June 14, 1938. J. H. VAN ALSBURG 2,120,433

REFRIGERATOR CAR

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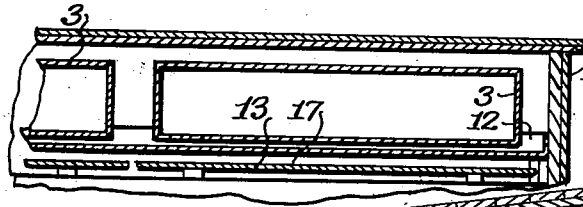

Fig. 3.

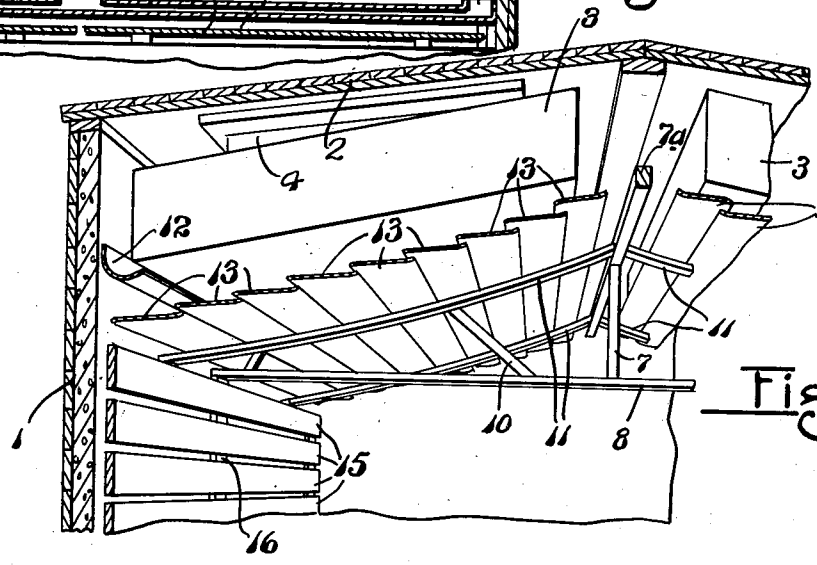

Fig. 1.

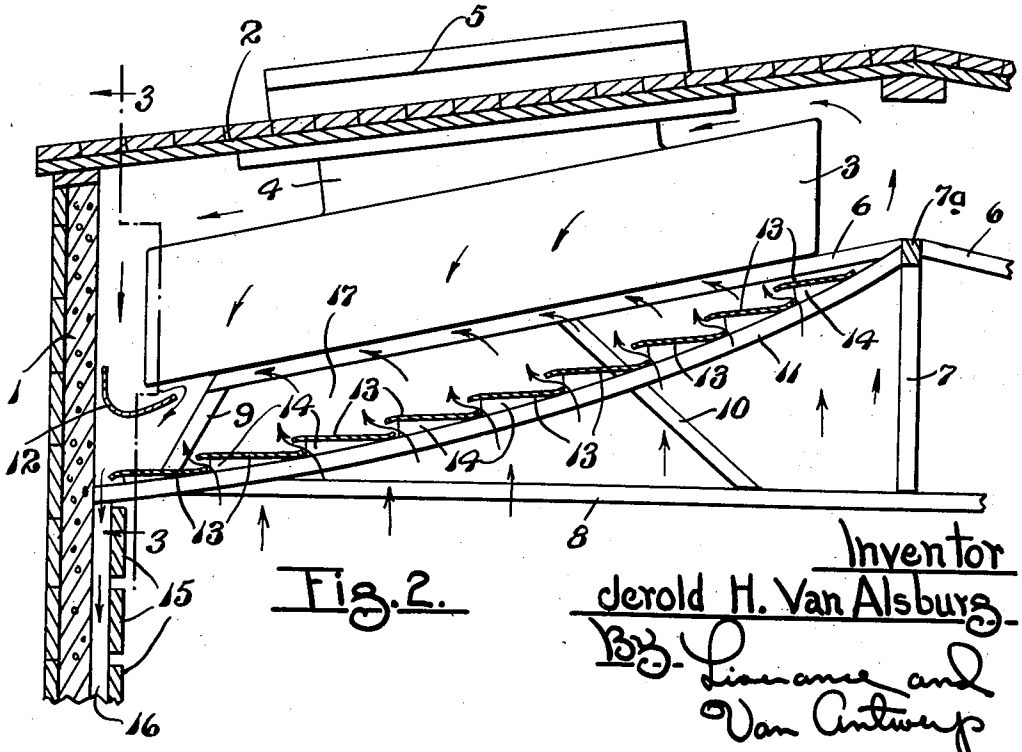

Fig. 2.

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REFRIGERATOR CAR

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5 Claims. (Cl. 62—17)

This invention relates to refrigerator cars and is primarily concerned with novel equipment and a method of refrigerating a railway car including construction which provides a circulation of air upwardly at the middle portion of the car and substantially the full length thereof, directs it laterally to the sides during which time the air is cooled and thence passes downwardly along the sides of the car to come in at each side at the bottom to resupply that which is rising at the middle portion. Therefore, at each side and for the full length of the car there is an upward circulation at the middle of the car, a carrying of the air laterally in both directions at an upper part of the car, with a cooling of the air while it is thus carried laterally and then a downward drop because of the greater specific gravity of the cooled air at each side and for the full length of the car.

The air within a refrigerator car has water vapor therein and it absorbs more water vapor as it becomes warmer. When it contacts the cooling member such vapor is condensed, becomes water and has to be taken care of. In my invention means are provided not only to conduct the condensation which takes place upon the cooling units but also upon air passing members located below the cooling units which likewise have condensation thereon. Such condensed vapor, in the form of water, is carried laterally to each side of the car and drops to the bottom away from the load in the car. It would be very detrimental to have water formed as a condensation of the vapor dripping upon the load, such as fruit, meats or any other food articles which are shipped to a large extent in refrigerated cars.

Further, in the construction of my invention there is a progressively increasing volume of air flowing laterally from the middle part of the car toward the outer side, this being provided through a progressively greater distance of the air passage members from the lower side of the cooling elements, thereby facilitating the air circulation and providing a more efficient cooling.

An understanding of the invention and the embodiment thereof, which at present seems best to me, may be had from the following description, taken in connection with the accompanying drawing, in which,

Fig. 1 is a fragmentary perspective and cross sectional view of the upper portion and at one side of a car equipped with my invention,

Fig. 2 is a somewhat enlarged transverse section through the upper part and to one side of the car, and

Fig. 3 is a reduced longitudinal sectional view taken along lines 3—3 of Fig. 2.

Like reference characters refer to like parts in the figures of the drawing.

The refrigerator car may have the usual body with sides 1, roof 2 and of course, a floor, the body of the car being equipped with suitable heat insulation lining so as to exclude as much as possible the entrance of heat from the outside. With my invention, immediately below the roof of the car and at each side thereof, are tanks 3 having inlet necks 4 extending from the upper side thereof through the roof, closed at their upper ends by doors 5, this being for the replenishment of the tanks with ice when needed. The drainage of the water from the tanks is old and well known and has been used in car refrigeration previously and need not be here shown and described. At each side of the longitudinal vertical plane of the car a number of these tanks may be provided so as to substantially extend the full length of the car. The width of the tanks is such that the ends approach, respectively, the sides 1 of the car and the middle plane of the car.

These tanks are supported on a truss frame structure, lying immediately upon bars 6 which extend downwardly and outwardly from the upper ends of central posts 7, which are preferably connected with a longitudinal rail 7a; horizontal bars 8 extending across from one side of the car to the other and end bars and intermediate bars 9 and 10, respectively, connecting the bars 6 and 8 as shown. The tanks 3 incline downwardly and outwardly toward each side 1 of the car. Downwardly and outwardly curved bars 11 also lead from the center rail 7a to each side of the car, their outer ends being supported in any preferred manner and lying substantially in the plane of the horizontal lower bar 8. This truss structure, of course, may be used to support the goods which are carried within the car, such as meat or the like, which can be hung by hooks from the lower horizontal bars 8, if desired. A longitudinal trough 12 extends lengthwise of and at the inner side of each side of the car, being located adjacent the lower outermost corners of the tanks 3 so that vapor condensed as water on the tanks and moving by gravity to said lower outermost corner drops therefrom into the trough and is carried to one end of the car and drained away.

Beneath each of the tanks 3 and supported

on the curved bars 11 are a plurality of eliminator plates 13 which are located in partially overlapping and spaced relation, as best shown in Fig. 2, the outer edge portions of the successive plates being disposed above, extending over and spaced from the inner edge portions of the adjacent lower and outer plates. With a plurality of tanks extending the length of the car, said tanks will be spaced apart at their ends for a short distance and, preferably, the length of the plates 13 will be such that at their ends they will project a few inches beyond the adjacent ends of the associated cooling tank 3 above. The plates are supported by supporting members 14 of substantially triangular form as shown so as to properly locate the same with respect to the next adjacent plates and provide longitudinal spaces between the adjacent overlapping edge portions of the respective plates. It will be noted that the outermost plate 13 adjacent a side of the car is spaced from the vertical side 1 of the car. With such construction the vapor condensed in the form of water upon the plates will flow outwardly to the outer edges of the plates and drop below to the next lower plate and finally drop from the outer edge of the outermost plate 13, falling in a vertical space which is made between the inner side 1 of the car and a plurality of spaced apart vertical boards 15 extending downwardly at each side of the car from a point directly below the outer ends of the truss frame structure to the floor of the car. The boards 15 are nailed or otherwise permanently secured to suitable vertical spacing strips or studding 16. It is between the inner side of the side 1 of the car and these boards 15 that the cooled air falls and thence passes to the interior of the car between said boards.

The passage 17 for the air between the lower sides of the tanks 3 and the upper sides of the eliminator plates 13 progressively increases in area toward its outer end. It will be evident with this construction that the air in the lower part of the car, as it becomes warmer, rises as indicated by the upwardly pointing arrows in Fig. 2 until it comes to the plates 13 and thereupon it passes above said plates through the passages between the adjacent overlapping spaced apart edge portions of the consecutive plates. It then rises upwardly and strikes against the lower side of the downwardly inclined tanks 3, is cooled, gives up some of the water vapor which it carries as condensation on the tanks, and other portions of said vapor are condensed on the plates 13. The volume of air reaching the passage 17 and striking against the tanks 3 is increased toward the outer sides of the car by reason of the additional warm air from below coming into said passage 17. The air finally passes underneath the trough 12 and downwardly into the passage outside of the boards 15 as indicated by the downwardly pointing arrows in Fig. 2.

With this construction and method of air circulation control in refrigerator cars, the car may be loaded the full length of the car without interfering with the height of the load. A very even temperature in the car is attained, the air being given a double circular motion upwardly at the longitudinal central portion of the car and outwardly in both directions and then downwardly at each side of the car. Any and all condensation from the air is fully taken care of without danger of damage to the goods which comprise the load in the car.

The invention is one which can be readily manufactured and installed in refrigerator cars. The claims appended hereto define the invention which is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A refrigerator car having a roof and vertical sides, a plurality of refrigerating elements located in spaced end to end relation lengthwise of the car at each side of the central longitudinal vertical plane of said car, said elements being inclined downwardly and outwardly and at their outer sides being spaced from the sides of the car, longitudinal drain troughs located underneath the outer lower corners of said elements, a plurality of longitudinal plates underneath said elements disposed in overlapping spaced apart relation at adjacent edge portions, said plates being spaced from the undersides of said elements and extending generally downwardly and outwardly, the outermost of said plates at each side of the car being spaced a short distance from the inner side of the adjacent vertical side of the car, the plates under each element at each end extending a short distance beyond the corresponding ends of the elements, and the outermost and innermost plates under each element extending respectively beyond the outer and inner sides of the elements with which associated.

2. A construction containing the elements in combination defined in claim 1, said plates being located with respect to said elements with which associated so that the vertical distance between the lower sides of an element and said plates progressively increases outwardly toward the vertical sides of the car.

3. A construction containing the elements in combination defined in claim 1, combined with vertical conduits along the inner side of each side of the car above the upper ends of which the outer edges of the outermost plates are positioned, said conduits being bounded by the inner side of each vertical side of the car and by vertical members spaced therefrom and secured fixedly in relation thereto, said vertical members having air passing spaces between them.

4. A refrigerator car having a roof and vertical sides, a plurality of refrigerating elements located in spaced end to end relation lengthwise of the car at each side of a medial longitudinal vertical plane therethrough, said elements being spaced apart and also being spaced from the top and sides of the car and spaced from the medial plane through the car whereby air may pass on all sides thereof, a plurality of longitudinal plates underneath each of said elements, said plates being of slightly greater length than the element thereabove and disposed in overlapping spaced apart relation at adjacent edge portions, said plates being materially spaced from the undersides of the said elements and extending generally downwardly and outwardly, the outermost of said plates at each side of the car being spaced a short distance from the inner side of the adjacent vertical side of the car and means for supporting the plates in position.

5. A combination of elements as set forth in claim 4 wherein the plates have a cross sectional form in which the inner edges are turned upwardly and the outer edges are turned downwardly for the purpose described.

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