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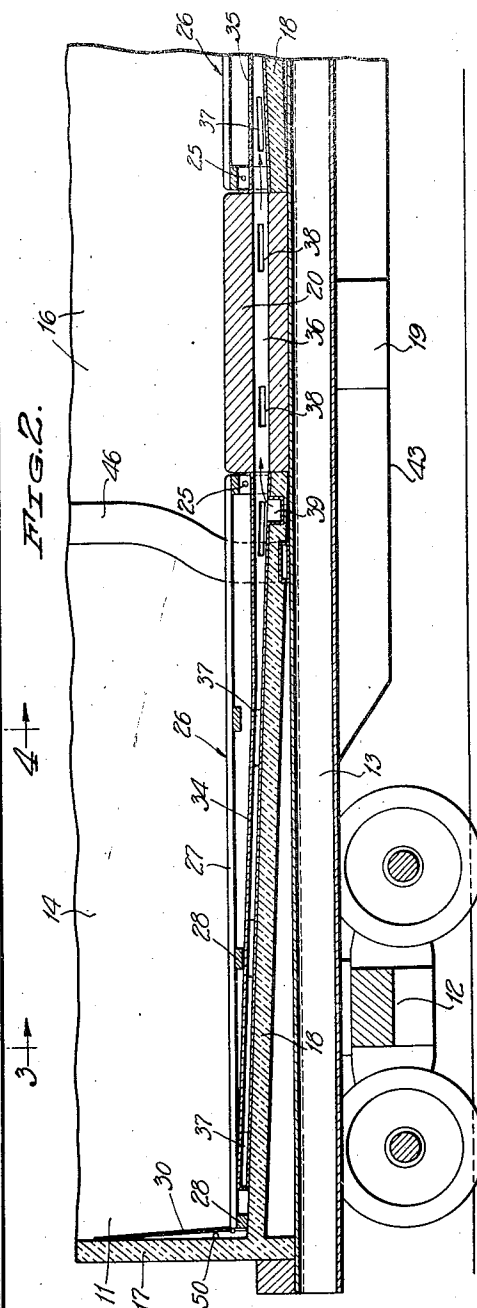
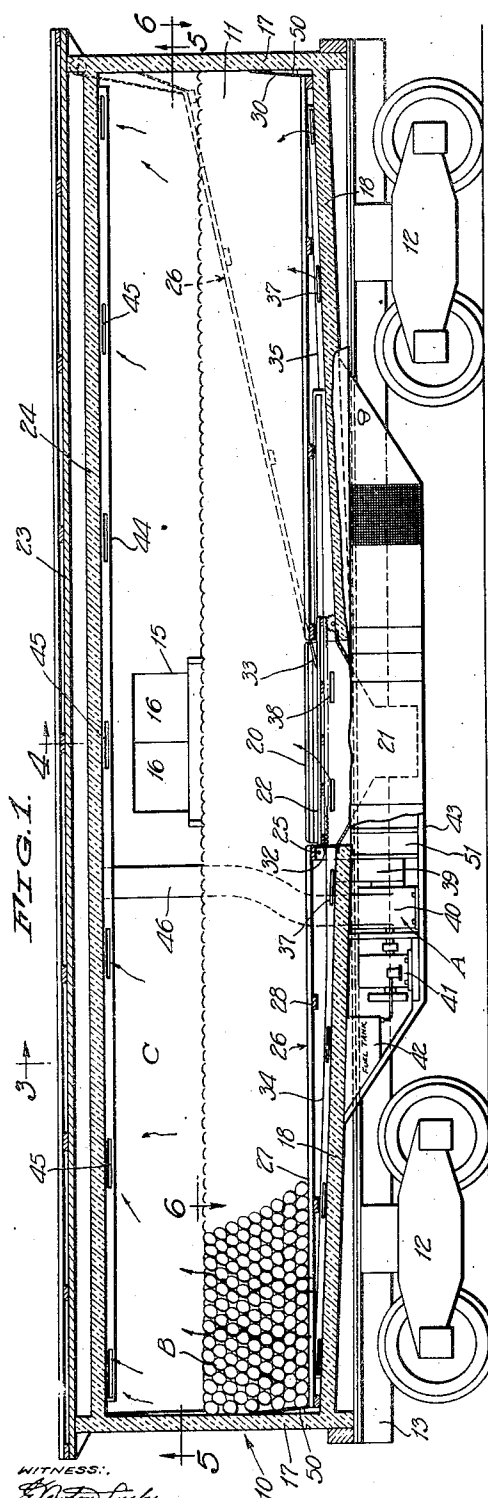
A. A. JOHNSON

2,360,686

SELF AIR CONDITIONING BULK COMMODITY RAILWAY CAR

Filed April 17, 1941

3 Sheets-Sheet 1



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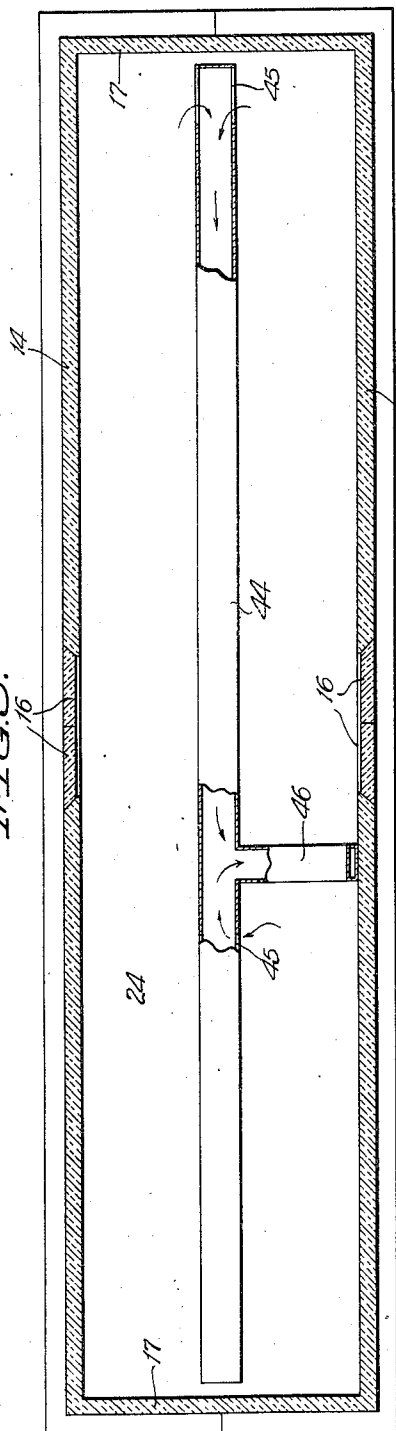
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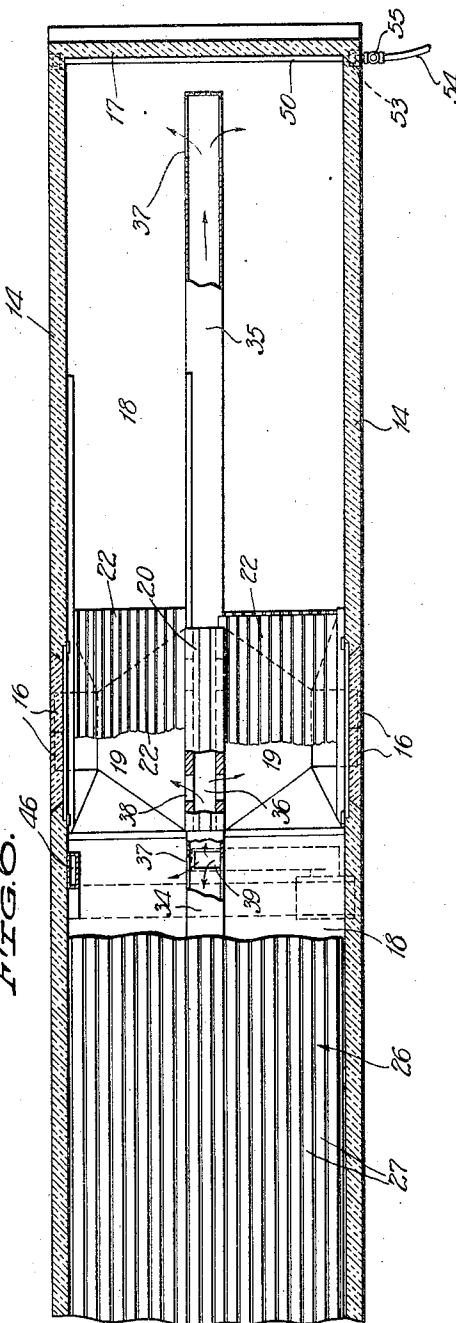
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FIG. 5.



WITNESS:
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FIG. 6.



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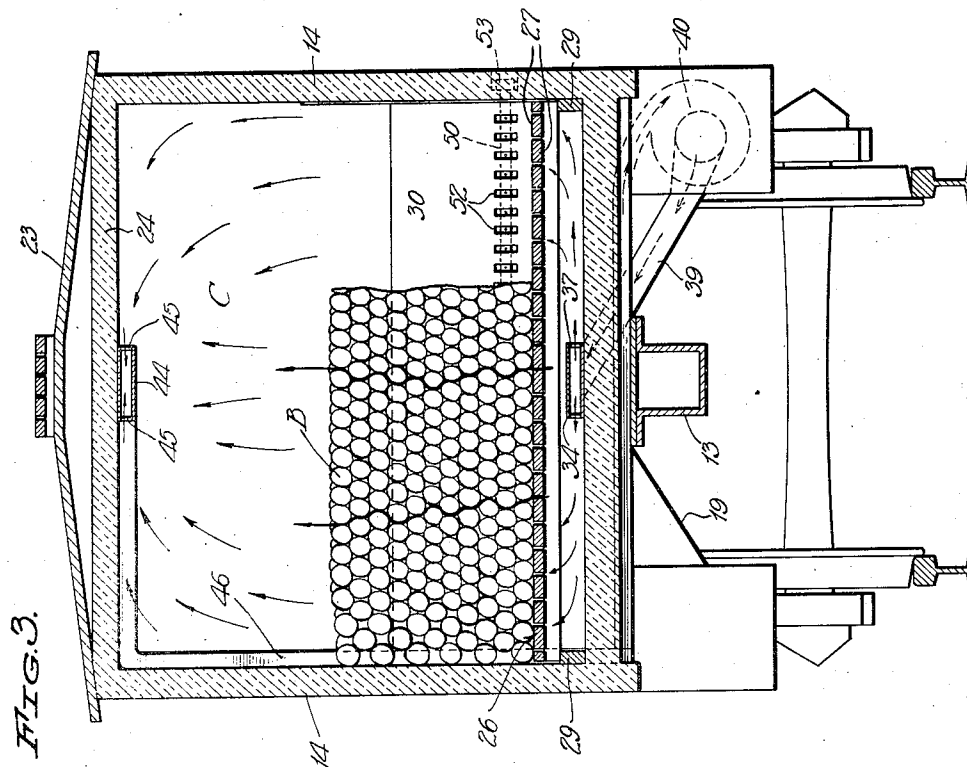
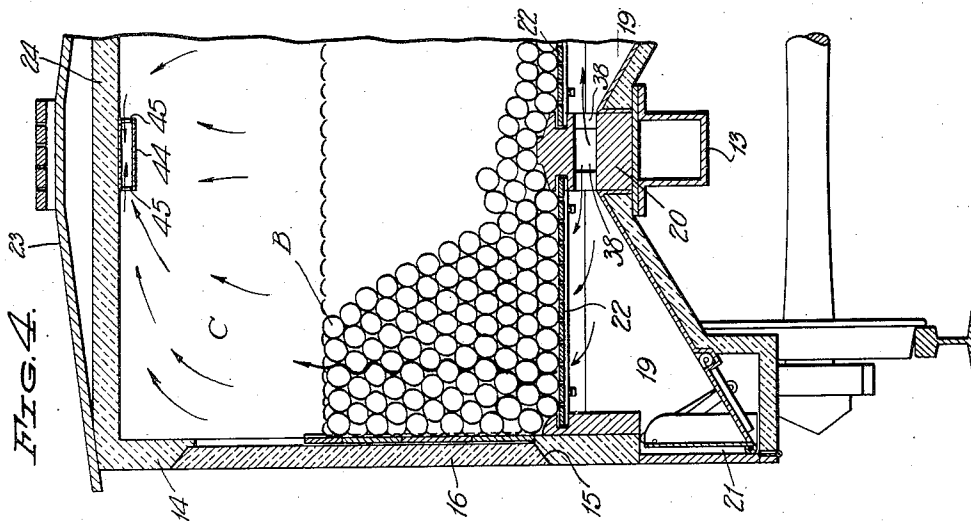
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,360,686

SELF AIR CONDITIONING BULK
COMMODITY RAILWAY CAR

Albert A. Johnson, New York, N. Y.

Application April 17, 1941, Serial No. 388,971

3 Claims. (Cl. 98—6)

This invention relates to improvements in bulk commodity railway cars, trucks, and trailers, and more specifically to a self air conditioning refrigerating system therefor.

Some of the important features of the invention are to provide a self-sustained refrigerator car; to eliminate the use and cost of ice as a cooling medium; to eliminate ice bunkers and make available the space usually taken up by ice bunkers in a standard size refrigerator car thereby increasing the pay-load carrying capacity of the car; eliminate the cost of two ice bunker equipment, four roof ice hatches, and customary floor racks; to maintain uniform predetermined temperature within the car at all times which is desirable in the bulk shipment of citrus fruits and the like; which permits the shipment of ripper fruit and the cooperative marketing thereof; to facilitate the holding of bulk shipments of fruit and other food commodities in cars at their destination without loss by spoiling, for the cooling system is operable while the car is motionless as well as in motion; and which provides a refrigerator car of relatively light weight when loaded.

Another important feature of the invention resides in a novel cooling system embodied in a self-unloading bulk commodity railway car of the type set forth in my prior Patents Nos. 2,186,700 and 2,186,701, granted January 9, 1940, which provides discharge chutes centrally of the car and tiltable slat floors extending from the discharge chutes to the ends of the car, whereby raising of the floors at the ends causes the bulk contents of the car to gravitate toward and through the discharge chutes. By reason of the novel unloading features embodied in the car, it is possible by means of my cooling system to circulate cool or warm air upwardly from beneath the slat floors through the citrus fruit or other bulk commodity supported by the slat flooring to assure cooling of the fruit or other perishable commodities, throughout the height of the bulk load.

A further feature of the invention is to provide a cooling and heating system for refrigerator railway cars in which the cooling and heating apparatus is compactly mounted exteriorly of the car so as not to take up pay-load space, yet readily accessible for inspection purposes.

A further feature of the invention is the provision of a bulk commodity railway car having flooring which inclines from the ends of the car downwardly toward discharge outlets centrally of the car, there being spray pipes at the

ends of the car to which a water hose may be connected when the car is unloaded and stationary for washing the floor, the water flowing by gravitation over the floor toward and through the discharge outlet.

Other novel features of the invention will become apparent as the following specification is read in conjunction with the accompanying drawings, in which:

Figure 1 is a vertical longitudinal sectional view taken forwardly of the longitudinal center of a self-cooling bulk commodity railway car constructed in accordance with the invention, certain parts being shown in side elevation.

Figure 2 is an enlarged fragmentary central longitudinal sectional view through one end of the car.

Figure 3 is an enlarged vertical transverse sectional view on the line 3—3 of Figure 1.

Figure 4 is an enlarged fragmentary vertical sectional view on the line 4—4 of Figure 1.

Figure 5 is a horizontal sectional view on the line 5—5 of Figure 1, looking toward the roof of the car as illustrated by arrows.

Figure 6 is a fragmentary horizontal sectional view on the line 6—6 of Figure 1 with the slat flooring removed from the right end of the car and with parts broken away.

Referring to the drawings by reference characters, the numeral 10 designates my self-cooling bulk commodity refrigerator railway car in its entirety which includes an insulated box car body 11 mounted on wheel chassis 12, the latter including the usual central longitudinal sill 13 extending the length thereof. The car body 11 comprises opposed side walls 14—14 having centrally located door openings 15—15, closed by doors 15—15, opposed end walls 17—17, inclined floor sections 18—18 which extend inwardly from the end walls 17—17 and terminate at the top of identical discharge chutes 19—19 respectively disposed at opposite sides of the beam 20 mounted on the sill 13. The lower ends of the chutes 19—19 are normally closed by doors 21, while sliding horizontal perforated or slat gratings 22—22 are mounted in the beam 20 for normally closing the entrances to the chutes 19—19. The top of the car body is closed by a roof 23 beneath which is a horizontal ceiling 24. The side walls, end walls, floor, and ceiling are constructed of insulated material and when the doors 16 and 21 are closed, the interior of the car body is substantially air-tight to confine the cool air which my improved cooling system circulates therein.

Hingedly mounted within the car body as at 25 adjacent the entrance to the opposed chutes 19—19, are tiltable normally horizontal floor sections 26—26. Each floor section is constructed of a plurality of spaced slats 27 connected by transverse cleats 28, the ends of which rest upon longitudinal rails 29 and by which the tiltable floor sections 26—26 are normally supported in spaced relation to the inclined floor sections 18—18 for reasons to be presently explained. The outer free ends of the tiltable floor sections are provided with a flagellated floor extension plate 30 which extends upwardly and outwardly to rest against the end walls 17 to close the gap between the outer free ends of the floor sections and the respective end walls when the floor sections are raised to unloading inclined position. Raising and lowering mechanisms 31 similar to that set forth in my prior patents hereinbefore mentioned may be employed for imparting a lifting action to the tiltable floor sections 26 during an unloading of the bulk commodities from the car, and for lowering the floor sections to normal horizontal position.

To prevent articles from accidentally entering the space between the pivoted ends of the tiltable floor sections 26—26 and the inclined stationary floor sections 18—18, I provide fixed and pivoted grill plates 32 and 33 respectively, the pivoted grill plates facilitating the sliding the gratings 22 to open and closed positions.

Alined air ducts 34 and 35 extend centrally within the car body along the inclined floor sections 18—18 from the ends of the beam 20 toward the respective ends of the car body, the inner ends of the ducts being connected by a connecting air passage 36. The ducts 34 and 35 are relatively flat and of rectangular shape in cross section to permit them to assume a position in the space between the inclined floor sections 18 and the tiltable floor sections 26. The connecting passage 36 is slightly larger in cross sectional area than the major cross sectional area of the ducts 34 and 35, and the inner ends of the ducts are gradually enlarged to aline with the ends of the passage 36. The side walls of the ducts 34 and 35 are provided with equidistantly spaced air outlets 37, and the beam 20 is provided with opposed outlets 38 which establish communication between the passage 36 and the chutes 19—19. The tiltable slat floor sections 26—26 protect the ducts 34 and 35 from the weight of the load placed in the car.

The inner end of the duct 34 has an air inlet duct 39 connected thereto, the said duct being connected to the fan outlet of the evaporator or cooling coil chamber of a refrigeration unit A. The refrigeration unit A may be of any compact standard commercial type, which in addition to the condenser and radiator 40 includes the evaporator or cooling coils located behind the condenser and radiator and a gas engine driving a compressor 41, the fuel for the engine being stored in a fuel tank 42. The air circulating refrigerating unit A may be of the kind known as "Type 68D" manufactured by Carrier Corporation. The refrigerating unit A is mounted in a housing 43 disposed adjacent the chute 19 at one side of the car, and if desired, two units A may be employed and respectively arranged in housing 43 at opposite sides of the chute. The front of the housing 43 is closed by gratings to exclude dust and dirt, although ventilating openings are provided for a cooling

mechanism and for the cooling of the internal combustion motor forming part of the unit.

Supported by and extending substantially the length of the ceiling 34 is an air duct 44, the same being centrally located in vertical alinement with the air ducts 34 and 35. The duct 44 is relatively flat and rectangular in cross section and has opposed equidistantly spaced air inlet openings 45 in the side walls thereof. The duct 44 is connected to the air inlet of the fan of the evaporator and cooler coil chamber by a vertical air return duct 46.

In practice, assume that the car 10 is loaded with oranges or other citrus fruit B to the level illustrated in Figures 1, 3, and 4, which level is slightly higher than half the height of the interior of the car so as to leave an air space C between the top of the load and the ceiling 24. The refrigeration unit A being turned on, cooled air from the evaporator or cooling coil chamber fan will be blown through the duct 39 and into the duct 34, a proportionate amount of cool air enters the passage 36 and flows into the duct 35. The cool air which is now being blown through the ducts 34, passage 36 and duct 35 is forcibly discharged through the outlets 37 and 38 as indicated by arrows in Figures 3 and 4 which causes a lateral distribution of the cool air throughout the underside of the tiltable slat floor sections 26—26 and into the chutes 19—19 beneath the gratings 22. The cool air rises upwardly through the slat floor sections 26 and gratings 22 on which the load is supported, and due to the irregular spaces between particles composing the lading, the cool air will rise in a serpentine path through the height of the load and contacting directly every particle and then enters the space C above the load from where the now warmer air is drawn into the ceiling duct 44 through the inlets 45 due to the suction action of the evaporator or cooling coil fan to which the duct 44 is connected by the return duct 46. The warmer air returned to the evaporator or cooling coil chamber in refrigeration unit A is recirculated thereby and recirculated through the system. It will be understood that some means will be provided for taking in a proportionate amount of atmospheric air to maintain the pure condition of the circulated air. Refrigerator units A of the kind hereinbefore mentioned are equipped with automatic temperature controls but it is not believed necessary to go into the description thereof for various thermostat controls may be arranged within the car body 11 to regulate the operation of air conditioning apparatus and thereby regulate the temperature of the air circulated through the system.

Also, a thermostatically controlled heating unit 51 may be operatively associated with the air circulating fan of the unit A to heat the air circulated through the system in instances where the car 10 is obliged to pass through cold areas during shipment of perishable commodities. Thus in addition to circulating cool air into the car while the car is passing through hot areas, it is possible to circulate heated air through the load to prevent freezing of the load when the car is routed through freezing cold areas.

The car 10 is unloaded by first opening the doors 21, coupling unloading chutes to the discharge chutes 19—19, which unloading chutes may lead to trucks, special permanent retail store display containers or a storage bin. After floor gratings have been opened the center of the load

is discharged by gravity, one of the tiltable floor sections 26 is raised to cause the citrus fruit thereon to gravitate toward and through the discharge chutes 19—19 until the load on one tiltable floor has been unloaded, after which the other tiltable floor section is lifted and that load is then discharged through the chutes 19—19.

Whereas the air conditioning system has been shown and described as being incorporated in a railway car, it is to be understood that the same may be embodied in trucks or trailers.

After the car 10 is unloaded, the inclined car floor sections 18—18 and the tiltable floor sections 26—26 may be washed, for I provide a spray pipe 50 at each end of the car adjacent the bottom wall sections 18—18. Each spray pipe 50 extends transversely of the car out of the path of raising and lowering movement of the adjacent tiltable floor section 26 and has a limited turning movement. When the floor sections 26 are in lowered horizontal position, the spray pipes 50 are disposed intermediate the flagellated plates 30 and end walls 17—17, and just above the free end of the adjacent floors, the plates 30 having spaced slots 52 therein in alinement with the spray openings in the spray pipes through which the streams of water may pass. One end of each spray pipe 50 has a hose coupling 53 counter-sunk in a side wall 14 to which one end of a hose 54 is connected. The hose includes a control valve 55 for regulating the flow of water from the hose to the spray pipe. The spray from the pipes washes the top of the tiltable floor sections 26 when they are in lowered position and by raising the tiltable floor sections 26 above the spray pipe, the underside of the floor sections are exposed to the stream of water, thus both sides of the tiltable floor sections and inclined floor sections 18—18 may be thoroughly washed. The sprayed water flows by gravity out through the discharge chutes 19—19, carrying with it any refuse which may be washed from the car.

Whereas I have mentioned that water is sprayed from the spray pipes 50, the same may be connected with a supply of fumigant or liquid or gas disinfectant, whereby the interior of the car is subjected to the action thereof for the destruction of bacteria or vermin.

While I have shown and described what I consider to be the preferred embodiments of my invention, I wish it to be understood that such changes in structure and design as come within the scope of the appended claims may be resorted to if desired without departing from the spirit of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a railway car, an enclosed box-like body having a ceiling, and floor proper provided with opposed unloading chutes midway of the length thereof; open floor sections supported in spaced relation to the floor proper, alined air inlet duct sections interposed between the floor proper and the open flooring and extending centrally thereof

from the unloading chutes to the ends of the body, a connecting duct section connecting the adjacent ends of the inlet duct sections, said inlet and connecting duct sections having laterally disposed outlet openings therein, an air outlet duct mounted within said body and extending the length of the ceiling and disposed in vertical alinement with the inlet and connecting duct sections, an air conditioning unit carried by the underside of the body having an air discharge outlet and an air inlet, a duct connecting the air discharge outlet with one of the inlet duct sections, and an air return duct connecting the air outlet duct with the air inlet of said unit, whereby air is circulated upwardly through the open flooring and through the height and length of the interior of said body.

2. In a railway car, an enclosed body having a floor provided with opposed unloading chutes approximately midway of the length thereof, alined air inlet duct sections adjacent the level of said floor and extending lengthwise thereof from the entrance to the unloading chutes to the ends of said body, slat floor sections overlying the inlet duct sections, a connecting duct section connecting adjacent ends of the inlet duct sections and disposed in non-obstructing position relative to the unloading chutes, said inlet and connecting duct sections having outlet openings therein which open into the interior of said body, an air circulating unit carried by said body having an air discharge outlet and an air inlet, said discharge outlet being connected to one of said inlet ducts, and an outlet duct located within and adjacent the ceiling of the body and being connected to the air inlet of the air conditioning unit.

3. In a railway car having a central longitudinal sill, an enclosed car body having a ceiling, a floor proper, opposed unloading chutes opening through the floor proper midway of the length of the car body and respectively at opposite sides of the sill, slatted floor sections supported in spaced relation to the floor proper, alined air inlet duct sections interposed between the floor proper and the slatted floor sections and extending centrally thereof from the entrances to the unloading chutes, an intermediate connecting duct section supported by said sill connecting the adjacent ends of the inlet duct sections, said inlet and intermediate duct sections having laterally disposed outlet openings therein, an air outlet duct mounted within said car body extending substantially the length of the ceiling and disposed in substantial vertical alinement with the inlet and intermediate duct sections, an air conditioning unit carried by said car body having an air discharge outlet and an air inlet, a duct connecting the air discharge outlet with one of the duct sections and an air return duct with the air inlet of said unit, whereby air is circulated upwardly through the slatted flooring and through the height and length of the interior of said car body.

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