United States Patent

[11] 3,584,564

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[54] **AERATING SYSTEM FOR A RAILWAY CAR**
4 Claims, 9 Drawing Figs.

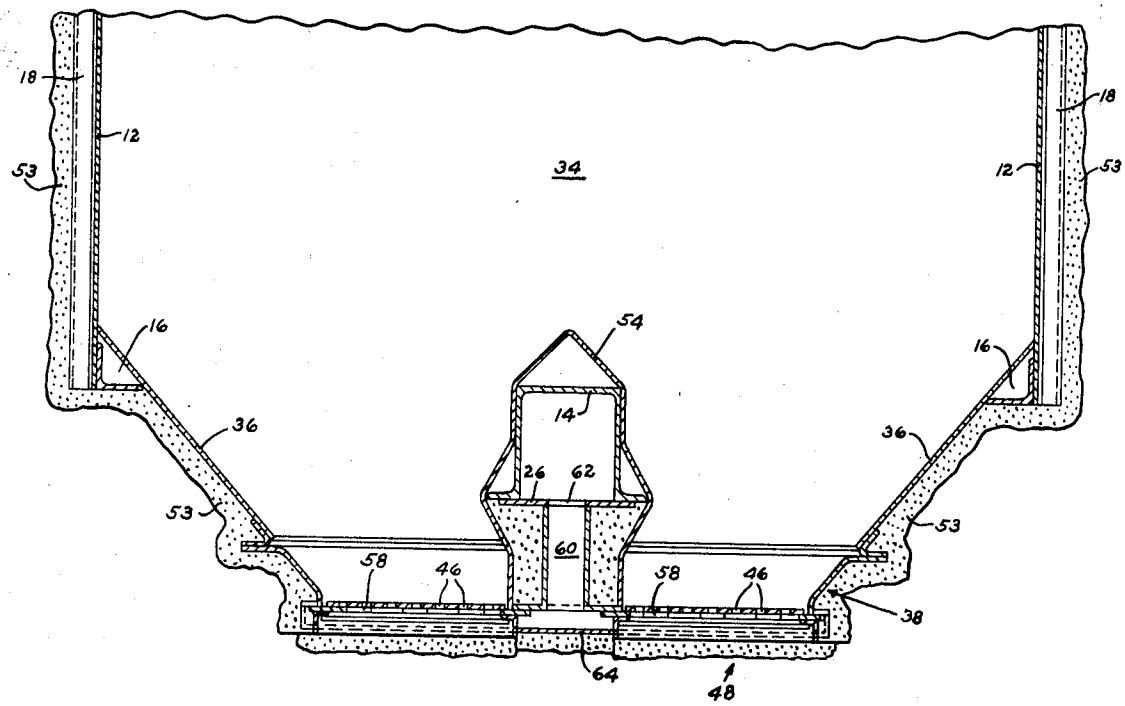
[52] U.S. Cl. 98/10, 98/55, 105/247
[51] Int. Cl. B61d 27/00
[50] Field of Search ..... 98/55, 53, 8, 10, 6; 62/237, 407, 411; 105/247 X, 240

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Primary Examiner—William E. Wayner
Attorneys—Samuel J. Snyder and Eugene N. Riddle

ABSTRACT: A system for aerating and controlling the temperature of ladings, such as potatoes or other perishable commodities, in a covered hopper railway car, includes a portion of the center sill, formed as an air duct, and connections between the center sill and perforated plates at the bottom of the hoppers. To complete the air circuit, there are also provided ducts at the top of the car connected to one side of an air blower, the other side of which is connected to the center sill.



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SHEET 1 OF 6

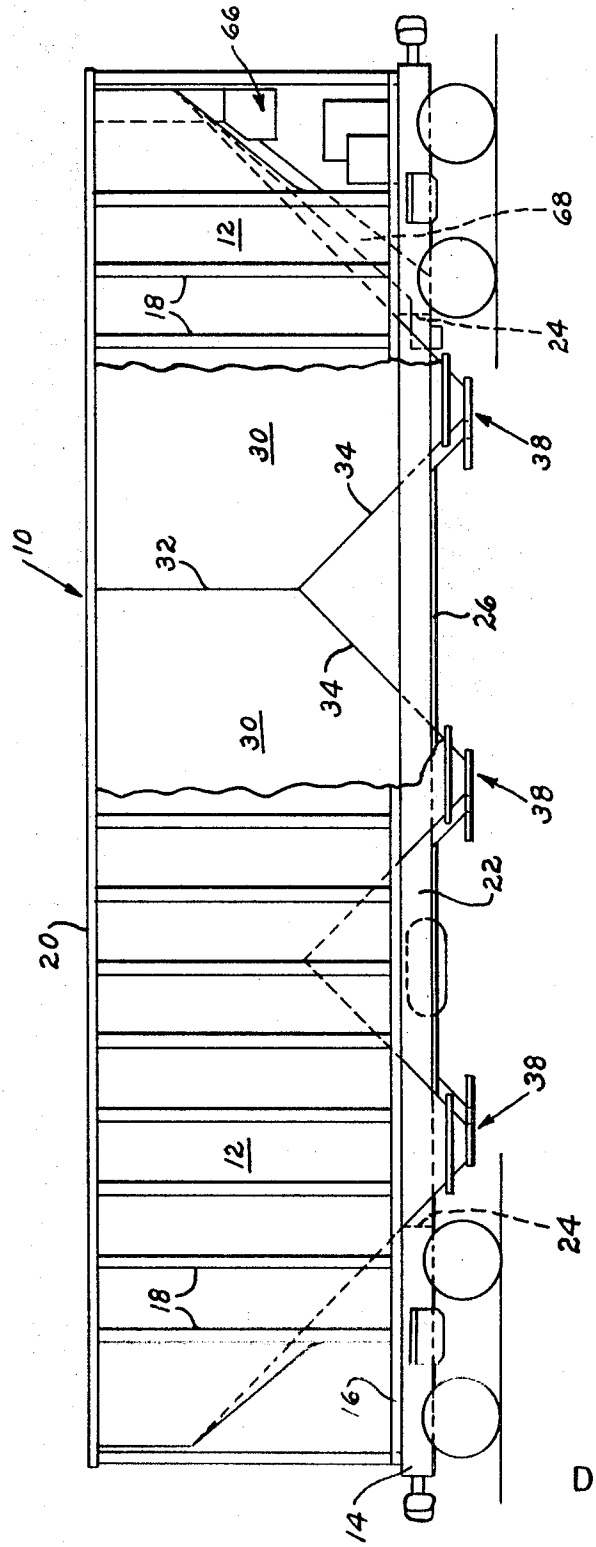


FIG. 1.

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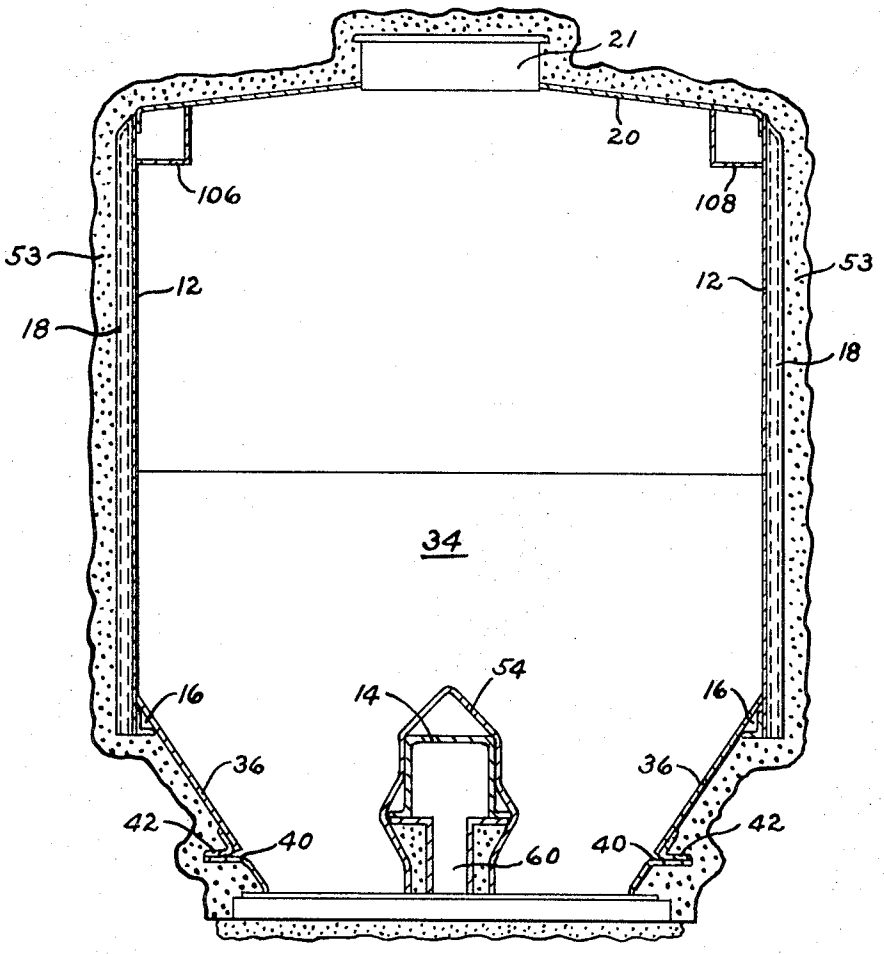

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FIG. 2.

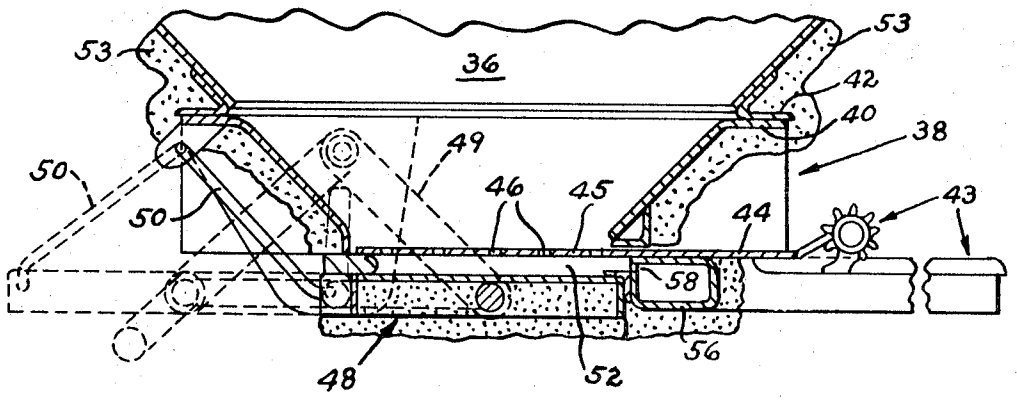

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FIG. 4.

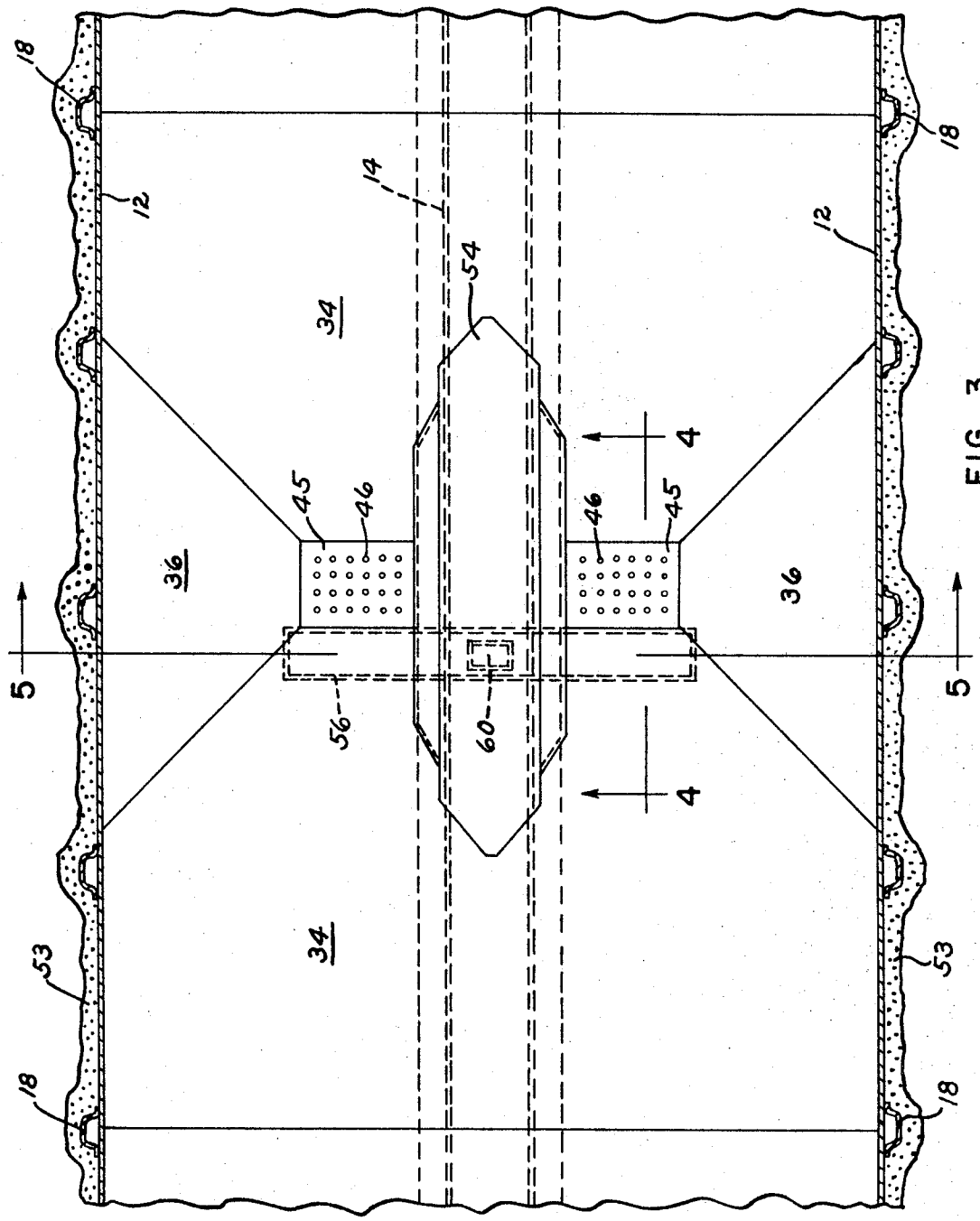


FIG. 3.

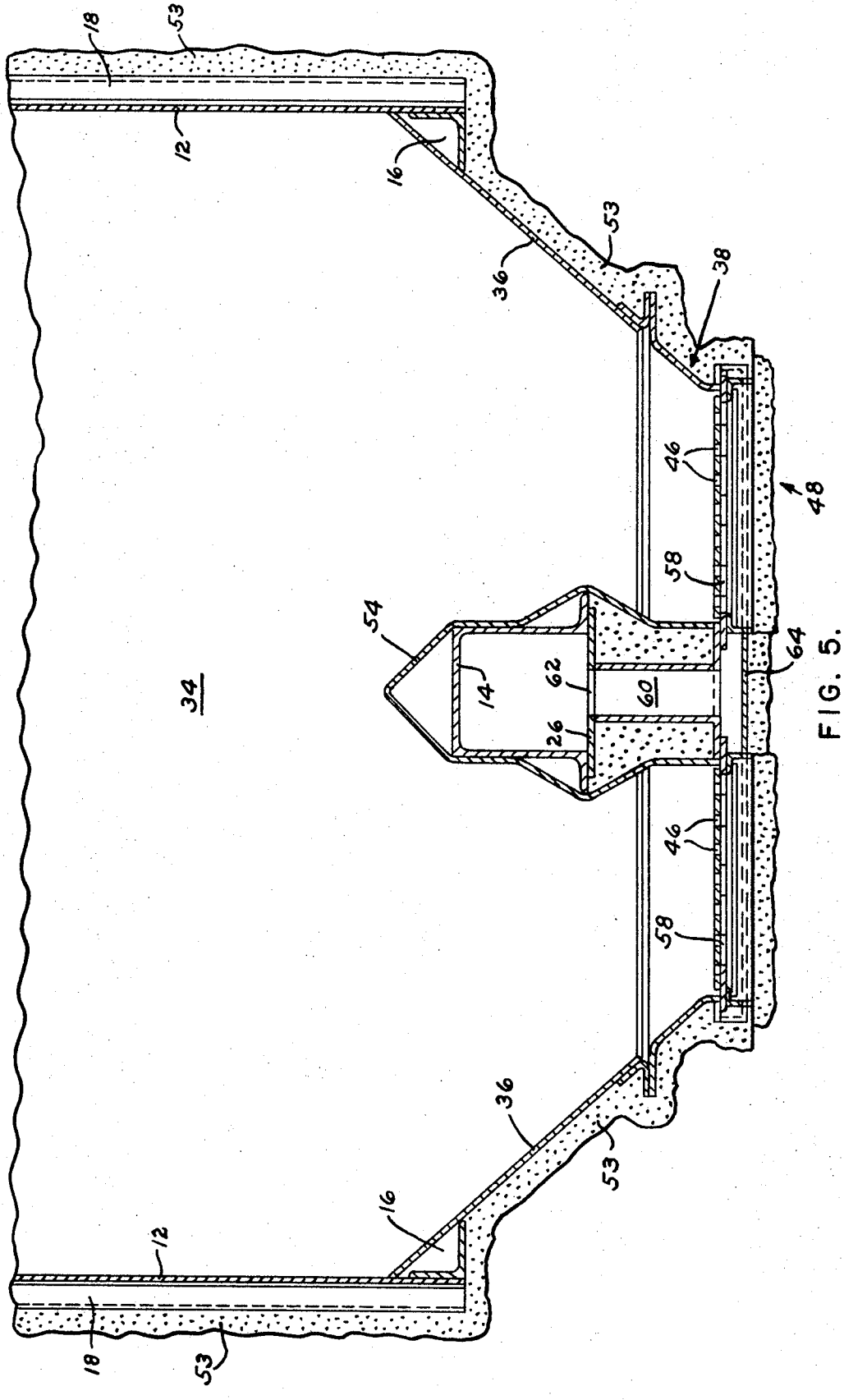

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FIG. 5.

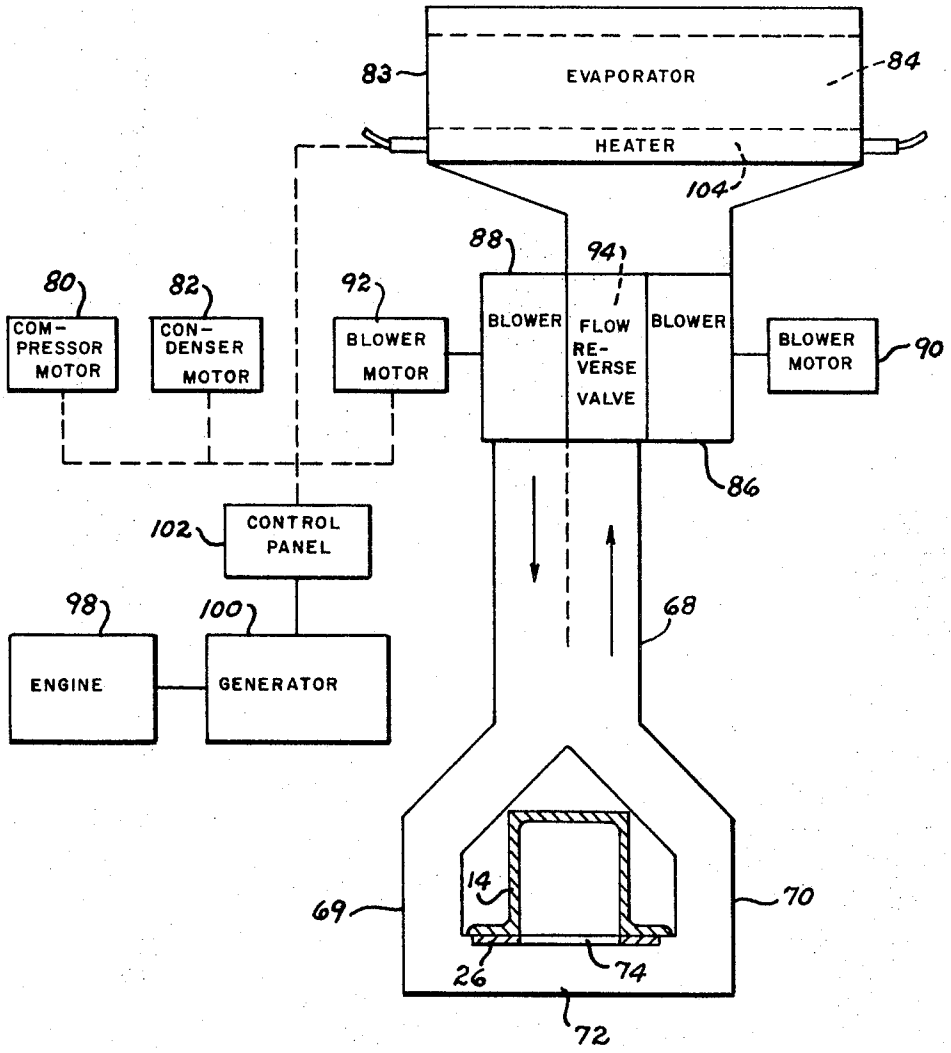

83
EVAPORATOR
84
HEATER
104
88
94
80
82
92
COM-
PRESSOR
MOTOR
CON-
DENSER
MOTOR
BLOWER
MOTOR
BLOWER
FLOW
RE-
VERSE
VALVE
BLOWER
BLOWER
MOTOR
90
86
102
CONTROL
PANEL
98
100
68
ENGINE
GENERATOR
14
69
70
26
74
72

FIG. 6.

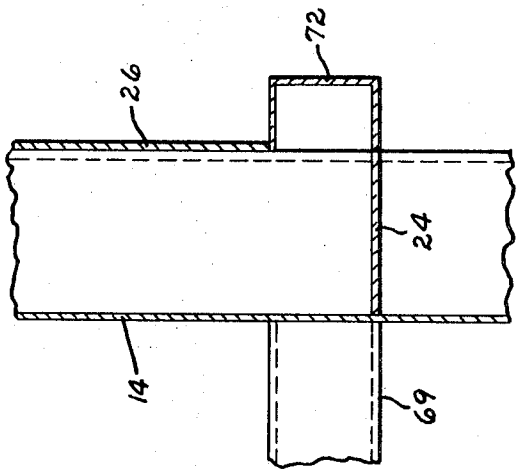


FIG. 9.

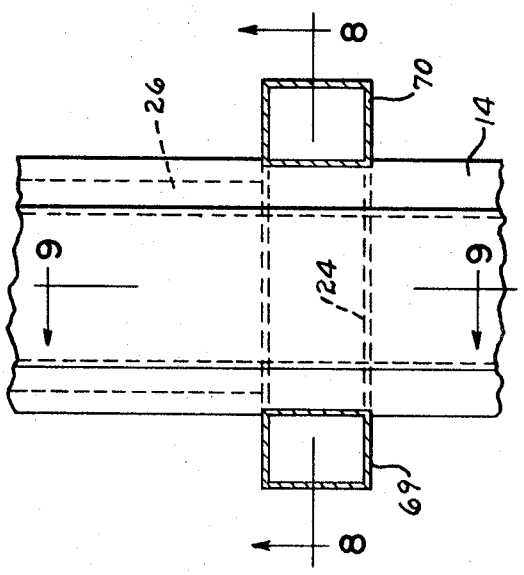


FIG. 7.

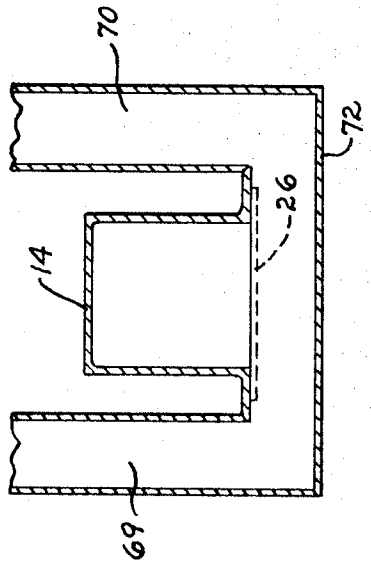


FIG. 8.

AERATING SYSTEM FOR A RAILWAY CAR

BACKGROUND AND DESCRIPTION OF THE INVENTION

This invention is related to the invention disclosed in application Ser. No. 760,93, filed Sept. 19, 1968, now U.S. Pat. No. 3,486,241 issued Dec. 30, 1969, and assigned to the assignee of this application.

It is apparent that an extensive system of ducts is required to provide good air distribution and freedom from dead spots in a railway car. The construction of a car having such a system of ducts would be complex and expensive, and might appreciably reduce the capacity of the car. It is, accordingly, an object of the invention to provide an air distribution system using existing structure of the car to convey and distribute air throughout the car.

SUMMARY OF THE INVENTION

The invention provides a covered hopper car for perishable lading, in which the center sill is formed as a high capacity air duct for conveying air between a blower and a pair of perforated plates in the bottom outlet of each hopper. Air ducts at the top of the car also are connected to the blower for causing air circulation through the car. Means are mounted on the car for heating or cooling the air circulated through the car.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing, the following figures illustrate embodiments of the invention:

FIG. 1 is a side elevation, partly schematic, of a covered hopper railway car, with one side partly broken away, illustrating the air system for aerating the interior of the car from bottom outlet structures and providing a continuous recirculation of air.

FIG. 2 is a sectional view of the car of FIG. 1.

FIG. 3 is a top plan of one of the hoppers.

FIG. 4 is a longitudinal section of a bottom outlet of a hopper, taken on line 4–4 of FIG. 3.

FIG. 5 is a section taken on line 5–5 of FIG. 3.

FIG. 6 is a schematic diagram of the power supply and air circulating apparatus.

FIGS. 7 to 9 are sectional views of the connection of air ducts to the center sill.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, a covered hopper car 10 has a pair of side sheets 12, a center sill 14, and side sills 16. Vertical stakes 18 are fixed to side sheets 12 to stiffen them, and a roof 20 is provided with hatches 21. A midportion 22 of center sill 14 is closed by end plates 24 and bottom cover plates 26 to convert this portion of the center sill into an air duct.

Car 10 has a plurality of hoppers 30 separated by partitions 32. End slope sheets 34 and side slope sheets 36 lead to bottom discharge or outlet structures generally indicated 38, disclosed in detail in U.S. Pat. No. 3,343,886, dated Sept. 26, 1967. Bottom discharge structures 38 are adapted to permit a flow of air, either upwardly or downwardly, through the lading for aerating the interior of the car, in addition to permitting the discharge of lading from the car. Each outlet structure 38 includes a housing having an upper rectangular flange 40 which may be bolted or welded to a flange 42 on the underside of each hopper 30. A gravity gate 44 carried by bottom outlet structure 38 is mounted thereon for sliding movement between open and closed positions. A rack and pinion combination 43 may be provided for opening and closing gate 44. The portions 45 of gate 44 within the hoppers have perforations 46. Covers 48 supported by links 49, 50 are spaced from gate 44 to provide chambers 52. The car may be covered with insulating material 53, as indicated in FIGS. 2 and 5.

The bottoms of the hoppers are divided by shrouds 54 over the center sill. Chambers 52 of each hopper communicate with duct 56 through opening 58, and duct 56 is connected to the center sill by upwardly extending duct 60, which enters center sill 14 through opening 62 in bottom cover plate 26. The bottom of shroud 54 is covered by plate 64. The right hand end of center sill portion 22, as seen in FIG. 1, is connected to blower system 66 by air ducts 68. FIGS. 6 to 9 show one manner of connecting ducts 68 to the center sill. Herein, ducts 68 are divided into ducts 69 and 70, having a bridging portion 72 communicating with center sill 14 through opening 74 of cover plate 26. Bridging portion 72 also has a plate portion extending into the center sill to form the end closure plate 24.

The apparatus for circulating the air and controlling its temperature is shown schematically in FIG. 6, and is disclosed fully in previously mentioned application Ser. No. 760,933 in FIGS. 10, 11, 19 and 20 thereof. The apparatus may include a conventional refrigeration system comprising a compressor 80 having a driving motor for compressing refrigerant gas and supplying it to condenser unit 82, which includes a fan and motor for cooling the gas while condensing it. The resultant liquid refrigerant is then supplied to evaporator unit 84, wherein the liquid is allowed to boil or vaporize at a controlled rate in a coiled pipe in the path of the air to be cooled, the heat of the air being absorbed by the refrigerant vapor in the process.

For circulating the air either blower 86 or 88 is driven by motor 90 or 92 and a flow direction control valve 94 is provided for closing the inlet to one blower or the other. Thus, the direction of air circulation may be reversed, as more specifically disclosed in U.S. Pat. No. 3,486,241. Generally it is desirable to operate the blowers and the flow control valve so that cold air is fed to the top of the car and withdrawn from the bottom of the car, while heated air is passed through the car in the opposite direction.

To supply power for the operation of the aerating system, a diesel engine 98 drives a generator 100. Controls for the phasing of the various operations are arranged in control panel 102. Electric energy from generator 100 drives compressor 80, condenser 82, and blower motors 90 and 92.

When the exhaust air from the interior of car 10 reaches a predetermined minimum, such as 40° F., the cooling cycle is stopped by various thermostatic controls in control panel 102, and a heat cycle may be started at around 35° F., for example. A heating element 104 is located in the bottom of evaporator 84. Heating element 104 is preferably of the electric resistance-type, and air passing downwardly over it is heated before entering blower 88. Ducts 106 and 108 extend from hood 83 into the car along the upper edges of sidewalls 12. These ducts open into one or more hoppers and convey air from the evaporator unit to the car or from the car to hood 83 and blower 88. It can be seen that the aerating system circulates heated or cooled air throughout the car by utilizing a center sill communicating with each hopper and perforated plates at the bottom of each hopper.

I claim:

1. A covered hooper railway car having a plurality of hoppers and a center sill extending the entire length of the car and having an intermediate portion intersecting all said hoppers; a wall in said center sill at each end of said intermediate portion for sealing off said intermediate portion from the remainder of the center sill; a blower mounted on said car outside said hoppers; means connecting one side of said blower to an upper portion of the hoppers; conduit means connecting the other side of the blower to said intermediate portion of the center sill; a plate closing the bottom of said intermediate portion of the center sill to form an air conduit and having a plurality of spaced openings therein; and air ducts means extending downwardly from the spaced openings in said cover plate and outwardly to the bottom of each hopper whereby air is circulated through the car including the intermediate portion of the center sill.

2. A covered hopper car according to claim 1, wherein each hopper includes an outlet having a movable horizontal gate in-

cluding a perforated plate and a movable closure beneath said plate, said air duct means communicating with the space between said plate and said closure member.

3. A covered hopper car according to claim 1, wherein each hopper has an outlet including a pair of gates on opposite sides of the center sill, each gate including a horizontal perforated plate extending across the bottom of the outlet, and means for removing said plates to permit unloading through said outlets, said air duct means being connected to said outlets below said perforated plates.

4. A car according to claim 1, including a second blower for moving air in the direction opposite to that in which air is moved by the first-mentioned blower, means for rendering one of said blowers operative and the other inoperative, and means for selectively heating or cooling the circulating air.