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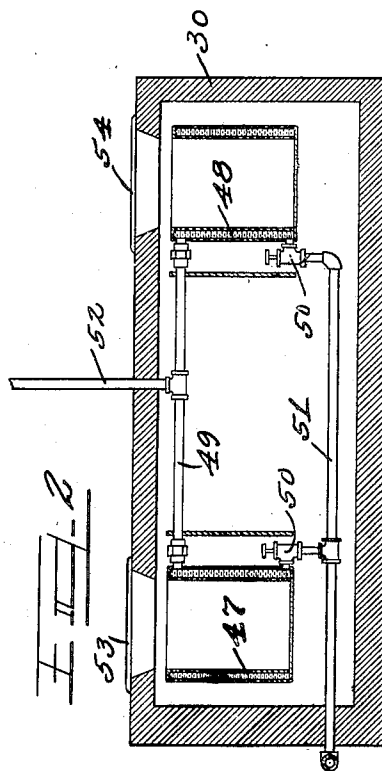
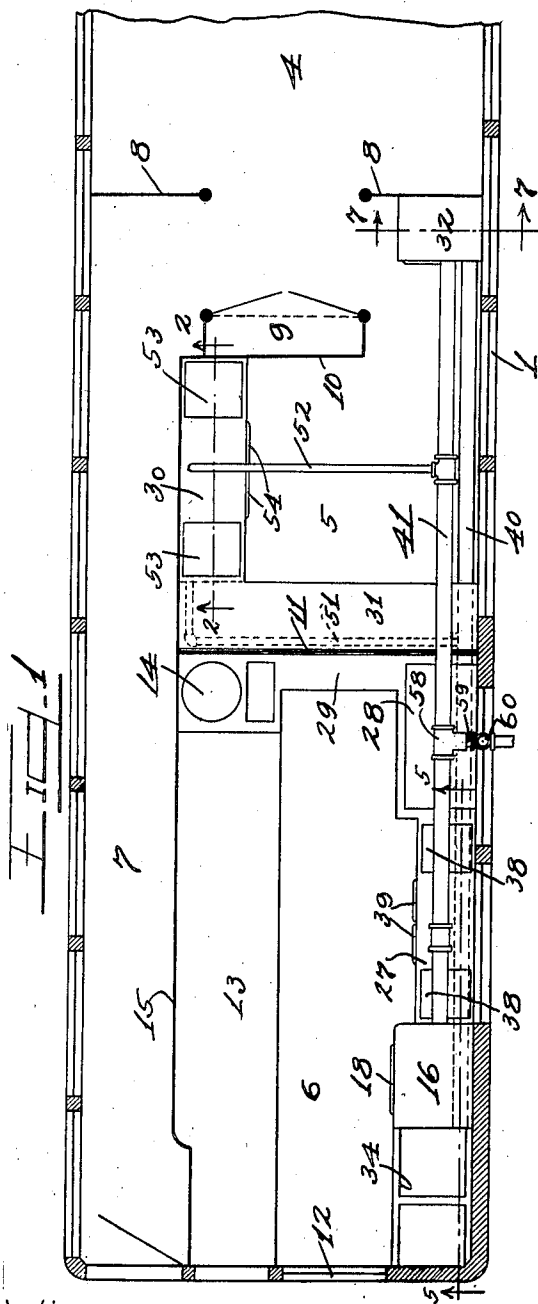
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W. WISHART ET AL

DINING CAR REFRIGERATOR INSTALLATION

Filed Aug. 8, 1921

4 Sheets-sheet 1



WITNESSES

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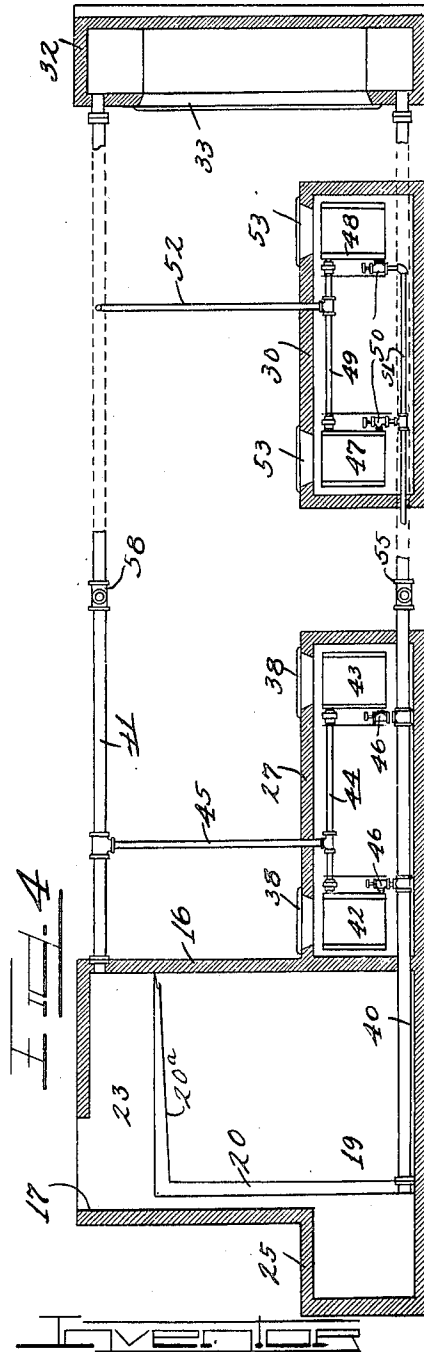
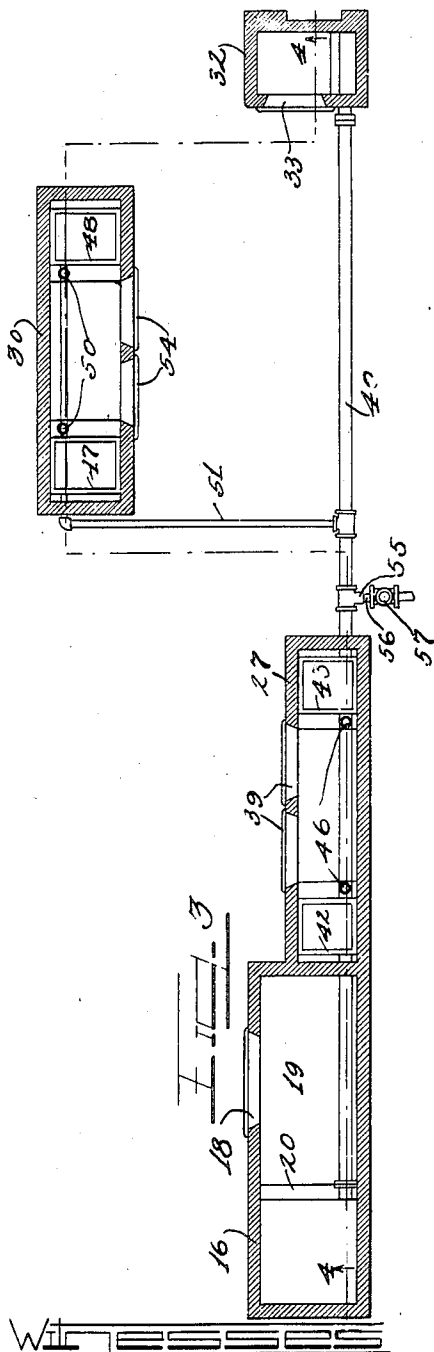
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DINING CAR REFRIGERATOR INSTALLATION

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4 Sheets-Sheet 2



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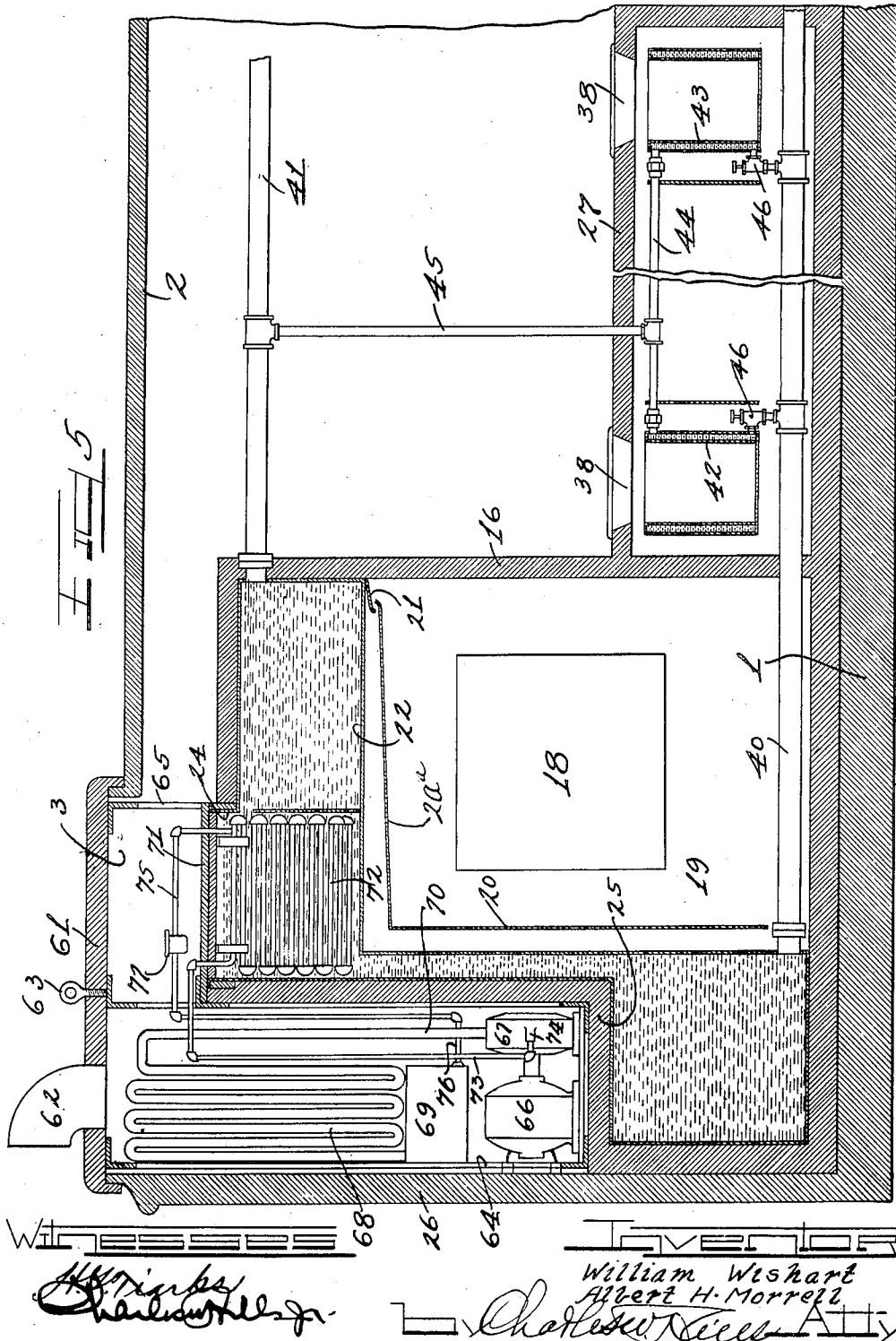
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DINING CAR REFRIGERATOR INSTALLATION

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Aug. 26, 1924.

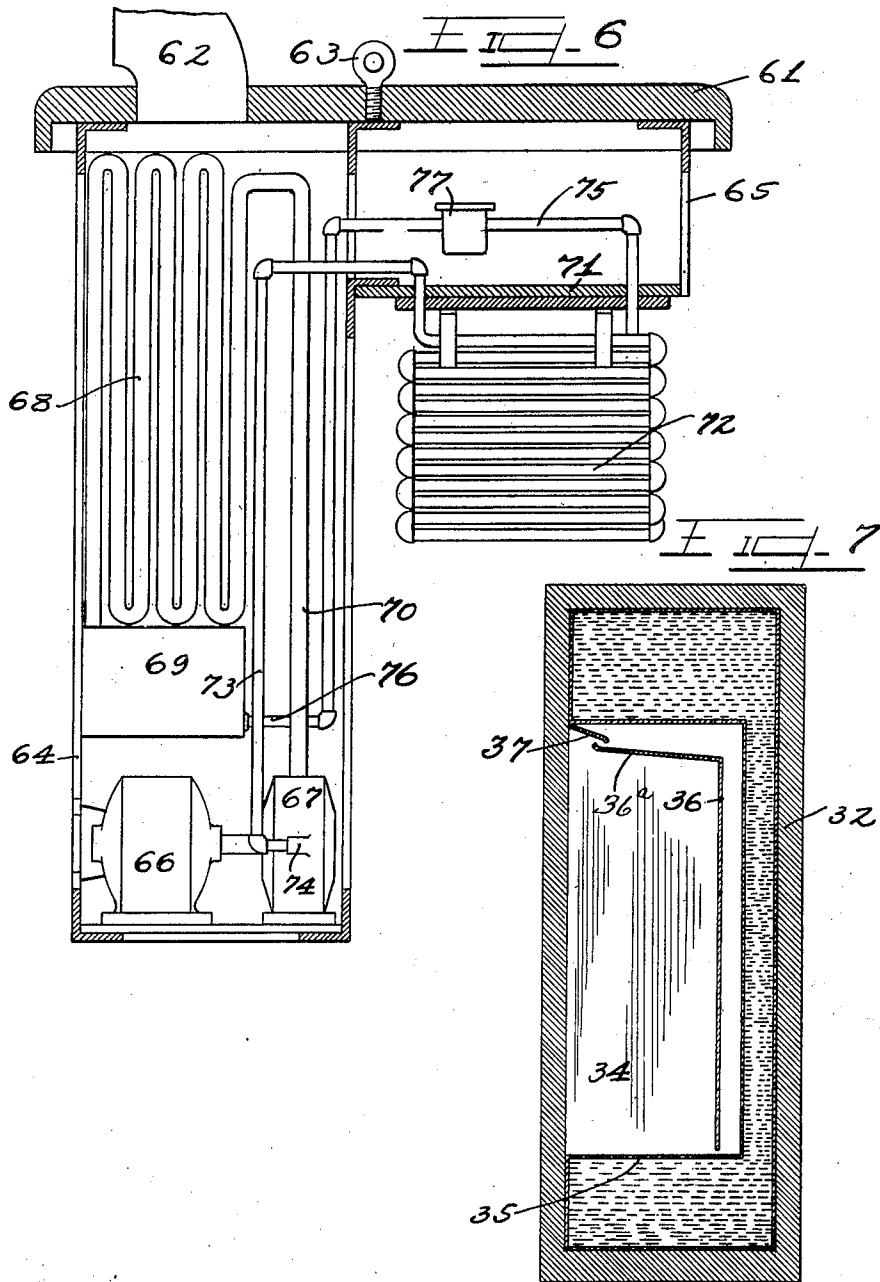
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DINING CAR REFRIGERATOR INSTALLATION

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4 Sheets-Sheet 4



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM WISHART AND ALBERT H. MORRELL, OF CLINTON, IOWA, ASSIGNORS, BY
MESNE ASSIGNMENTS, TO CLIMAX ENGINEERING COMPANY, OF CLINTON, IOWA,
A CORPORATION OF DELAWARE.

DINING-CAR REFRIGERATOR INSTALLATION.

Application filed August 8, 1921. Serial No. 490,781.

To all whom it may concern:

Be it known that we, WILLIAM WISHART and ALBERT H. MORRELL, citizens of the United States, and residents of the city of Clinton, in the county of Clinton and State of Iowa, have invented certain new and useful Improvements in a Dining-Car Refrigerator Installation; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates more particularly to a dining car refrigerating system wherein the main refrigerator box is equipped with a refrigerator high side and low side for the purpose of cooling brine which not only cools the main refrigerator box but also circulates through a pipe system connecting a plurality of subsidiary refrigerator boxes with the brine chamber of said main box to permit all of the refrigerator boxes to be brine cooled.

It is an object of this invention to provide a cooling system for cooling all of the refrigerator boxes of a dining car from one source.

It is also an object of the invention to install a combination high and low side refrigerating unit in a dining car to maintain a circulating cooling medium at a low temperature for the purpose of cooling all of the dining car refrigerator boxes.

Another object of the invention is to connect all of the various refrigerator boxes of a dining car by a piping system with a tank the cooling medium of which is cooled by a refrigerant expansion coil connected with a high side refrigerator unit.

A further object of this invention is to circulate a cooling medium through a piping system which connects all of the refrigerator boxes of a dining car with a tank containing the cooling medium and a refrigerant expansion coil for cooling said medium.

It is furthermore an object of the invention to equip the main refrigerator box of a dining car with a refrigerator high side unit having pipes connected with an expansion coil which projects into a brine chamber to cool the brine to cause circula-

tion thereof through a piping system connecting all the auxiliary refrigerator boxes of the dining car with the brine chamber of the main refrigerator box.

It is an important object of this invention to connect all of the refrigerator boxes of a dining car by means of a piping system adapted to be supplied with a cooling medium from a dining car supply tank or from an exterior source of supply when the dining car is not in motion and the cooling medium in the supply tank is not sufficient to supply the required amount of the cooling medium to the piping system.

Other and further important objects of this invention will be apparent from the disclosures in the specification and drawings.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings—

Figure 1 is a plan view of the interior of the kitchen end of a dining car equipped with a refrigerator installation embodying the principles of this invention.

Figure 2 is an enlarged detail section taken on line 2—2 of Figure 1.

Figure 3 is a horizontal section of the various dining car refrigerator boxes.

Figure 4 is a sectional view taken on line 4—4 of Figure 3.

Figure 5 is an enlarged detail section taken on line 5—5 of Figure 1 showing the roof of the dining car and the refrigerator high and low sides in place.

Figure 6 is a detail elevation of the refrigerator high side and low side unit with the supporting frame shown in section.

Figure 7 is an enlarged detail section taken on line 7—7 of Figure 1.

As shown in the drawings—

The reference numeral 1 indicates a dining car provided with a top 2, which has an opening 3 therein at one corner of the car. The dining car 1 is divided in a dining room 4, a pantry 5, a kitchen section 6 and a passageway 7. The passageway 7 leads from one entrance of the car between the kitchen section and one side wall of the car to the inner entrance to the dining room. The dining room 4 is separated from the passage 7 by side partitions 8 spaced apart to afford an open doorway. A buffet

or cabinet 9 is positioned transversely of the car in front of the inner end wall 10 of the kitchen section. A transverse wall 11 separates the pantry from the kitchen, and said wall is provided with openings to permit dishes and food to be passed from the kitchen into the pantry. Entrance into the kitchen is made through a doorway 12 at one end of the car 1.

The kitchen is equipped with a range 13 and with an urn 14, which are positioned longitudinally in the kitchen along the inner kitchen wall 15. Mounted in one corner of the kitchen 6 is a main refrigerator box 16 having an opening 17 in the top wall thereof. The main refrigerator box 16 is provided with a front door 18 affording access to a main refrigerating chamber 19 for keeping meats and other products. The chamber 19 is provided with a baffle 20 to the upper portion of which a drip pan 20^a is connected. A drip plate 21 extends over the upper end of the drip pan 20^a. A brine tank 22 is mounted in a chamber 23 of the box 16 and extends vertically at one side of the baffle 20 and across the upper portion of the box 16, as shown in Figure 5. The top of the brine tank 22 is provided with an opening surrounded by a flange 24, which projects upwardly into the opening 17 of the box 16. The main refrigerator box 16 is provided with a projection 25, into which the brine tank 22 projects. The box extension 25 abuts against the end wall 26 of the car 1.

Mounted in the kitchen against the outer longitudinal wall of the car is an auxiliary refrigerator box 27 and a sink 28. A shelf 29 is provided transversely of the kitchen on the wall 11. Stationed in the pantry 5 against the longitudinal inner wall thereof is a second auxiliary refrigerator box 30. A shelf or table 31 is disposed transversely of the pantry on the wall 11. The fruit and vegetable refrigerator box 32 is located in the pantry in the corner formed by one of the partitions 8 and the outer car wall of the pantry. The entrance to the pantry is between the cabinet 9 and the refrigerator box 32.

The refrigerator box 32 is provided with a door 33, which permits access to a cooling chamber 34 for fruits and vegetables. A brine tank 35 is mounted within the box 32 for the purpose of absorbing heat for cooling the chamber 34. If desired, a coil may be substituted for the tank 35. A baffle 36 and a drip pan 36^a are provided in the chamber 34. A drip plate 37 projects over the upper end of the drip pan 36^a.

The refrigerator box 27 is provided with top doors 38 and front doors 39 to afford access to the interior of said box.

Connected to the lower end of the main brine tank 22 is one end of a main brine sup-

ply pipe 40 which projects through the main refrigerator box 16 and through the auxiliary refrigerator box 27 and then passes through the pantry and connects with the lower end of the secondary brine tank 35 in the refrigerator box 32. Connecting the upper end of the primary brine tank 22 with the upper end of the secondary brine tank 35 is a main return brine pipe 41. The auxiliary refrigerator box 27 is provided with hollow cooling cylinders or jackets 42 and 43 connected to one another by an outlet or return pipe 44. Pipe coils may be used in place of the cylinders 42 and 43 if desired. A pipe 45 connects the pipe 44 with the main return pipe 41. The heat absorbing or cooling jackets 42 and 43 are each connected with the main brine supply pipe 40 by means of a regulating valve 46. The auxiliary refrigerator box 30 is provided with hollow heat absorbing or cooling cylinders or jackets 47 and 48 connected to one another at their upper ends by an outlet or return pipe 49. Pipe coils may be used in place of the cylinders 47 and 48. The cooling jackets 47 and 48 are each connected at their lower ends with a regulating valve 50 which connects with a brine feed pipe 51. The feed pipe 51 has one end connected with the main pipe 40 and extends across the pantry below the shelf 31 and into the box 30 to permit the regulating valves 50 to be connected therewith. Connected with the pipe 49 is one end of a return pipe 52, which projects upwardly out of the box 30 and across the top of the pantry to connect up with the main return pipe 41. The auxiliary refrigerator box 30 is provided with top doors 53 and front doors 54.

Connected in the main brine supply pipe 40 at the outside of the box 27 is a three way connector 55 to the middle arm of which a short pipe length 56 is connected. A shut-off valve 57 is provided in the pipe 56 and is adapted to be connected with an outside source of brine for charging the dining car brine system when the dining car refrigerating plant is out of commission. A three way connector 58 is connected in the main return pipe 41. A short pipe length 59 is connected with the middle arm of the connector 58 and has a shut-off valve 60 attached thereto to permit a return pipe of an outside refrigerating system to be connected with the return line of the dining car system.

For cooling the cooling medium such as brine used in the dining car refrigerating system a portable type combination high side and low side refrigerating plant unit is used, as illustrated in Figures 5 and 6. The portable unit comprises a peripherally flanged cover or plate 61 adapted to close the opening 3 in the car roof 2. A ventilating hood 62 is provided on the cover 61. To

lower the high side-low side unit in place an eye screw bolt 63 is secured to the cover. Attached to the bottom of the cover 61 is a supporting frame embracing a long section 64 and short section 65. The long frame section 64 projects into the space above the main refrigerator box extension 25 and between the end wall 26 of the car and the wall of the main refrigerator box. Supported in the long frame section 64 is a driving motor 66 connected to operate a compressor 67. Also mounted in the long frame section 64 is a condenser 68, one end of which is connected to a refrigerant tank 69, while the other end is connected by means of a pipe 70 with the outlet pipe of the compressor 67. The short frame section 65 supports a cover plate 71 for closing the opening 24 in the top of the main refrigerator box 16. Secured to said cover 71 is a low side expansion coil 72 which projects into the brine in the brine tank 22. The outlet end of the expansion coil 72 is connected by means of a pipe 73 with the inlet pipe 74 of the compressor 67. The intake end of the expansion coil 72 is connected by a pipe 75 with the outlet pipe 76 of the refrigerant tank 69. An expansion valve 77 is provided in the pipe 75.

The operation is as follows:

As shown in Figures 5 and 7, brine or any other cooling medium is provided in the tanks 22 and 35 and in the various pipes of the cooling pipe system. With the refrigerator low side expansion coil 72 projecting into the upper end of the brine tank 22 in the main refrigerator box 16 the brine in the upper portion of said tank 22 is adapted to be cooled by the refrigerant from the high side tank 69 flowing through the expansion coil 72 when the motor 66 is in operation to operate the compressor 67.

The refrigerant circulating through the expansion coil is permitted to expand and draws the heat from the brine. The heated refrigerant leaves the expansion coil 72 by way of the pipe 73 and enters the compressor 67 where it is compressed. The compressed refrigerant from the compressor 67 flows through the pipe 70 into the condenser 68 where it is condensed and allowed to enter the refrigerant tank 69 ready for re-use in the expansion coil 72. The heated brine in the upper portion of the brine tank 22 is thus cooled by the refrigerant passing through the expansion coil 72. As the brine is cooled it moves downwardly in the tank 22 and out through the main pipe 40 to enter the lower end of the brine tank 35 in the fruit and vegetable refrigerator box 32. The cooled brine in the tank 22 is adapted to serve as a stored cooling means adapted to cool the system for a considerable period of time after the machine has been stopped. The cold brine from the main pipe 40 also

circulates through the cooling cylinders 42 and 43 of the auxiliary refrigerator box 27 when the valves 46 are open. From the cooling cylinders 42 and 43 the brine which gradually becomes heated while circulating rises in the pipe 45 and flows back into the upper portion of the brine tank 22 by way of the main return pipe 41.

Cold brine from the pipe 40 flows through the pipe 51 into the cooling cylinders 47 and 48 of the auxiliary refrigerator box 30 when the valves 50 are open. From the cylinders 47 and 48 the brine which gradually becomes heated rises in the pipe 52 and returns to the main brine tank 22 by way of the main return pipe 41. It will thus be seen that the cold brine is circulated through the refrigerator system thereby cooling the various refrigerator boxes in the dining car kitchen and pantry.

The main refrigerator box 16 located in the kitchen is adapted to have meats or other food products stored in the chamber 19 thereof. The chamber 19 of the box 16 is provided with a baffle 20, a drip pan 20^a and a drip plate 21 to provide a path whereby air is conducted against the surfaces of the brine tank 22 to produce a circulation for cooling the box 16. The plate 21 and the pan 20^a prevent moisture from dripping on the foods. A similar baffle 36, drip pan 36^a and drip plate 37 are provided in the cooling chamber of the fruit and vegetable refrigerator box 32.

The auxiliary refrigerator box 27 is located in the kitchen and is provided with the cooling cylinder or jacket 42, which may be used for fish, while the cooling cylinder or jacket 43 is adapted to receive a can of milk. The middle cooling chamber in the box 27 is accessible through the front doors 39 and may be used for storing any kind of food products. The auxiliary refrigerator box 30 is located in the pantry and the cooling cylinder 47 thereof is adapted to receive a cream can, while the cooling cylinder 48 is for ice cream. The cooling chamber between the cooling cylinders 47 and 48 is accessible through the front doors 54 and may be used as desired.

It will of course be understood that any number of refrigerator boxes may be connected in the system and connected by suitable pipes with the cooling brine tank 22. If preferred a cooling medium other than brine may be used if desired.

In case trouble is developed in the refrigerator high side and low side unit so that the brine cannot be cooled the dining car may be run on a side track and connected with an external refrigerator brine charging station by means of suitable pipes which may be removably connected with the valves 57 and 60 to charge the dining car refrigerator system with cold brine sufficient to last

until the next external charging station is reached or until the refrigerator high side and low side unit is repaired.

Attention is called to the refrigerator high side and low side unit which may be removed through the roof of the dining car as a unit by connecting a hoisting cable with the screw eye 63.

We are aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and we therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

We claim as our invention:

1. A dining car refrigerator system, comprising a main refrigerator box embodying a food-receiving chamber, a brine tank therein, a plurality of auxiliary refrigerator boxes, a pipe system connecting said auxiliary boxes with the brine tank, and a refrigerator high side and low side unit associated with the brine tank with the low side projecting into the brine tank to cool the brine therein and thereby cause circulation of the brine through the main refrigerator box and through the auxiliary refrigerator boxes to cool the same.

2. In a dining car refrigerating system, a main refrigerator box, a brine tank therein, a removable cover for an opening in the car roof above said box, and a refrigerator high side and low side unit fixed to the underside of said cover and adapted, when said cover is in position on said car roof, to be positioned with its high side alongside said box and with its low side in said box brine tank.

3. In a dining car refrigerating system, a main refrigerator box, a brine tank therein, a removable cover for an opening in the car roof above said box, a refrigerator high side and low side unit fixed to the underside of said cover and adapted, when said cover is in position on said car roof, to be positioned with its high side alongside said box and with its low side in said box brine tank, a plurality of auxiliary re-

frigerator boxes and pipes connecting said main and auxiliary boxes to provide a circulation of the brine therethrough.

4. The combination with a dining car, a closed circulating system therein containing a heat exchange medium, means in the car for cooling said medium, and means connected with said system whereby a charge of the heat exchange medium may be supplied thereto from an exterior charging plant when the cooling means in the car is out of commission.

5. The combination with a dining car, of a closed circulating system therein embodying a plurality of refrigerator boxes, means in the dining car for cooling said system, and means for connecting an external cooling medium charging plant with said system to supply a cooling medium charge thereto when said cooling means is out of commission.

6. The combination with a dining car, of a closed circulating system embodying a plurality of refrigerators, a combination high side and low side refrigerator unit in the dining car and connected with one of said refrigerators for cooling said system, and means connected with said system for supplying a cold charge of the cooling medium from an exterior charging plant when the high side and low side refrigerator unit is not in operating condition.

7. The combination with a plurality of dining car refrigerators each embodying a food-receiving chamber, of a brine circulating pipe system connecting said refrigerators in tandem, and means in one of said refrigerators adapted to cool the brine to cause circulation thereof through the various refrigerators to cool the same.

In testimony whereof, we have hereunto subscribed our names in the presence of two subscribing witnesses.

WILLIAM WISHART.
ALBERT H. MORRELL.

Witnesses:

FRED E. PAESLER,
JAMES M. O'BRIEN.