HEATED REFRIGERATOR CAR

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2 Claims. (Cl. 237—31)

1. This invention relates to heating systems for refrigerator cars and more particularly to improvements in means for effectively distributing heated air from a heating device to the entire loading space in ice bunker type refrigerator cars.

While the heating system of this invention is especially suited to the heating requirements of railway refrigerator cars, it is obviously adapted for other purposes, and may be employed for heating box cars, motor trucks and vans, ships, and storage houses, generally.

In cold or freezing weather, refrigerator cars are generally provided with heating devices intended to maintain the air in the merchandise or lading chambers at such temperatures as will protect perishable commodities from the damage that is caused by cold or freezing temperatures. Many of the existing heating systems fail to provide for a circulation of warm or heated air or heating fluids effective to promote even temperature conditions throughout the lading chamber. In many instances such systems furnish heating fluids at points within the chamber which permit the formation of cold pockets or the formation of cold air layers at the floor level or at the central portion of the chamber. Some of the known systems permit the damage of goods through overheating the upper part of the lading space or permit the freezing of portions of the shipment adjacent the doors and/or the floor of the shipment chamber. Many of the known heating systems for refrigerator cars provide a heater device within the lading chamber or within an ice bunker, thereby preventing full use of the lading space and making it difficult to service the heater while the car is in transit. While it is known to arrange a car heating device below the floor of refrigerator cars, such systems heretofore have generally been inefficient and ineffective through the loss of heat and the uneven distribution of heating fluids to the lading chamber.

It is, therefore, the principal object of this invention to provide an improved heating system for shipping vehicles, such as railway refrigerator cars, in which even temperatures are efficiently maintained throughout the lading chamber.

It is another object of this invention to provide a heating system for refrigerator cars in which heat or heated air is evenly supplied to the coldest portions of the lading space, i.e., to the ends of the car adjacent the floor level and to the central portion of the car adjacent the bottom of the car doors.

It is another object of this invention to provide a car heating system in which cold air from adjacent the car doors is heated and delivered to the ends of the car through a novel arrangement of ducts and a heating device.

It is another object of this invention to provide an air heating and air distributing system for refrigerator cars that does not utilize any of the lading space of the car.

It is a further object of this invention to provide an improved heating system for refrigerator cars in which the heating device may be easily and quickly serviced without disturbing or exposing the goods loaded within the lading space.

It is a still further object of this invention to provide a heating system for refrigerator cars in which the heating unit is securely locked against movement or vibration while the car is in transit.

Other objects and advantages of this invention will be readily apparent from the following detailed description of the preferred embodiments of the invention shown in the accompanying drawings in which:

Figure 1 is a plan view, partially in section of the lower portion of a refrigerator car, showing details of the improved heating system of this invention.

Figure 2 is a vertical longitudinal section view taken along line 2—2 of the refrigerator car shown in Figure 1.

Figure 3 is a horizontal section view of the heater storage box showing the air duct connections thereto.

Figure 4 is a vertical longitudinal section view showing the location of the transverse outlet duct of Figure 3 with respect to the end wall and floor of the car.

Figure 5 is an elevation view, partly in section, of the front of the heater storage box showing details thereof.

Figure 6 is a vertical section view taken on line 6—6 of Figure 5, showing diagrammatically a heater positioned in the heater box.

Referring now to the drawings, Figures 1 and 2 illustrate an embodiment of the heating system of this invention as applied to a railway refrigerator car of the overhead ice bunker type construction. The refrigerator car shown has the usual lading space or merchandise chamber enclosed by end walls 11, side walls 12, and a floor 13. The side walls 12 are provided with the usual doors 14 at or adjacent the longitudinal center of the car. The car is provided with a suitable roof 15, shown in Figure 2, and with overhead ice bunkers 16, adjacent the underside of the roof. The car walls, floor and roof may be constructed on the usual wooden or metal frame
work and preferably are insulated according to standard practice. Suitable roof hatches providing access for filling the bunkers 16 and drain boards for carrying off water from melted ice may be provided. The floor 13 may be of plywood, supported above a subfloor 17 by longitudinal stringers 18. As shown in Figures 1 and 2 at the right end thereof, the floor 13 is provided with the usual spaced floor rafts 19 supported on cross members 20 laid over the floor 13, to provide for the circulation of air beneath the merchandise in the lading space 10. Conventional insulation 21 is provided between the floor 13 and the subfloor 17. The longitudinal frame of the car may include the usual channel side sills 22 and a center sill 23.

The heater box 30 is suspended from the frame of the car, preferably slightly off the transverse center of the car, so as to be clear of the usual doorway step (not shown). The box 30 may be supported by reinforcing angle irons 31 secured to the box and bolted or otherwise secured to cross frame members of the car. The box 30 is located to one side of the longitudinal sill member 23, as shown in Figure 6. The walls and floor of the box 30 are preferably formed by spaced sheet metal plates 32 and 33 provided with fire resistant heat insulation 34 therebetween. A hinged door 35 is provided on the front of the box 30, hung on the horizontal pivots 36, and having one or more chains 37 or equivalent stop devices to support the open door 35 in the horizontal position shown in dotted lines in Figure 6. The supporting chains 37 may be connected with springs or counter weights to over-balance the weight of the door 35, and thereby insure its closing, should it be inadvertently left in the open position. A safety bolt or pin 38 is provided in the car sill frame member 22 to prevent the door 35 from swinging to the open position in case the door becomes unfastened while the car is in transit. A suitable locking device such as the pivoted bar 39, the catch 40, and hook or padlock 41, is provided to secure the door 35 in the closed position. When the door 35 is in the open position, its inner lining is preferably in alignment (level) with the inner surface 32 of the bottom of the box, in order to permit the heater unit 42 to be drawn outward onto the supported door for servicing.

The heater unit indicated by the numeral 42 may be of any conventional type such as, for example, as those shown in United States Patents Nos. 1,905,954, dated April 25, 1933, 2,068,281, dated December 22, 1938, 2,211,631, dated August 13, 1940, or other types of automatic fuel burners. Such heaters provide a fire pot and a magazine for automatically feeding fuel, such as "charquettes," to the fire pot, or provide a liquid fuel burner. The bottom of the heater box 30 is provided with upstanding angle iron stops or lugs 43 which may engage slots or flanges in the base of the heater unit 42 to prevent the heater from shifting its position during transit of the car. Likewise the inner face of the heater box door 35 is provided with a recess 44 to receive the handle 45 of the heater 42 for preventing the heater from turning in the box 30 after the door 35 is closed. When the door 35 is closed as shown in Figure 6, the inner portion of the door engages the handle 45 of the heater 42 to force the heater against the stops 43 to prevent shifting or vibration of the heater in transit. The heater box upper section may be provided with a spreader angle 46 engaging the top of the heater unit 42 to further prevent the latter from moving out of place during jarring incident to coupling, switching, etc. The ducts for circulating heated air from the box 30 to the lading space 10 and for the return of cool air to the box will now be described. The upper portion of the box 30 is in direct communication with sheet metal ducts 50 leading from the heater 42 and extends laterally at right angles at each end of the car. Dampers 49 may be provided in each duct 50. The ducts 50 curve from the box 30 to the center line of the car and thence run longitudinally in the space between the floor 13 and the subfloor 17. The ducts 50 may be covered with asbestos paper and are placed in insulating material 21 between the car floors. The ducts 50 are preferably tapered in thickness towards the ends of the car to provide for even air circulation. The transverse outlet ducts 51 at the ends of the car are provided with outlet louver 52 for directing the flow of heated air horizontally toward the center of the car along between the flooring 13 and the floor rakes 19. A return duct 53 is provided extending from a floor screen 54 near a car door 14, to the inner wall of the heater box 30 for return ducts 51, and to the box 30, for heating. The duct 53 is connected to a vertical flue or passageway 55 in the inner wall of the box 30 as shown in Figure 6. The passageway 56 opens into the bottom of the box 30. A second return duct or passageway 56 extends from the floor screen 51 to a flue or duct 58 in the door 35 of the heater box 30, the duct 58 also opening into the bottom of the box 30. The inlet screens 54 and 57 direct the return of cool air from the car body into the heater box for heating. The heater box 30 may be provided with a water trap 60 in the bottom of conventional type, for permitting any water that may accidentally enter the box to flow outward through the drain pipe 61. The heater box sides may be provided with inlet pipes 62 for use when additional fresh air is required for heater operation. Where a "charquettes" type of heater unit 42 is used, an extensible filling chute may extend outward therefrom through the door 35, and an ash removal opening may be provided in the bottom of door 35, to permit servicing of such heaters without opening the heater box 30.

The operation of the heater heating system described above will now be described. A suitable heater unit 42 is charged with "charquettes" or liquid fuel or the like, ignited, and pushed into the heater box 30 until the stops 43 engage the base of the unit. The door 35 is then closed and fastened with the latch 39. Hot air, heated by the unit 42 rises in the heater box and flows to each end of the car through the insulated ducts 59. At the ends of the car, the heated air is distributed transversely of the car by the duct 51, and is directed horizontally toward the center of the car by the louvered outlets of duct 51 between the floor 13 and the floor slats 19. The heated air rises between the slats 19 to evenly heat the entire lading space 10 within the car. The central portion of the car may be heated to some extent by the radiation of heat upwards from the central heated heater bottom. Subsequently cool air is returned from the center of the car through the ducts 53 and 56 to the bottom of the heater box 30, for reheating.

When it is necessary to service the car heater unit 42, the operator unlocks and lowers the door 35 of the heater box to the horizontal position while raising the stop pin 38. The heater unit...
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is then drawn outward onto the horizontal inner surface of the door where the heater can be cleaned and refilled with “charquettes” and re-ignited. The service operation may be completed quickly without opening the car doors and without disturbing or cooling the merchandise within the lading space. The serviced heater is then pushed back in position in the heater box, the door closed and locked, and the car is ready to continue to its destination.

The arrangement of the insulated heater box and distribution ducts promotes even and efficient heating of the lading space and effectively prevents the formation of cold spots or cold layers which might damage perishable merchandise. The improved construction of the heater box prevents the heater unit from shifting its position during transit and also facilitates servicing the heater when necessary.

It will be readily apparent from the above description that this invention is particularly applicable to many forms of railway and road vehicles, and to ships and storage houses, as well as to the refrigerator type car described herein. Only preferred embodiments of this invention have been shown and described, but other forms and modifications embodying our invention may be readily devised within the spirit and scope of the invention, as defined by the following claims.

We claim:

1. In a heating system for a refrigerator car having a floor, side and end walls and a roof, the combination comprising: a heater box supported below said floor, warm air distribution ducts extending from the upper portion of said box to the ends of said box adjacent the floor level of said car, air return ducts within said car and heater box extending from the floor level of said car to the bottom of said heater box, said box having a door on one side thereof pivoted to the bottom edge of said box, said door having a recess in the inner face thereof, and a removable heating unit positioned within said box with a projecting portion of the unit extending into said recess in said door.

2. In a heating system for a refrigerator car having a floor, side and end walls and a roof, and having a door in each of said side walls near the central portion of the length of said car, the combination comprising a heater box supported below said car floor near the center of said car, closed warm air ducts extending from said heater box to each end of said car, a transverse air duct at each end of said car in communication with said first mentioned ducts, said transverse duct having louvered air discharge openings adjacent the surface of said car floor, and air return ducts within said car and heater box extending from the level of said floor to the bottom of said heater box, one of said return ducts starting adjacent one side wall of said car adjacent the bottom of the door in said side wall and extending horizontally through said floor to said heater box, the other of said return ducts extending vertically downward from said car floor adjacent the bottom of the door in said other wall through the front wall of said heater box to the bottom there-of.

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