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A. Y. PREBLE

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METHOD AND APPARATUS FOR PRECOOLING FREIGHT CARS

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2 Sheets-Sheet 1

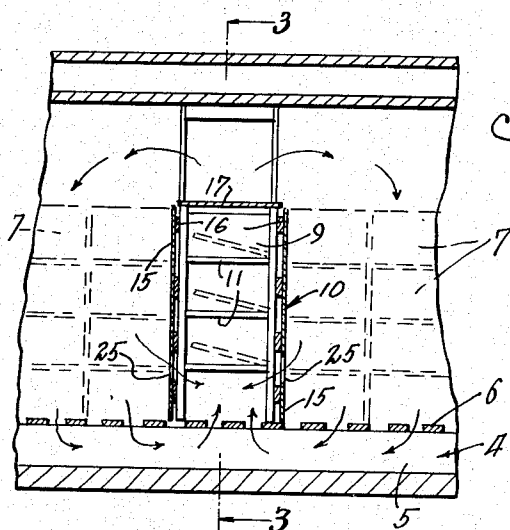
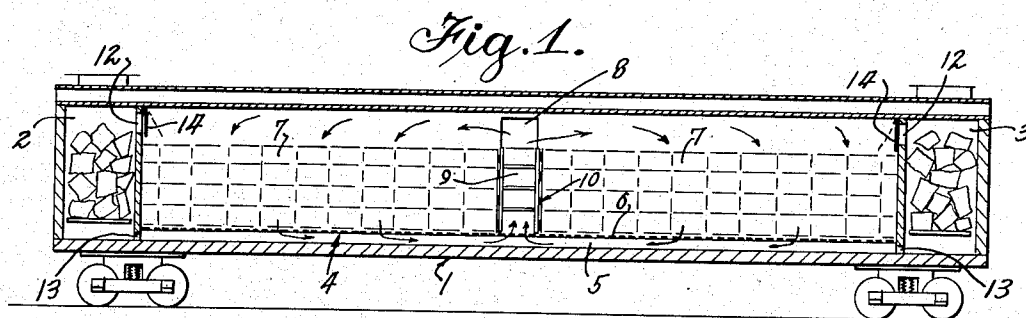
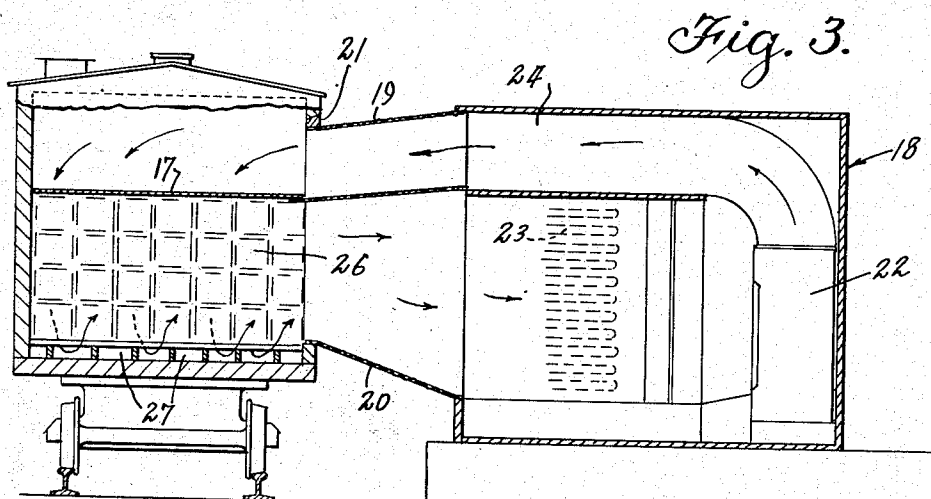
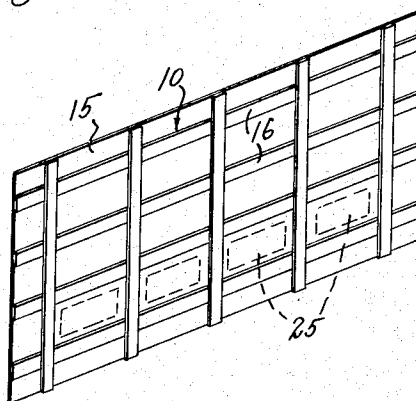


Fig. 2.

Fig. 4.



INVENTOR
Andrew Y. Preble
 BY *Lyon & Lyon*
 ATTORNEYS

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Fig. 5.

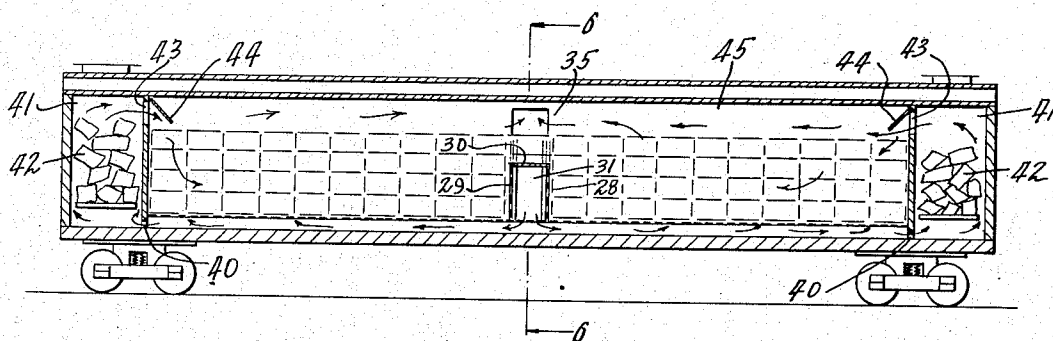
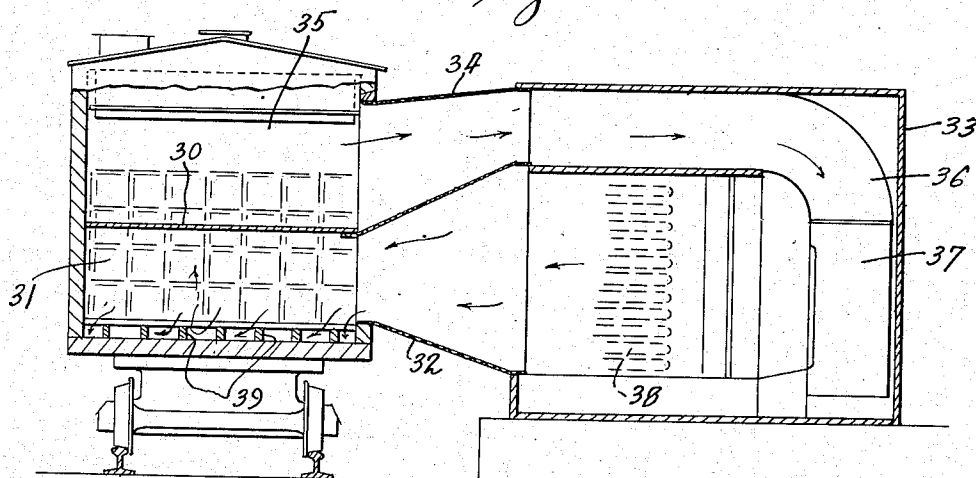


Fig. 6.



INVENTOR:
Andrew Y. Preble
BY
Lyon & Lyon
ATTORNEYS.

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METHOD AND APPARATUS FOR
PRECOOLING FREIGHT CARS

Andrew Y. Preble, El Centro, Calif.

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8 Claims. (Cl. 62—24)

This invention relates to a method and apparatus for precooling vehicles carrying freight, such as freight cars. It is the usual practice to provide an ice bunker in each end of the freight car, and to start the car on its trip with the bunkers full of ice. In very hot weather in trips across the continent, it is necessary to re-ice the bunkers, and this greatly increases the refrigerating costs.

One of the objects of the present invention is to provide a simple method and simple apparatus for facilitating a precooling of the car, that is to say, precooling a freight space to such an extent that the car can start on its trip without throwing the burden on the bunkers, of having to refrigerate any portions of the freight space down from a high temperature after the car has departed, the general purpose being to avoid the necessity for re-icing on the trip.

This improvement avoids the necessity for using any refrigerating machinery inside of the car, but provides simple means by circulation from the exterior to reduce the temperature of the freight space to a desired temperature.

Practically all the freight cars have bunkers in their ends, and a door on each side of the car at about its middle. The cargo is stored on each side of the "squeeze" or space between the doorways and between the two divisions of the cargo, one located toward the forward end of the car, and the other located toward the rear end. In order to prevent the load from shifting in the freight space, it is the present practice to employ gates built of lattice work, and these gates are held against the inner ends of the cargo at each side of the squeeze and braced in this position by struts set in position between the gates.

One of the objects of this invention is to provide a simple method for utilizing the squeeze space and the gates to facilitate the circulation of a cooling fluid such as air, through the freight space and through or between the crates of produce that constitute the cargo.

A further object of the invention is to provide a simple method for developing circulating ducts in the squeeze space between the provisions of cargo in a freight car, and to provide simple apparatus for effecting this.

Another object of my invention is to provide a simple method and apparatus for effecting the precooling without requiring the ice in the bunkers to assist in the precooling operation.

A further object of the invention is to provide a simple method and apparatus in which the ice

in the bunkers can be utilized to assist in the precooling operation.

Further objects of the invention will appear hereinafter.

The invention consists in the novel steps and features to be described hereinafter, all of which contribute to produce an efficient method and 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 drawings:

Fig. 1 is a longitudinal sectional view taken through a freight car and of a diagrammatic nature, illustrating the method and apparatus as employed where the cooling of the freight space is effected independently of the ice bunkers.

Fig. 2 is also a sectional view similar to Fig. 1, but upon an enlarged scale and showing only the middle portion of the car adjacent the doorways. This view particularly illustrates the means and apparatus employed for guiding the cooling fluid or air in precooling the cargo space.

Fig. 3 is a vertical section taken about on the line 3—3 of Fig. 2, and further illustrating the method and apparatus and the manner in which it is connected up to the cooling plant at the side of the track. In this view a portion of the end of the car is shown in elevation.

Fig. 4 is a perspective illustrating one of the gates employed at the squeeze, for bracing the cargo within the car, and illustrating how I adapt these gates to my purpose.

Fig. 5 is a vertical section through a freight car similar to Fig. 1, and illustrating one of the modifications of my method in which I utilize the ice bunkers to assist in effecting the precooling of the freight space.

Fig. 6 is a vertical section similar to Fig. 3, taken about on the line 6—6 of Fig. 5.

In Figs. 1 to 4 I illustrate my method and apparatus, in which the operation is such that the cargo space is cooled independently of the bunkers. Referring to these figures, 1 indicates the car body having ice bunkers 2 and 3 in its ends, and having a grid-form floor 4 composed of longitudinal stringers 5 laid on the car floor and supporting transverse slats 6 on which the freight or cargo such as crates 7 are placed. These crates are supposed to hold produce, and the crates are packed in rows and tiers on each side of the doorway 8 of the car, there being a tightly packed division of these crates on each side of the doorway. In the squeeze or space 9 opposite

the doorways and between the two divisions of the load, it is customary to provide gates 10 which are in the form of grills or gratings such as illustrated in Fig. 4, and composed of horizontal slats and vertical slats. These gates are put in place against the load, and short struts 11 are put in place between the gates and nailed in position. These struts 11 are put in place in an inclined position as indicated by the dotted lines, and are long enough so that when they are brought down to a horizontal position they will exert a squeeze or compression on the gates. The bunkers 2 and 3 are provided with the usual upper circulation openings or outlets 12 and similar bottom outlets or openings 13. These openings are preferably provided with shutters such as the shutters or covers 14 indicated on the upper outlets 12.

In accordance with my invention, I provide each of the gates 10 with a cover or sheet 15 of material such as cardboard, that is capable of cutting off flow of a fluid such as cold air. If desired, this cover 15 may be applied in the form of strips slid into position between the horizontal bars 16 of each gate, but as illustrated in Fig. 4, I have applied a sheet 15 to cover the entire area of the gate. When the areas of the gates have been covered in this way, I also provide a substantially horizontal dividing wall 17 which may be supported if desired, on the upper edges of the gates. This dividing wall is preferably at about the level of the upper rows or tiers of the cargo. With the interior of the car in this condition, the car is run into position opposite the precooling apparatus 18, which apparatus includes two flexible trunks 19 and 20, the ends of which are attached to a plug or false door 21 that is inserted in the doorway. The precooling apparatus 18 includes a blower or fan 22, and refrigeration coils indicated in dotted lines at 23. As illustrated in Fig. 3, the suction side of the blower 22 communicates with the trunk 20 and the delivery side to the trunk 19. With this arrangement, the air that passes over the cooling coils at 23 will be forced back through the delivery duct 24 so as to pass through the doorway of the car above the horizontal inserted division wall 17. This air current passing inwardly in this way will pass laterally and toward the ends of the car, passing along over the cargo as indicated by the arrows in Fig. 1. This cold air is delivered in sufficient volume to develop a slight pressure to insure that an effective air current will be developed flowing toward each end of the car, which will be sufficient to reach the crates disposed adjacent the ends of the car. As a matter of fact, however, the ends of the car need less precooling than the middle portion, and for this reason it is sometimes advisable to provide means for inducing an increased downward flow of the longitudinal air currents through the lower portions of the gates. For this purpose I may omit the cardboard covering near the lower end of each gate, or I may provide openings 25 through the cover sheet 15 as indicated by the dotted lines in Fig. 4. The principal effect of these openings is to develop secondary cooling currents, preventing "channeling" of the current by the shortest route to its outlet. In this way, the distribution through the cargo can be controlled, and dead air pockets avoided.

While the blower 22 is in operation, of course it develops a reduced pressure in the space 26 below the horizontal dividing wall 17, and this of course develops currents of cold air flowing

through the crates and in the longitudinal channels 27 between the longitudinal stringers 5 of the false bottom of the car.

It will be obvious that if desired, the cooling apparatus can be arranged to circulate the air in the opposite direction from that illustrated. However, I prefer to circulate the air as indicated.

In Figs. 5 and 6 I illustrate a method and apparatus in which the direction of circulation is the reverse of that illustrated in Fig. 3. In this case I provide covered side gates 28 and 29 extending across the interior of the car at its middle point, and I provide a horizontal division wall 30 that cooperates with these sides 28 and 29 to form a transverse duct 31 to which the delivery trunk 32 of the cooling apparatus 33 may be attached, the suction trunk 34 being connected up in the upper portion of the doorway opening so as to develop a relatively low pressure in the space 35 from which the circulated air is withdrawn as indicated by the arrows, and delivered through the breeching 36 to the fan 37 which circulates the air back through the cooling coils indicated by the dotted lines at 38. In accordance with this method, the air current that is driven transversely across the car in the space 31 below the division wall 30, flows under the lower edges of the covered gates 28 and 29, so that it passes toward the ends of the car through the channel spaces that are formed between the longitudinal stringers 39 of the floor grating. These air currents that flow longitudinally to the ends of the car are driven by the force of the fan through the lower inlet openings 40 into the interior of the bunkers 41, so some of the air circulates up or around ice 42, and thence out again into the cargo space through the upper openings 43. The covers 44 for these outlets 43 are preferably held in an inclined position so that as the air current passes out of the bunkers, it is deflected downwardly into the cargo, but eventually is drawn upwardly through the cargo by reason of the fact that the suction of the fan is creating a reduced pressure in the spaces 45 between the upper ends of the bunkers and the reduced pressure zone 35 in the middle of the car. This method is particularly advantageous to be used where there is an abundance of ice 42, and where the cooling apparatus is not operating at its highest efficiency.

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

What I claim is:

1. A method of precooling a freight car having ice bunkers at its ends, a grating false bottom, a doorway on the side, and with a lattice-form gate located toward each side of the doorway for retaining the portion of the load between that gate and the corresponding ice bunker, which consists in providing a substantially fluid-tight covering for the lattice gates; placing a substantially horizontal dividing wall located at about the upper edge of the gates, extending transversely within the car body opposite the doorway; and circulating a cooling fluid into the car in the space on one side of the said horizontal division wall, and withdrawing the cooling fluid from the space on the other side of the horizontal division wall.

2. A method of precooling a freight car having ice bunkers at its ends, a grating false bottom, a doorway on the side, and with a lattice-form gate located toward each side of the doorway for retaining the portion of the load be-

tween that gate and the corresponding ice bunker, which consists in providing a substantially fluid-tight covering for the lattice gates; placing a substantially horizontal dividing wall located at about the upper edge of the gates extending transversely within the car body opposite the doorway; circulating a cooling fluid into the car from the exterior and into the space on one side of the said horizontal division wall, withdrawing from the car the cooling fluid in the space on the other side of the horizontal division wall, and forming holes at any desired level through the said coverings to develop a secondary path for the cooling fluid and prevent formation of any dead air pockets.

3. A method of precooling a freight car having ice bunkers at its ends, a grating false bottom, a doorway on the side, and with a lattice-form gate located toward each side of the doorway for retaining the portion of the load between that gate and the corresponding ice bunker, which consists in providing a substantially fluid-tight covering for the lattice gates; placing a substantially horizontal dividing wall located at about the upper edge of the gates extending transversely within the car body opposite the doorway; and circulating a cooling fluid from the doorway inwardly into the space above the horizontal dividing wall and so that the circulating fluid passes outwardly through the doorway from the space below the said horizontal division wall.

4. In apparatus for precooling a freight car having a side door at an intermediate point of its length, with a cargo space on each side of the door, the combination of a grating false bottom for the car with means for supporting the same so as to permit flow of air currents in a general longitudinal direction under the grating, a transverse gate inside the car and adjacent each side of the doorway, each gate having a covering for limiting flow of air past the same and longitudinally of the car, means including braces between the gates for holding them pressed laterally against the cargo in the freight spaces, a substantially horizontal cover extending transversely of the car from the doorway and at about the level of the upper edges of the gates cooperating with the gates to form a duct extending transversely to the car opposite the doorway, and means for circulating a precooling fluid through the said duct, through the cargo space and the space above the said cover, and through the space below the grating.

5. A method of precooling a freight car having a false bottom, ice bunkers at its ends, and a side doorway, which consists in circulating cooling fluid inwardly through the doorway at a low level and thence laterally from the doorway so that the cooling fluid passes longitudinally of the car and upwardly through the ice bunkers from below, permitting the current of circulating fluid to escape from the ice bunkers into the freight space, obstructing the path of flow of the current so as to deflect the said current

downwardly adjacent its point of escape from the ice bunkers, and thereby directing the cooling current down into the freight space adjacent the bunkers, and withdrawing the cooling fluid through the upper portion of the doorway.

6. A method of precooling a freight car having a freight space with side doors leading into the same, and having ice bunkers at its ends with inner walls dividing off the bunker space from the freight space, and with elevated openings on their inner walls leading from the upper ends of the ice bunkers into the freight space, which consists in providing a transverse duct at the doorway, having a substantially horizontal dividing wall and side walls extending downwardly therefrom to a point adjacent the false bottom, circulating cooled air into the duct through the doorway so that the cooled air passes laterally from said duct under the false bottom, thence into the ice bunkers and upwardly through the ice therein, deflecting downwardly the current of ice-cooled air passing outwardly through the said elevated openings, and withdrawing the cooled air through the doorway at the space above the said horizontal wall of the duct.

7. A method of precooling a freight car having ice bunkers at its ends, with inner walls at its ends dividing off the bunker space, a side door, and having openings on the inner walls of the bunkers leading from the upper ends of the ice bunkers into the freight space, which consists in circulating precooled air into the car along the car floor and into the lower ends of the ice bunkers, thence upwardly through the ice, and in an ice-cooled current passing through the said upper openings into the freight space, deflecting the said ice-cooled air current downwardly at said openings, and withdrawing the air thereafter through the upper portion of the doorway.

8. A method of precooling a freight car having ice bunkers at its ends, a grating false bottom, a doorway on the side, and with a lattice-form gate located toward each side of the doorway for retaining the portion of the load between that gate and the corresponding ice bunker, which consists in providing a substantially fluid-tight covering for the lattice gates; placing a substantially horizontal dividing wall located at about the upper edge of the gates extending transversely within the car body opposite the doorway; and circulating a cooling fluid in through the doorway into the space above the horizontal dividing wall and thence laterally so as to flow longitudinally of the freight space within the car, and thence outwardly through the doorway on the other side of the said horizontal dividing wall, and providing openings in the covering of the lattice gates disposed near the floor of the car so as to prevent channeling of the circulating fluid and preventing the formation of a dead pocket in the freight space adjacent to the sides of the fluid-tight covering toward the ends of the car.

ANDREW Y. PREBLE.