

June 15, 1954

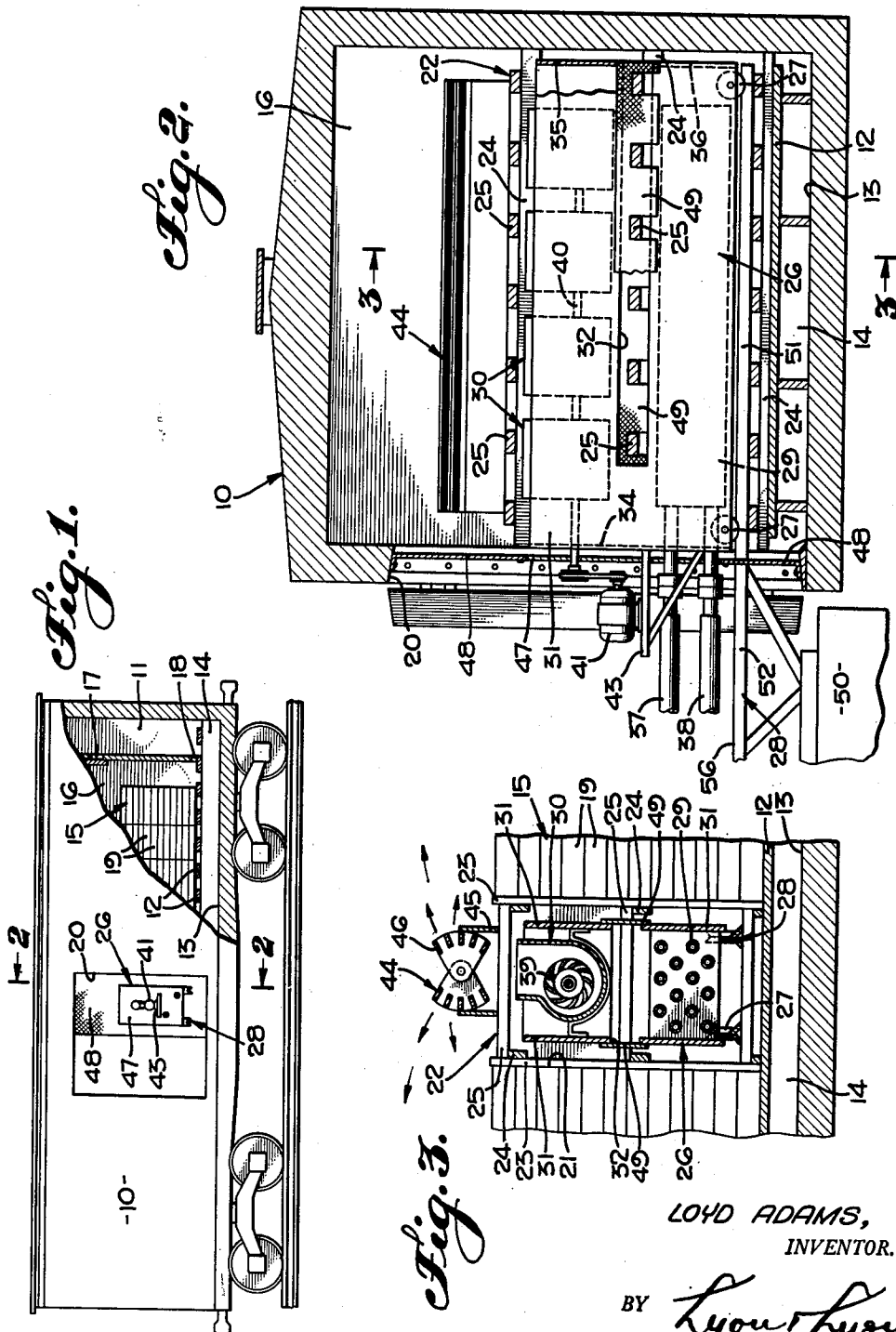
L. ADAMS

2,680,957

CAR PRECOOLING APPARATUS

Filed Sept. 22, 1950

2 Sheets-Sheet 1



LOYD ADAMS,
INVENTOR.

BY *Lyon & Lyon*
ATTORNEYS

June 15, 1954

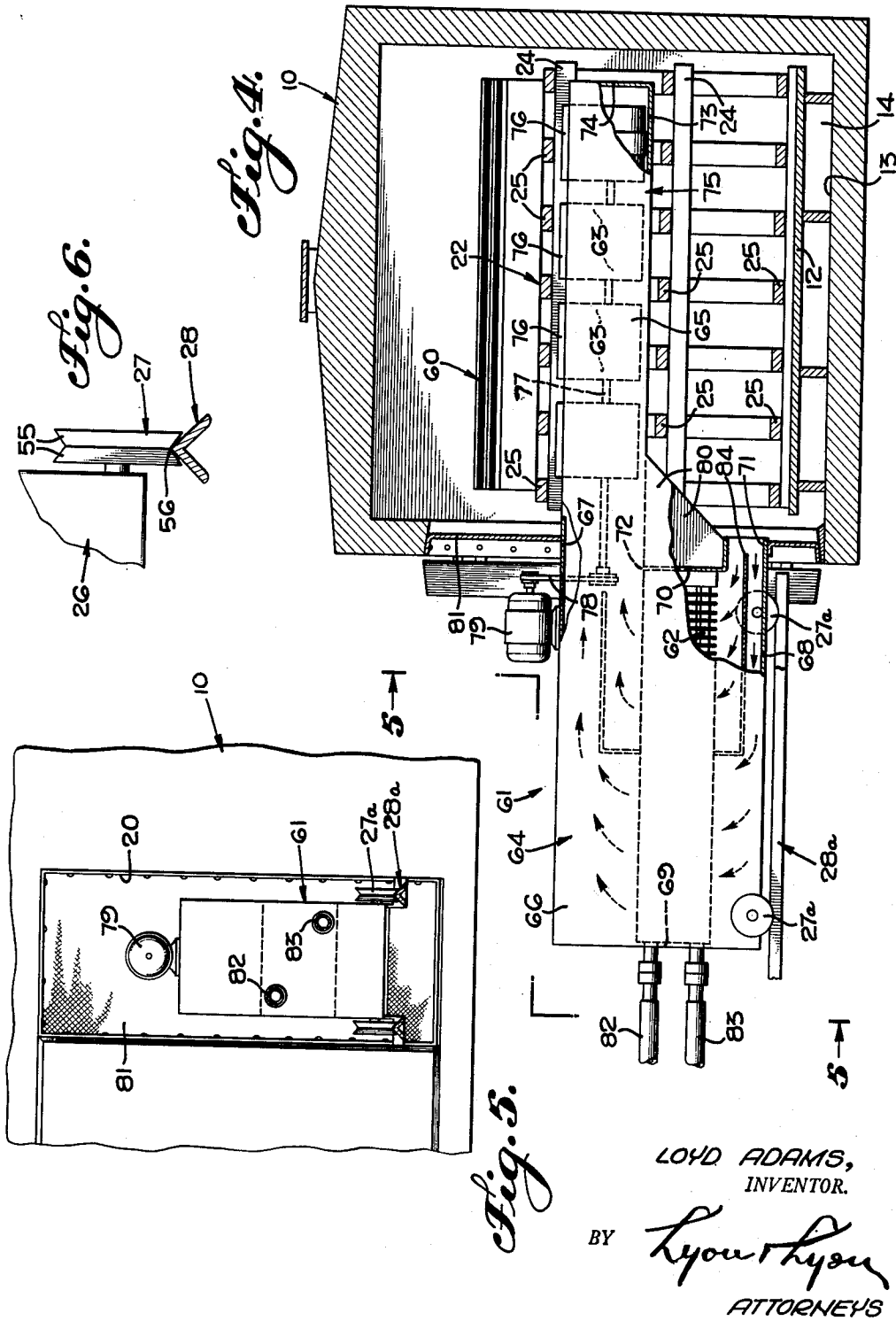
L. ADAMS

2,680,957

CAR PRECOOLING APPARATUS

Filed Sept. 22, 1950

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,680,957

CAR PRECOOLING APPARATUS

Lloyd Adams, Maywood, Calif., assignor to Calavo Growers of California, Los Angeles, Calif., a corporation of California

Application September 22, 1950, Serial No. 186,215

7 Claims. (Cl. 62-117)

1

This invention relates to a method and apparatus for precooling the load or contents of a railway refrigerator car prior to starting the car in transit.

The majority of fruits and vegetables which are transported to market by refrigerator cars are grown in areas having warm climates, such as in California, Florida and other sections of the South and Southwest. The fruit consequently arrives at the cars and is loaded at an atmospheric temperature of approximately 80 to 90° or more. In order to preserve the fruit, the temperature of the car and contents must be brought down to, in some cases, as low as 34° F. and maintained at that temperature while it is in transit. One of the principal objects of my invention is then, to provide an improved method and apparatus for quickly cooling the car to the desired temperature before it is started in transit.

In order to provide adequate air circulation into the car interior from the conventional ice bunkers located at the ends of the car while in transit, both carriers and shippers have agreed upon standard methods of loading and bracing wherein the load is divided into two sections forming a transverse central aisle or air passage between the loads and providing space for a suitable form of bracing or shoring which secures the load against shifting, displacement and damage. It is desirable to precool the car after the load bracing is installed in place so that the car may be sealed immediately after the precooling operation has been completed. The present method of loading and bracing so limits the unimpaired space in the transverse aisle between the sections of the load that known devices for precooling freight cars (for example, that described in my United States Patent No. 2,323,439) cannot be used after the bracing has been installed. Another important object of my invention is, then, to provide apparatus for precooling freight cars which does not require any substantial change in the present method of loading and bracing.

Another object of my invention is to provide car precooling apparatus embodied in a unit adapted to be inserted in the central aisle of a refrigerator car and partially supported by the standard load bracing.

Another object of my invention is to provide novel and improved track and roller means for easily and rapidly inserting a precooling unit in or removing it from the central aisle of a refrigerated freight car.

Other objects and advantages of my invention

2

it is believed will be readily apparent from the following detailed description of preferred embodiments thereof when read in connection with the accompanying drawings.

In the drawings:

Figure 1 is a side elevation, partly in section, of a conventional railway refrigerator car, illustrating a preferred embodiment of my invention in place in the central aisle thereof.

Figure 2 is a sectional elevation taken substantially on the line 2-2 of Figure 1.

Figure 3 is a sectional elevation taken substantially on the line 3-3 of Figure 2.

Figure 4 is a sectional elevation similar to Figure 2, but illustrating a modified form of my invention.

Figure 5 is a sectional elevation taken substantially on the line 5-5 of Figure 4.

Figure 6 is a detail view illustrating the rail and roller arrangement for moving the precooling unit in and out of the refrigerator cars.

Referring now to the drawings, particularly Figures 1-3, a preferred embodiment of my invention is illustrated in operative position in a refrigerator car, generally indicated 10, which may be of any suitable or desirable construction as is well understood in the art and which normally is provided with refrigeration or ice bunkers 11 at its opposed ends. The car is further provided with a false floor 12 above the base floor 13 providing an air circulation passage 14. The false floor 12 is ordinarily of slat or open construction permitting air circulation from the load 15 down through the floor. The bunkers 11 are ordinarily open to the refrigeration space 16 within the car through the medium of upper and lower outlets 17 and 18 through which air circulates over ice or other refrigerating medium placed within the bunkers.

In accordance with standard practice, the crates or boxes 19 containing the fruits or vegetables are stacked within the refrigerator space 16 leaving at the center of the car adjacent doorway 20 a transverse central aisle 21. Bracing generally indicated 22 is disposed in the central aisle and generally consists of uprights 23, lateral bracing 24 and cross-braces 25. The cross-braces 25 are commonly arranged so that they form three horizontal rows or tiers, dividing the transverse central aisle 21 into substantially separate compartments. In accordance with my invention it is necessary only to modify this standard form of load bracing by omitting the single cross-brace nearest the door in the middle row of braces, as shown in the Figures 2 and 4.

3

The precooling apparatus which comprises a preferred embodiment of my invention includes a coil and blower unit, generally indicated 26, mounted on wheels or rollers 27 for movement along a track 28. The unit 26 includes a refrigerant circulation coil 29 and a plurality of blowers or fans 30 mounted above the coil, both being mounted between a pair of rigid side plates 31. Each of the plates 31 is U-shaped, being provided with a longitudinal channel or opening 32 extending the major portion of the length of the side plates. The channels 32 are sufficiently wide to provide clearance between the side plates and the middle row of cross-braces 25 when the unit is in the operative position in the central aisle 21 as shown best in Figure 2. As pointed out above, the first cross-brace in the middle row is removed, or omitted, this to avoid interference with the unslotted portion of each of the side plates 31. The side plates 31 are secured together in substantially parallel relation by means of end plate 34 at one end and plates 35 and 36 at the other slotted end.

The coil 29 is supplied with cold water or other suitable refrigerant through an inlet conduit 37 leading from a suitable source of refrigerant and the refrigerant is taken from the coil 29 through the return conduit 38, the conduits 37 and 38 being preferably of flexible tubing. The fans 30 include rotors 39 of the squirrel-cage type mounted for rotation on a shaft 40. The shaft is journaled in suitable bearings (not shown) and is driven by a motor 41 mounted on a platform 43 which is in turn secured to the end plate 34. Warm air is thus drawn up through the false floor 12 over the coil 29 and through the series of fans 30. Means are provided to divert the now cold air toward each end of the car 10 in accordance with the method described in my United States Patent No. 2,323,439 issued July 6, 1943, and as shown in the drawing, these means may include the diverting unit 44. The unit 44, which includes a diverting duct 45 and a plurality of adjustable vanes 46, rests on top of the upper row of cross-braces 25 directly above the coil and blower 26.

Means are provided to effectively seal the car 10 and the coil and blower unit 26 against air leakage, and as shown in the drawings these means may include a rectangular plate or sheet 47 adjacent to and parallel with the end plate 34, which sheet is provided with suitable apertures for the shaft 40, motor platform 43, and conduits 37 and 38. A curtain 48 of canvas or other suitable material is secured to car door opening 20 and is provided with a central rectangular opening corresponding to the size and shape of the plate 47 so that when the unit 26 is in the operative position shown, the plate 47 and curtain 48 cooperate to form a closure for the door opening 20. A pair of curtains 49, also of canvas may be hung, one on each side of plate 31, to substantially cover the channels 32.

In operation, the loaded and braced refrigerator car 10 is moved into position adjacent the loading dock or platform 50 and a section 51 of the track 28 is placed in the central aisle and aligned with the track section 52 on the dock. The coil and blower unit 26 is then rolled into the operative position shown and the diverting unit 44 is placed in position on the upper row of cross-braces 25. It should be pointed out that the unit 44 need not be secured to the cross-braces 25 since it is sufficiently heavy to remain in place without fastening means other than by

4

gravity. The curtain 48 may then be installed by any convenient means and the electrical connection (not shown) to the motor may be made. With the blowers 30 in operation and refrigerant circulating through the coil 29, the warm air from the floor 13 is cooled as described above and forced outwardly through the vanes 46 in the direction of the arrows in Figure 3. The cold air is thus forced in either direction longitudinally of the car, falls down through the load and is drawn under the floor back into the precooling unit to be recirculated. When the temperature of the refrigeration space 16 has reached the desired level, the entire precooling unit may be quickly removed and the car placed in transit.

Precooling units made in accordance with my invention are of substantial weight and in order to permit them to be moved about manually, the tracks 28 are constructed of angle iron or other material in V-shaped form (see Figure 6). The rollers 27 are provided with double flanges 55 forming a V-shaped section of somewhat flatter shape than that formed by the tracks so that there is a substantially single point contact between each roller and the knife-edge portion 56 of the tracks. This very small area of contact reduces friction to a minimum and units so mounted may be easily moved in either direction by a single operator. While I have found that this roller and track arrangement is particularly well adapted for use in combination with precooling units of the type described, it is of course not inherently limited thereto.

A modified form of my invention is illustrated in Figures 4 and 5 and briefly, it consists of a blower unit adapted to be positioned within the central aisle of the refrigerator car in a manner similar to that described above, but with the coil unit positioned outside of the car on the loading platform.

This modification of my invention includes, specifically, an air diverting unit 60 substantially the same as the unit 44, and resting on the upper row of cross-braces 25 in the same manner. The coil and blower unit 61 here again is mounted on rollers 27a for movement along a track 28a which is supported on the loading platform (not shown). The refrigeration coil 62 and series of fans or blowers 63 are mounted between a pair of rigid side plates 64, which plates are generally L-shaped, each having a horizontal cantilever leg 65 extending forwardly from an integral base section 66. The coil 62 is mounted between the base sections 66 and enclosed by means of top and bottom walls 67 and 68 and end walls 69 and 70. Air inlet and outlet openings 71 and 72 respectively, are provided in the end wall 70.

Mounted between the cantilever legs 65 of the parallel plates 64 is the series of blowers 63. Bottom wall 73 and end wall 74 cooperate with the legs 65 to form a housing 75 for the blowers, the blower outlet conduit 76 extending through the open top of the housing. The blowers 63 are provided with rotors (not shown) mounted for rotation on a shaft 77. The shaft is journaled in bearings (not shown) and is driven, through suitable belting 78, by a motor 79 mounted on the top wall 67.

In operation, the unit is positioned with respect to the refrigerator car 10 as shown, with the blower housing 75 inserted in the central aisle 21 between the middle and upper rows of cross-braces 25. It is to be understood that in this embodiment of my invention the track 28a

need not extend to the interior of the car 10, since the side plates 64 are so fashioned that the blower housing 75 is held in overhanging or cantilever relationship to the refrigeration coil 62. Again, the only change in the standard method of load bracing is the omission or removal of the first cross-brace 25 in the middle row, here to prevent interference with the web portions 80 of the side plates 64. The diverting unit 60 is placed in position above the blower outlet 75 and a curtain 81, similar to that described above, is secured to the car door opening to prevent air leakage. Refrigerant may then be circulated through the coil 62 by way of the conduits 82 and 83 and the fan motor 79 energized. The blowers 63 cause warm air to be drawn from the lower portion of the car and through the inlet opening 71 to the coil and thence the now cold air is drawn, in the direction of the arrows, through the blower housing and diverting unit 60. The vanes (not shown) of the unit 60 direct the cold air longitudinally of the car in both directions to fall through the load and be returned to the precooling unit for recycling. In order to prevent channeling of the air through the refrigerating coil, a baffle 84 may be provided, as shown.

While I have shown and described specific embodiments of my invention, I do not limit myself to the exact details of the constructions set forth, and the invention embraces such changes, modifications and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

I claim:

1. In an apparatus for precooling the load of a refrigerator car of the type having bracing in a transverse central aisle formed in the load, the bracing including several rows of horizontal cross-braces extending transversely of the central aisle, the combination of: a unit having a pair of parallel side plates, each plate being provided with an opening extending from one end for the major portion of the plate, the openings providing clearance so that the unit may be placed in the central aisle without interference from a central row of cross-braces; a blower mounted between said side plates above the openings therein; a refrigerating coil unit mounted between the side plates below the openings, said coil unit having an inlet adjacent the lower portion of the central aisle; and means positioned above said blower for directing cold air outwardly from the central aisle and toward opposed ends of the car.

2. In an apparatus for precooling the load of a refrigerator car of the type having bracing in a transverse central aisle formed in the load, the bracing including several rows of horizontal cross-braces extending transversely of the central aisle, the combination of: a unit having a pair of parallel side plates substantially equal in length to the central aisle, each plate being provided with an opening extending from one end for the major portion of the plate, the openings providing clearance so that the unit may be placed in the central aisle without interference from a central row of cross-braces; a series of blowers mounted between said side plates above the openings therein; a refrigerating coil unit mounted between the side plates below the openings, said coil unit extending for substantially the full length of the side plates and having an inlet adjacent the lower portion of the central aisle; and means positioned above said blowers for directing cold air

outwardly from the central aisle and toward opposed ends of the car.

3. In an apparatus for precooling the load of a refrigerator car of the type having bracing in a transverse central aisle formed in the load, the bracing including several rows of horizontal cross-braces extending transversely of the central aisle, the combination of: a unit having a pair of parallel side plates, each plate being provided with a horizontal opening extending from one end for the major portion of the plate, the openings providing clearance so that the unit may be placed in the central aisle without interference from a central row of cross-braces; a blower mounted between said side plates above the openings therein; a refrigerating coil unit mounted between the side plates below the openings, said coil unit having an inlet adjacent the lower portion of the central aisle; and an air diverting unit resting on an uppermost row of cross-braces and above the blower, the air diverting unit having directional vanes extending for substantially the full length of the central aisle, whereby cold air may be directed outwardly from the central aisle and toward the opposed ends of the car.

4. In an apparatus for precooling the load of a refrigerator car of the type having bracing in a transverse central aisle formed in the load, the bracing including several rows of horizontal cross-braces extending transversely of the central aisle, the combination of: a unit including a pair of parallel spaced side plates, each plate lying in a substantially vertical plane and each plate having a base portion with a cantilever arm extending horizontally from the upper portion of the base portion, the arms being sufficiently narrow so that they may be inserted in the central aisle between adjacent rows of cross-braces, and top, bottom and end walls connecting the base portions of said plates; a blower mounted between the arms of said side plates; a refrigerating coil mounted between the base portions of the side plates, air inlet means and outlet means to said refrigerating coil, the inlet means being adjacent the lower portion of said central aisle; and means positioned above said blower for directing cold air outwardly from the central aisle and toward opposed ends of the car.

5. In an apparatus for precooling the load of a refrigerator car of the type having bracing in a transverse central aisle formed in the load, the bracing including several rows of horizontal cross-braces extending transversely of the central aisle, the combination of: a unit including a pair of parallel spaced side plates, each plate lying in a substantially vertical plane and each plate having a base portion with a cantilever arm extending horizontally from the upper portion of the base portion, the arms being sufficiently narrow so that they may be inserted in the central aisle between adjacent rows of cross-braces, and top, bottom and end walls connecting the base portions of said plates; a blower mounted between the arms of said side plates; a refrigerating coil mounted between the base portions of the side plates, air inlet means and outlet means to said refrigerating coil, the inlet means being adjacent the lower portion of said central aisle; and an air diverting unit resting on an uppermost row of cross-braces and above the blower, the air diverting unit having directional vanes extending for substantially the full length of the central aisle, whereby cold air may

7

be directed outwardly from the central aisle and toward the opposed ends of the car.

6. In an apparatus for precooling the load of a refrigerator car of the type having a central transverse aisle formed in the load, the combination of bracing in said central aisle including two or more horizontal rows of cross-bracing extending transversely of said aisle, a blower insertable into said central aisle between said horizontal rows of cross-bracing, a refrigerating coil unit associated with said blower for cooling air drawn thereacross by said blower, said coil unit having an inlet adjacent the lower portion of the central aisle and being connected to said blower but having a portion spaced therefrom whereby said blower is insertable between adjacent horizontal rows of cross-braces, and an air-diverting unit resting on an uppermost row of horizontal cross-bracing and above said blower, whereby cold air may be directed outwardly from the central aisle and toward the opposed ends of the car.

7. In apparatus for precooling the load of a refrigerator car of the type having a central transverse aisle formed in the load, the combination of bracing in said central aisle including two or more horizontal rows of cross-bracing extending transversely of said aisle, a blower unit comprising a plurality of blowers insertable into said central aisle between said horizontal rows of cross-bracing, a refrigerating coil unit associated with said blower unit for cooling

8

air drawn thereacross by the blower unit, said coil unit having an air inlet adjacent the lower portion of the central aisle and being connected to said blower unit but having a portion spaced therefrom whereby said blower unit is insertable between adjacent horizontal rows of cross-braces, and an air-diverting unit resting on an uppermost horizontal row of cross-bracing and above the blower unit, the air-diverting unit having directional vane means extending for substantially the full length of the central aisle, whereby cold air may be directed outwardly from the central aisle and toward the opposed ends of the car.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
836,995	Schroeder	Nov. 27, 1906
1,605,521	Drake	Nov. 2, 1926
1,986,413	Ruemelin	Jan. 1, 1935
2,279,847	Stebbins	Apr. 14, 1942
2,323,439	Adams	July 6, 1943
2,477,250	Hincz	July 26, 1949
2,523,749	Wilson	Sept. 26, 1950
2,525,868	Corhandis	Oct. 17, 1950

FOREIGN PATENTS

Number	Country	Date
4,024	Great Britain	Oct. 18, 1876