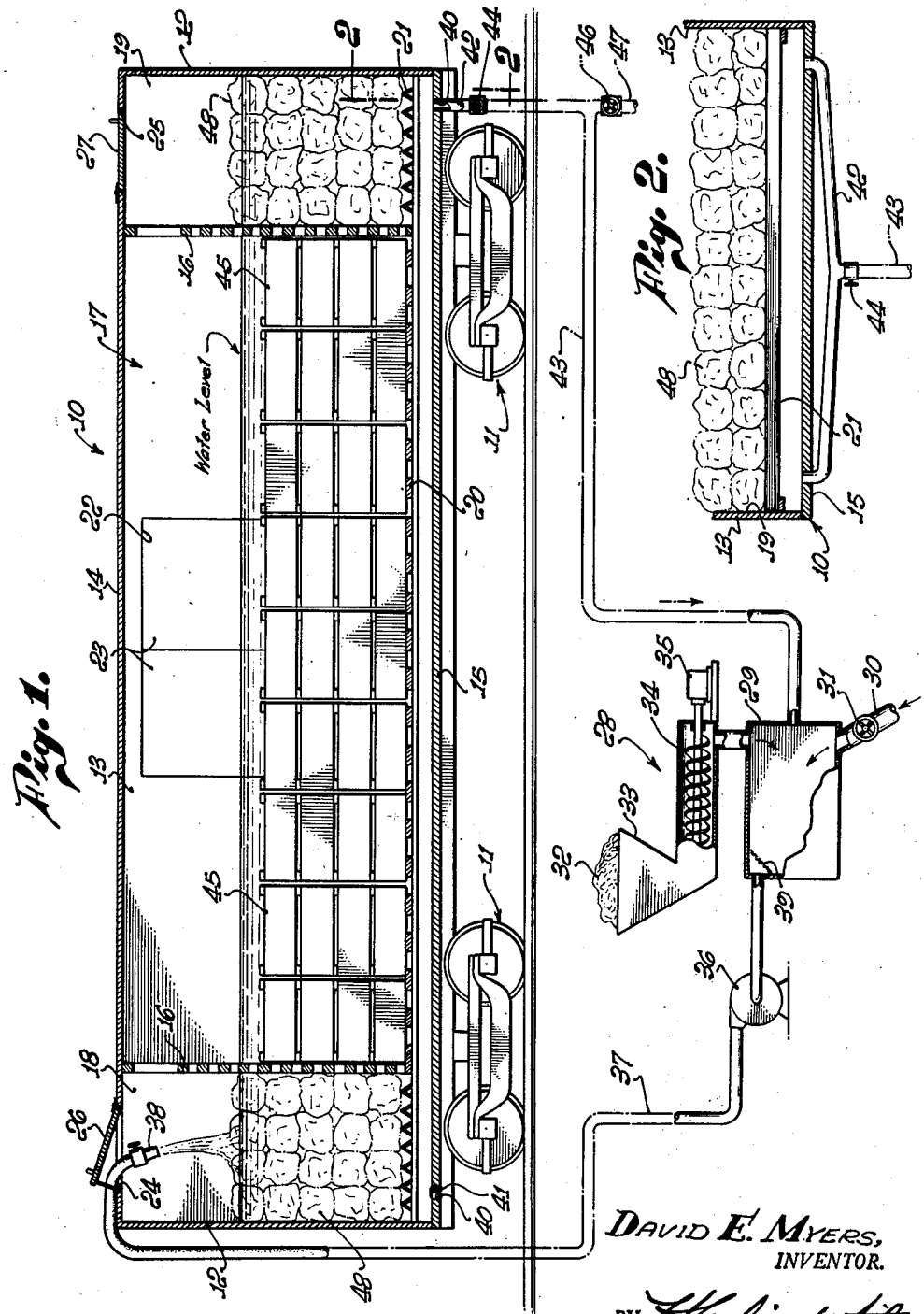

Fig. 1.

Fig. 2.

DAVID E. MYERS,
INVENTOR.

BY Hoskins White

ATTORNEY.

Patented June 2, 1953

2,640,328

UNITED STATES PATENT OFFICE

2,640,328

CAR AND PRODUCE CHILLING SYSTEM

David E. Myers, Shell Beach, Calif.

Application February 12, 1952, Serial No. 271,093

8 Claims. (Cl. 62—19)

1

This invention relates to improved methods and apparatus for refrigerating railroad car loads of boxed produce, and is particularly concerned with the prechilling of such loads in preparation for the usual refrigeration in transit.

In the shipment by rail of produce requiring refrigeration, it is customary to employ a type of box car containing a main load receiving compartment and a pair of smaller refrigerant compartments or ice bunkers at its opposite ends. To minimize the refrigeration requirements in transit, the produce is usually prechilled in a manner initially reducing its temperature to or near the refrigeration temperature. Such prechilling is often accomplished by cooling of the individual produce containing boxes before they are loaded into the railroad car.

An important object of the present invention is to provide improved prechilling methods and apparatus which serve to initially cool both the produce and the car, and which do so in a manner minimizing their reheating before closure and sealing of the car for travel. As will appear, these results are achieved by first loading the boxed produce into the car without precooling, and then introducing cold water into the car in amounts to completely immerse the produce, and thus thoroughly chill both the produce and car. As will appear, the water is introduced into the car at a first location, and then withdrawn at a location offset longitudinally of the car from its point of introduction, so that the cooling water is circulated longitudinally of the car and through the load. The cooling effect may be maximized by first filling the car to a desired level and then, while maintaining the car filled to that level, creating a circulation of the water along a closed path extending longitudinally through the car and through a water-cooling refrigeration unit at the outside of the car. After the produce and car temperature have been lowered by this circulation to a predetermined value, the water may be drained from the car, ice filled into the bunkers, and the car sealed for travel. Thus, there is little opportunity for reheating of the car and produce before the car is sealed.

To attain a most effective circulation of water longitudinally through the car, the water is preferably introduced into the car through one of the end ice bunkers, and is then withdrawn through the drain connection of the other bunker. A circulating pump is provided for pumping water through an external refrigerating unit into the first bunkers, and is adapted to selectively take

2

suction from either an external source of water (for initial filling of the car), or the car discharge line from the opposite bunker (for circulation after the filling operation).

The above and other features and objects of the present invention will be better understood from the following detailed description of the typical embodiment illustrated in the accompanying drawing, in which:

Fig. 1 is a view showing a railroad car prechilling system embodying the invention, the car being shown in longitudinal section and the prechilling equipment being represented schematically; and

Fig. 2 is a fragmentary transverse section through the drain portion of the Fig. 1 car and taken on line 2—2 of that figure.

In Fig. 1, I have shown at 10 a conventional elongated refrigerated box car, having the usual wheel assemblies 11, end walls 12, side walls 13, and top and bottom walls 14 and 15. The interior of the car 10 is divided by a pair of preferably slatted transverse partitions 16 into a main relatively long load-receiving compartment 17 and a pair of smaller end compartments or bunkers 18 and 19 for receiving ice to refrigerate the load in transit. Main compartment 17 has the usual slatted floor 20 spaced above the bottom wall 15 of the car, and ice bunkers 18 and 19 may have similarly elevated ice supporting and discontinuous floors formed by a number of spaced parallel ice supporting angle irons 21. Access may be had to the main compartment 17 through openings 22 in the side walls of the car, which openings are closed by doors 23. The ice bunkers 18 and 19 are accessible through a pair of top openings 24 and 25 closed by doors 26 and 27.

The precooling apparatus of the present invention includes a water chilling unit 28, having a cooling chamber 29 through which water passes before delivery to the car. Water may enter cooling chamber 29 through an inlet line 30 which communicates with a suitable source of water and is controlled by an inlet valve 31. As water passes through chamber 29, finely ground ice 32 is fed into it from a hopper 33 by a screw 34, which is driven in any suitable manner, as by a motor 35. The ice intimately mixes with and chills the inlet water, which in its cooled condition is withdrawn from the chamber by a pump 36, and then forced through flexible hose 37 and a carried valve controlled outlet nozzle 38 into one of the end ice bunkers 18 of the car. As indicated in Fig. 1, hose 37 is positioned for

filling the car by merely inserting its nozzle end into the bunker 18 through its upper access opening 24. To prevent the passage of ice from the cooling chamber to the pump and car, the cooling chamber may contain a screen 39 extending across the outlet leading to the pump.

In refrigerated cars of the type illustrated, it is customary to provide a number of drain outlet openings in the bottom 15 of the car, there usually being four such outlet openings 40 located near the four corners respectively of the car and beneath the ice bunkers 18 and 19. When a car load is being chilled in accordance with the present invention, it is desirable to circulate the cooling water longitudinally through the car; and therefore the drain openings 40, beneath the bunker 18 into which the water is filled, are closed against water discharge, as by a pair of closure plugs 41. The water is thus required to leave the car through the drain openings 40 at its opposite end, into which are connected a Y-fitting 42 leading into a conduit 43 which conducts water from the car back to the cooling chamber 29. The discharge of water from the car through fitting 42 and conduit 43 may be closed off by a valve 44 connected into the fitting.

In preparing a car for travel in accordance with the present invention, the produce containing boxes 45 are first progressively loaded into the car compartment 17 through its side opening 22 until a desired load has been assembled. The side doors of the car are then closed, hose 37 and its nozzle 38 are inserted into one of the ice bunkers 18 and a drain fitting 42 is connected into the drain outlets beneath the opposite bunker 19. For initial filling of the car, valve 44 is closed to prevent the drainage of water from the car, and valve 31 is opened to admit water from a supply into cooling chamber 29. The nozzle valve 38 of filling hose 37 is of course opened to admit water into the car

With the valves in this condition, ice is filled into hopper 33, and the ice feeding motor 35 and pump 36 are placed in operation. The pump then acts to draw water through inlet 30 and cooling chamber 29 and to discharge it through hose 37 into ice bunker 18. As the water is drawn through the cooling chamber, the ice fed into the chamber by screw 34 thoroughly chills the water. The valves are maintained in their filling condition until the water within the car rises to a level completely immersing the boxed produce load, so that heat may be transmitted directly from the boxes and produce of the load to the water. When the water has reached such an immersing level, as for instance that shown in Fig. 1, valve 44 is opened and valve 31 is closed, so that the pump and cooling chamber take their suction from the car through fitting 42 and conduit 43, rather than through inlet 30 leading from the external water supply. Thereafter, the operation of pump 36 acts to maintain a continuous circulation of cooling water from the cooling chamber 29 through hose 37 into bunker 18, then longitudinally through the car and produce to outlet fitting 42, and finally through conduit 43 back to the cooling chamber. During such circulation, the chilled water thoroughly cools the produce, boxes, and car walls, while the cooling unit 28 at the same time acts to continuously cool the water. The circulation is continued for a period sufficient to reduce the load and car temperatures to desired values, after which the motor 35 and pump 36 are stopped, and the water is drained from the car by opening of a drain valve 46 in a drain spout 47 leading from conduit 43. After the car has been completely drained, hose 37, drain plugs 41 and Y-fitting 42 are disconnected from the car, ice 48 is filled into bunkers 18 and 19, and the bunker doors 26 and 27 are closed, so that the ice acts to maintain the low temperature of the air and load within the car in transit.

I claim:

1. The method of precooling an elongated railroad box car and a contained boxed produce load that comprises filling cold water into said car at a location near a first end thereof and to a level immersing said load, and withdrawing said water from the car at the second end thereof to create a circulation of cooling water longitudinally within the car.

2. The method of precooling an elongated railroad box car and a contained boxed produce load that comprises filling cold water into said car to a level immersing said load, creating a circulation of said water along a closed path extending first longitudinally within the car and then along a return course at the outside of the car, refrigerating said circulating water at the outside of the car, and finally draining said water from the car.

3. The method of precooling a railroad box car having an elongated main compartment containing a boxed produce load and having a communicating end refrigerant compartment, that comprises filling cold water into the car through said refrigerant compartment and to a level immersing said produce, and then draining the water from the car.

4. The method of precooling a railroad car having a main compartment containing a boxed produce load and having refrigerant bunkers at opposite ends communicating with said main compartment, that comprises filling cold water into said car through one of said bunkers and to a level immersing said load, creating a circulation of said water along a closed path extending longitudinally of the car from said one bunker to the second, and then along a return course at the outside of the car back to said one bunker, refrigerating said circulating water at the outside of the car, and then draining said water from the car at said second bunker.

5. The method of precooling an elongated railroad box car and a contained boxed produce load that comprises filling cold water into said car to a level immersing said load, draining said water from the car, and then refrigerating the air remaining in said car by means other than said water.

6. The method of loading a railroad refrigerator car having a main compartment and an end ice bunker that comprises progressively filling boxes of produce into said main compartment to form a load, filling cold water into the car to a level immersing and chilling said produce, draining said water from the car, and then filling ice into said bunker to maintain the produce is said chilled condition.

7. The combination comprising a railroad car containing a main compartment adapted to receive a boxed produce load and containing a pair of ice bunkers at opposite ends and communicating with said main compartment, a refrigerating unit at the outside of said car adapted to cool water to be fed to the car, conduit means directing cold water from said unit into one of said ice bunkers to flow therefrom through the main compartment and into

the other ice bunker, said car having drain outlet means at the bottom of each of said bunkers, means closing the drain means at the bottom of said one bunker, second conduit means leading from the drain means at the bottom of said other bunker to said refrigerating unit to permit a continuous circulation of water through said conduit means and unit and longitudinally through the car, valve means in said conduit means for closing off drainage from the car and causing said cold water to accumulate in the car to a level immersing and chilling the boxed produce, means for placing said unit in communication with a supply of water to receive water therefrom when said valve means are closed, and a pump connected into one of said

conduit means for pumping water through said unit and conduit means and into the car.

8. The combination recited in claim 7, in which said car has access openings in a top wall of said bunkers, and in which said first conduit means include a flexible hose extending through one of said access openings into said one bunker.

DAVID E. MYERS.

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