April 29, 1941. A. Y. PREBLE 2,240,377

APPARATUS FOR PRECOOLING FREIGHT CARS

Filed Aug. 11, 1939

Fig. 1

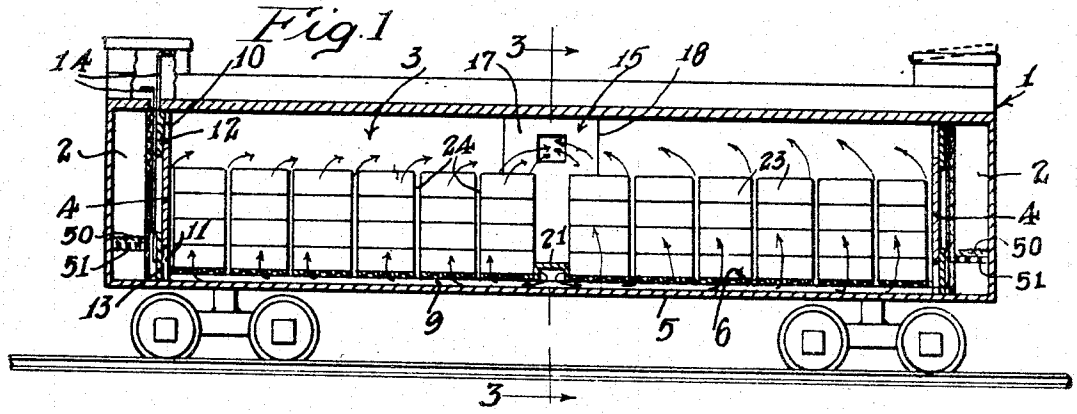


Fig. 2

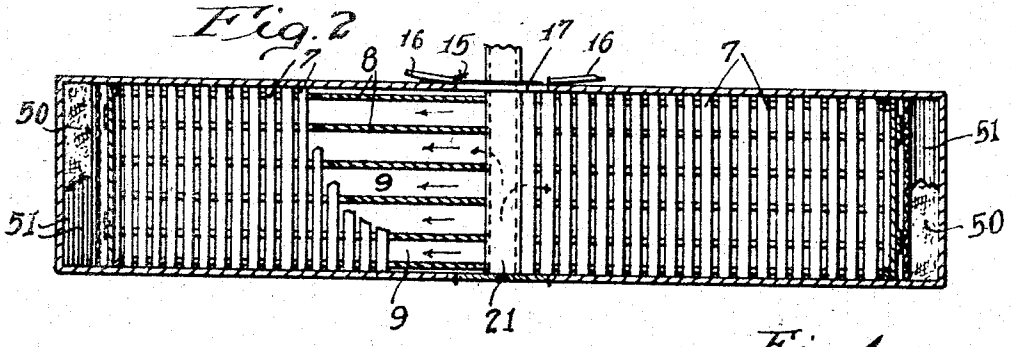


Fig. 4

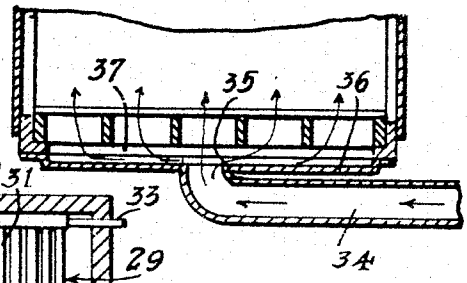
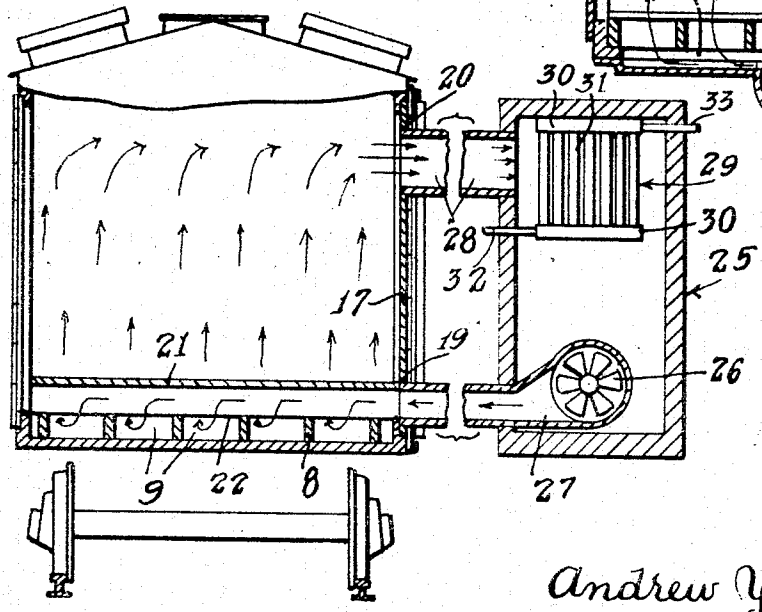


Fig. 3



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APPARATUS FOR PRECOOLING FREIGHT CARS

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4 Claims. (Cl. 62—24)

This invention relates generally to the refrigeration of freight cars containing shipments of perishable goods, and the invention is particularly concerned with apparatus for effecting the precooling of the air in the car before it departs.

It is the present practice to provide an ice bunker in each end of freight cars that are shipped long distances, such as from the west coast to the east coast, and while the car is in transit the circulation of air from the bunkers is maintained usually mereby by reason of the different specific gravity of the cold air and the warmer air in the freight space, circulating openings being provided in the ice bunkers near their upper portions and near their lower portions. The refrigeration of cars by this means has not been generally satisfactory, because it is usually impossible to have the cars pass through their complete journey without being re-iced. The re-icing of the cars may involve an expense of $100.00 for each car. One of the reasons why the second icing is necessary, is that by methods now in use it is not possible to efficiently replace all of the air in the freight chamber, with cool air.

One of the objects of this invention is to provide simple apparatus for enabling a thorough precooling of the freight chamber of the car, to be effected before the car departs.

The invention may be applied to any type of carrier or car having an ice bunker, but it is particularly applicable to a type of freight car that has come into extensive use, and which involves the use of a false bottom in the form of a grating on which the freight is placed. Heretofore the false bottoms referred to, have functioned to facilitate the circulation of the cooling air from the ice chambers through the interior of the car. In accordance with my invention, I can utilize the false bottom and longitudinal ducts under the same, to facilitate the thorough precooling of the freight chamber within the car.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient apparatus for precooling freight cars.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a longitudinal section through a freight car, illustrating the apparatus and my method of effecting the precooling. This view shows a car as partially filled with crates of goods.

Fig. 2 is a horizontal section through the freight car above the false bottom, but this view shows a portion of the false bottom broken away with longitudinal ducts under the false bottom indicated with end walls in cross-section.

Fig. 3 is a vertical section taken about on the line 3—3 of Fig. 1 upon an enlarged scale, a portion of the car end being shown in elevation, and certain parts being broken away. This view illustrates an embodiment of the invention in which the cooling gas or air is forced through a temporary door set up in the door frame.

Fig. 4 is a vertical section illustrating parts such as those shown in the lower portion of Fig. 3, but illustrating another embodiment of the invention in which the cooling gas or air is passed up through the bottom of the car instead of being forced through a temporary car door.

Referring more particularly to the parts, 1 indicates a freight car body of any suitable construction, illustrated as provided with ice bunkers 2 at each end, said bunkers being separated from the freight space 3 of the car by partitions 4. The entire outer wall of the car should be of course effectively insulated, although such insulation is not illustrated in the drawing. The car illustrated is constructed with a bottom 5 and a false bottom 6 forming a grating, and preferably composed of a plurality of transverse slats 7 laid upon longitudinal stringers 8. These stringers 8 are disposed apart so as to form a plurality of longitudinal ducts extending along under the false bottom toward the ends of the car. The partitions 4 are provided with upper circulation openings 10 and lower circulation openings 11, which open from the freight chamber 3 into the ice bunkers. In accordance with my invention, when the car is being precooled, circulation through the ice bunkers is prevented, preferably by closing these communication openings 10 and 11 with doors 12 and 13, which may be in the form of sliding doors as shown, and provided with means such as bars 14 for controlling the same from the roof of the car; or by blocking circulation through the ice bunker in any other way. Then the bunker may be left empty and a blanket 50 spread over the top of the grating 51 which supports the ice.

In practice, I project a current of cooled air across the car and partially confine this current

above, and on its sides to insure that the air will move across the car and laterally from the main current toward the ends of the car. I prefer to effect the circulation through one of the doorways 15 of the car, usually located adjacent the middle of the car; and in order to accomplish this, I open the regular doors such as the doors 16 of the car, and employ a temporary door 17 that is clamped into place by any suitable means (not illustrated), and properly gasketed so as to make a substantially air-tight connection around the edge 18 of the doorway. This temporary door 17 is provided with an inlet opening 19 near its lower edge, and an outlet opening 20 near its upper edge. I also remove several of the cross slats 7 of the false bottom, that are located opposite the opening 19, and at this point I insert the air duct 21. This air duct is preferably of U-shape cross section so that it will confine a transverse current of cooling air on its upper side, and also on two opposite sides sufficiently to insure that some portion of the air will pass completely across the car. When the cooling gas or air is forced into the car, although it is directed across the car, the construction is such that it can pass longitudinally toward the ends of the car. In the present instance, this is effected by passing the air under the bottom edge 22 of each side of the duct 21, and in this way the air passes into the longitudinal ducts 9. The freight 23 is piled in banks with clearance spaces 24 between the banks. When the cooling air passes outwardly toward the ends of the car in the ducts 9, it passes up through these spaces 24, and also in any other spaces that may be left between the banks of crates or boxes in which the freight is held.

In practice, a cooling apparatus 25 is provided which, if desired, may be carried on a flat car on a track alongside of the track on which the freight car is standing. This apparatus includes circulating means such as a blower 26 connected by a flue or trunk 27, with the inlet 19 in the temporary door, and is also provided with an outlet duct 28 that is connected with the outlet 20 and enables the air or gas drawn out of the car to be circulated through a heat exchanger or air cooler 29. This air cooler may be of any suitable construction, and preferably involves the use of headers 30 connected by a plurality of tubes 31 through which brine or similar cooling fluid or liquid may be circulated by means of an inlet pipe 32 and an outlet pipe 33.

When the cooling gas or air is being circulated through the car being precooled, the doors 12 and 13 of the ice bunkers are maintained closed. This enables the cooling to be effected without affecting the quantity of ice in the ice bunkers, if they have been previously provided with ice. If the bunkers are empty, circulation therethrough may be prevented by a baffle, such as the blanket 50 in the bunker. In the latter event, the bunker is filled with ice after precooling has been completed.

It will be evident that in accordance with my invention, I am not restricted to forcing the cooling gas or air through the door, but I do prefer to force this cooling current into the car at its middle portion, and I confine the current above and on its sides sufficiently to enable the cooling gas or air to pass across the car, and longitudinally in the ducts 9.

In Fig. 4, I illustrate another embodiment of the invention in which the cooling air or gas is admitted through an inlet flue 34 that connects with an opening 35 in the car floor 36 and below the false bottom. In this case, the cooling air or gas passes as indicated by the arrows in Fig. 4, into the transverse duct 37, where it divides and passes in two currents toward the side walls of the car.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. In apparatus for effecting the precooling of a freight car having ice bunkers at its ends, the combination of partition walls at the ends of the car dividing the interior of the ice bunkers from the freight space within the car, said partitions having circulating openings therein through which air within the car may circulate when the car is enroute, means for closing said circulating openings, a grating forming a false bottom for the car on which the freight rests, a transverse duct located at the middle portion of the car constructed so as to permit cooling gas or air forced into the duct, to pass from the duct toward the ends of the car; and means for withdrawing the air from the upper portion of the car after the same has circulated through the interior of the car.

2. In apparatus for precooling an iced refrigerated car, the combination of a grating forming a false bottom in the car for supporting the freight within the car, a partition at each end of the car forming an ice compartment at each end, said partition having circulation openings therethrough through which air may circulate when the car is enroute, means for closing the said openings, a temporary car-door capable of fitting into the door of the car to form a closure therefor, a transverse duct of inverted U-form extending inwardly from the car-door and transversely to the car, said grating having longitudinal stringers under the same forming a plurality of longitudinal ducts for conducting the cooling air or gas toward the ends of the car, said temporary door having an inlet opening and an outlet opening therethrough, means for forcing cooling air or gas through the inlet opening, and means for withdrawing the same through the outlet opening.

3. In apparatus for effecting the precooling of a freight car having an ice bunker at its end with a wall separating the ice bunker from the interior of the car, said wall having circulating openings therein through which air within the car may circulate when the car is enroute, closures for temporarily closing said circulating openings while the interior of the car is being precooled, a grating forming a false bottom for the car on which the freight rests, a transverse duct located at the middle portion of the car, constructed so as to permit cooling gas or air forced into the duct to pass from the duct toward the end of the car, and means for withdrawing the air from the upper portion of the car after the same has circulated through the interior of the car.

4. In apparatus for precooling an iced refrigerating car, the combination of a grating forming a false bottom in the car for supporting the freight, said car having an ice bunker at each end with walls separating the same from the freight space within the car, said walls having circulation openings therethrough through which the air may circulate when the car is enroute, closures for temporarily closing the said openings while the interior of the car is being precooled, a temporary car door capable of fitting into the door of the car to form a closure therefor, a transverse

duct extending inwardly from the car door and transversely to the car for conducting the cooling air or gas across the car, said grating having longitudinal stringers under the same forming a plurality of longitudinal ducts communicating with said transverse duct for conducting the cooling air or gas within the car and longitudinally of the same, said temporary door having inlet and outlet openings therethrough; and means for forcing cooling air or gas through the inlet opening and for withdrawing the same through the outlet opening.

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