Oct. 5, 1943. A. E. SMALL 2,331,002

AIR CIRCULATING MEANS FOR REFRIGERATOR CARS

Filed Aug. 3, 1942 3 Sheets-Sheet 1

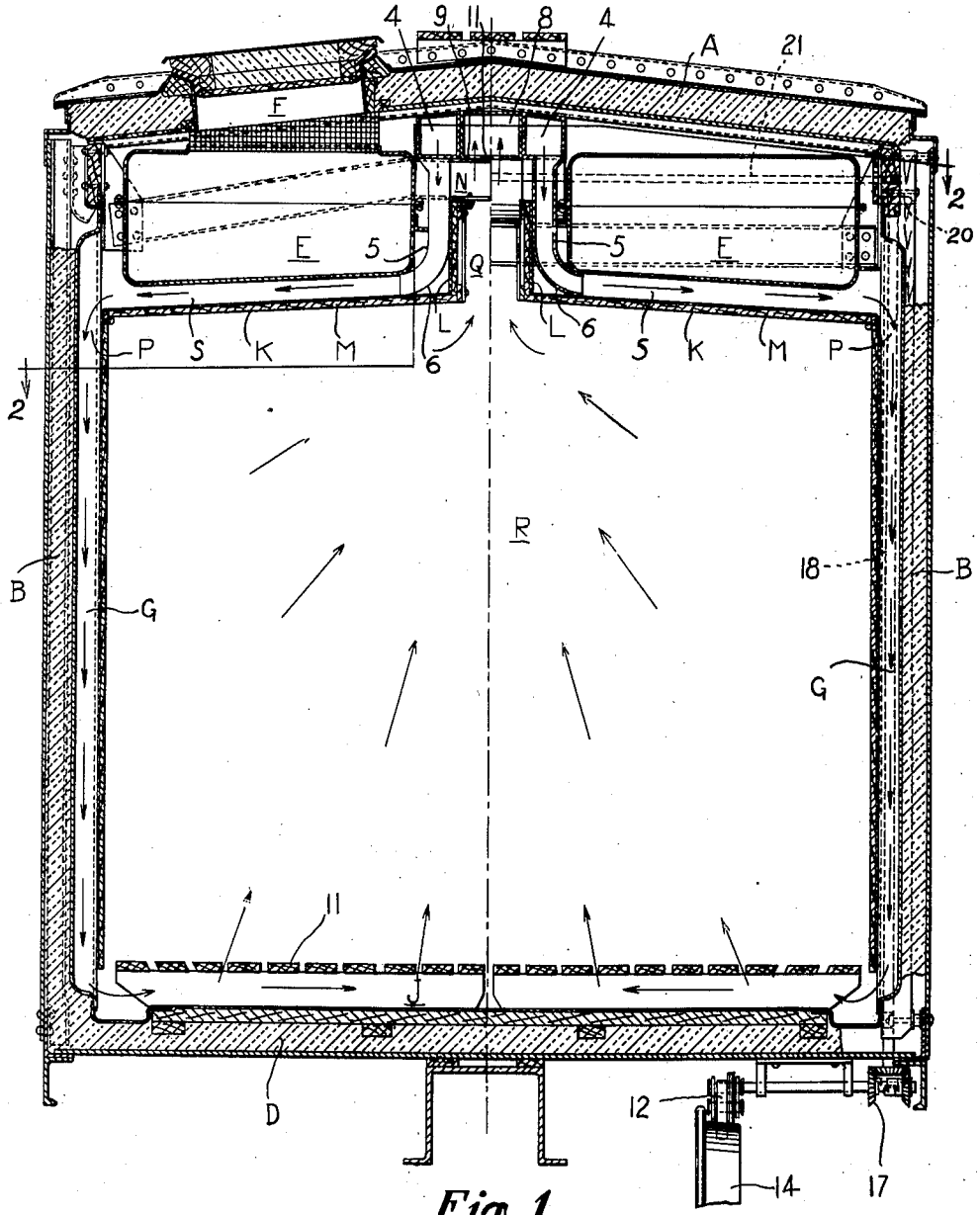


Fig. 1

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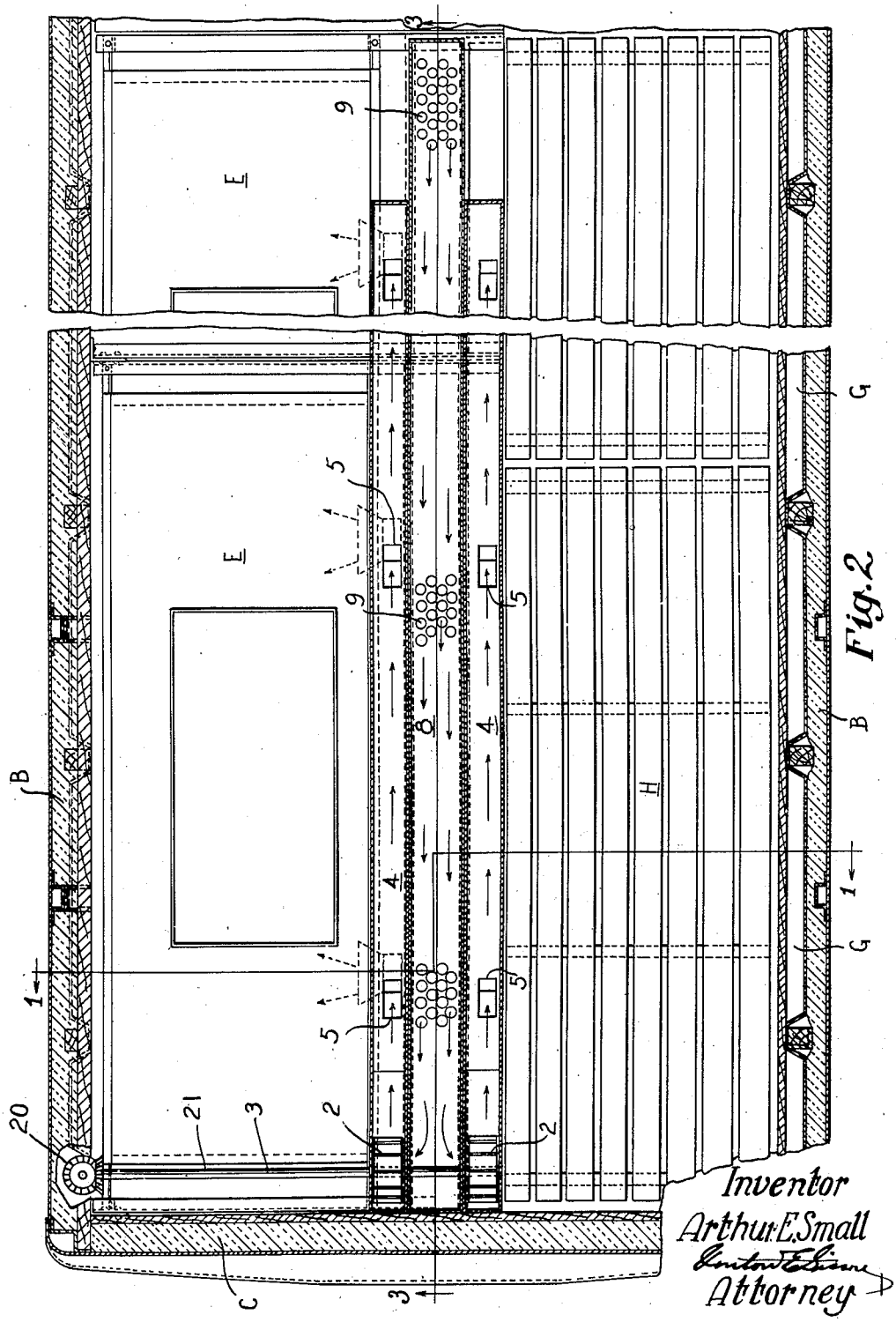


Fig. 2

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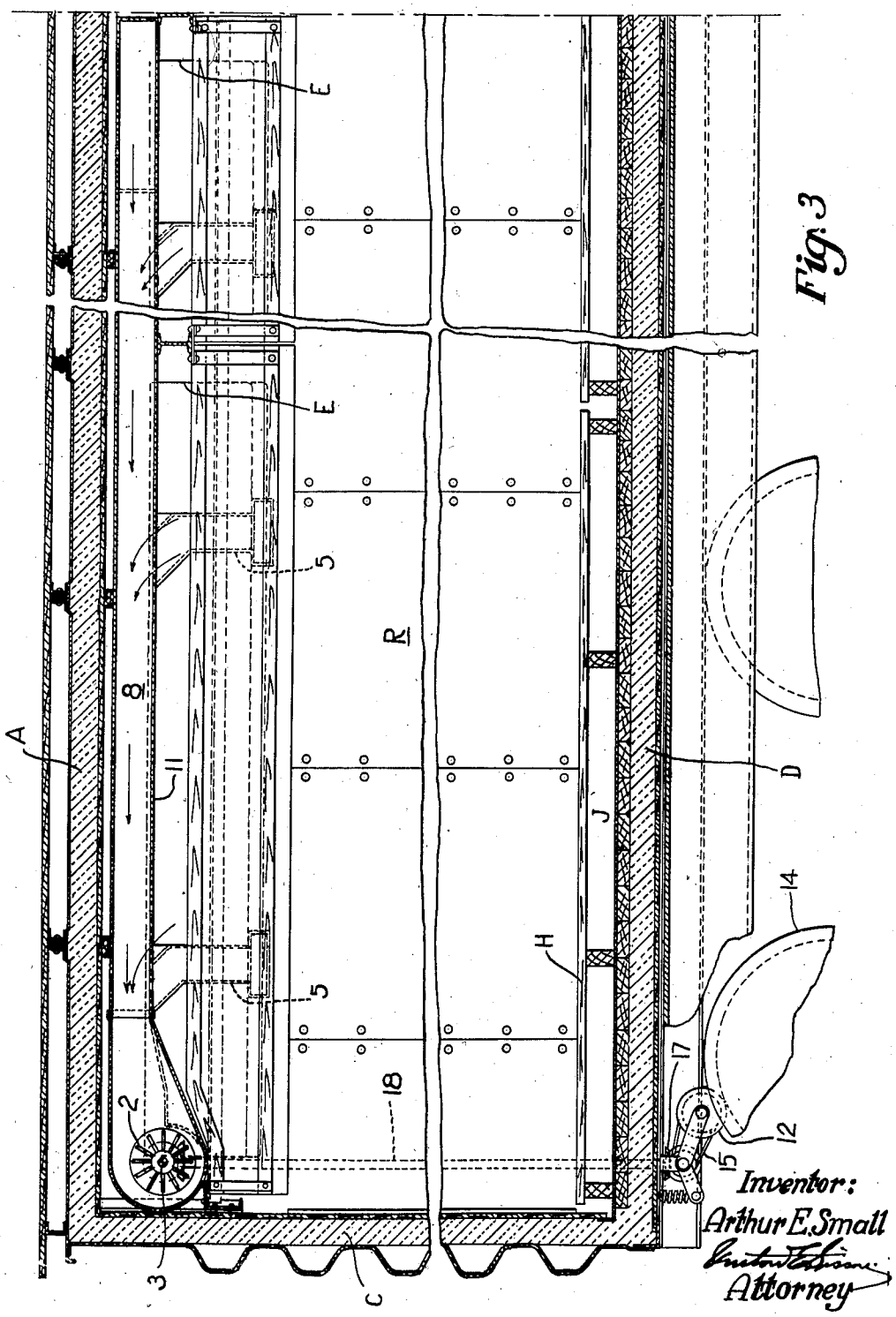


Fig. 3

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AIR CIRCULATING MEANS FOR REFRIGERATOR CARS

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Application August 3, 1942, Serial No. 453,453

5 Claims. (Cl. 62—17)

This invention relates to refrigerator cars used to transport perishable commodities at a predetermined temperature. The essential features of a refrigerator car are an insulated body to prevent or retard ingress of heat during warm weather and egress of heat during cold weather and a cooling means and preferably a heating means to be used during warm and cold weather respectively.

This invention applies particularly to cars in which the cooling means, preferably containers for water ice, eutectic ice, brine or dry ice, are disposed immediately below the roof of the car. The lading is supported in spaced relation to the floor by a foraminous rack. Flues, preferably associated with the side walls of the car, communicate between the cooling means and the space under the floor rack to provide a path for the circulation of air. The path is from the cooling means downwardly through the aforementioned flues, through the space under the floor rack, upwardly through the lading compartment thereby cooling the lading, and finally to the cooling means from where the cycle is repeated.

The above mentioned circulation of air is a natural thermo-convective circulation and under certain conditions may not be adequate to properly circulate a sufficient amount of cold air through the interior of the car to properly refrigerate the lading.

An object of the invention is to provide a power driven fan for circulating air within the car and to provide ducts to direct the forced air circulation in substantially the same path as is followed by natural convective circulation in a similar car.

Another object is to provide the above mentioned forced air circulation without substantially interfering with the natural convective circulation which takes place when the fan is inoperative.

Other objects and advantages of my invention will be apparent from the following detailed description by referring to the accompanying drawings.

In the drawings:

Fig. 1 is a transverse section through a refrigerator car embodying my invention.

Fig. 2 is a plan section on line 2—2 of Fig. 1.

Fig. 3 is a longitudinal section on line 3—3 of Fig. 2.

The general parts of the refrigerator car shown are insulated roof A; side walls B, end wall C; floor D; refrigerant containers E; hatch F for loading refrigerant into a container E; side wall flues G; foraminous floor rack H and space J between the rack H and the floor D. Spaced apart refrigerant containers E are positioned immediately below the roof A and respectively adjacent the side walls B. A drip pan K is provided below each container E and a partition L is disposed in an upstanding position at the edge of each drip pan K, the drip pans K and the partitions L cooperating with the roof A and the upper parts of the side walls B to form enclosures M around the containers E. Air inlet openings N to the enclosures M are provided above the partitions L and air discharge openings P lead from the enclosures M to the flues G at a lower elevation than the air inlet openings N. Cars of this type commonly have a row of refrigerant containers E near each side wall B, which containers are spaced apart longitudinally of the car to provide air passages between the ends of the containers. The partitions L are spaced apart to form a duct Q which communicates between the lading compartment R and openings N.

When the air circulating means is inoperative, a natural convective air circulation takes place as follows:

Air in the lading compartment R is warmed by contact with the lading and rises through the duct Q to enter the enclosing structures M through the air inlet openings N. The air then flows through the passages S between the containers E and drip pans K where it is cooled by contact with the bottoms of the cold refrigerant containers E and falls by reason of its lower temperature and therefore greater density through the discharge openings P and flues G to the space J whence it rises through the rack H to the lading compartment R. The above described cycle is thereafter continuously repeated.

A pair of centrifugal fans 2 are disposed substantially above the duct Q adjacent one of the end walls C of the car and arranged to revolve upon a substantially horizontal, transversely extending axis 3. A pair of spaced apart discharge flues 4 are disposed substantially above the duct Q extending lengthwise of the car and arranged to receive air discharged from the respective fans 2. Branch conduits 5 communicating with the flues 4 depend therefrom and extend between the refrigerant containers E and the adjacent partitions L. Elbows 6 on the lower ends of the branch conduits 5 direct air from the flues 4 into the passages S between the containers E and the drip pans K. The air discharged by the fans 2 is thus cooled by contact with the bottoms of the

refrigerant containers E in the same manner as the naturally circulating air is cooled.

A return air conduit 8 is disposed above the duct Q and between the discharge flues 4. The return air conduit 8 also extends lengthwise of the car and leads to the inlet openings to the fans 2. Openings 9 in the bottom wall 11 of the conduit 8 are provided so that air flowing from the lading compartment R upwardly through the duct Q may enter the conduit 8 and may then be directed to the fans 2. It is pointed out that the flues 4 and conduit 8 are spaced a substantial distance above the upper edges of the partitions L and that the branch conduits 5 obstruct only a small part of the space between the containers E and the adjacent partitions L so that natural air circulation is not substantially obstructed.

A pair of fans 2 are preferably disposed adjacent each end wall C of the car and may be driven by any suitable means. The means disclosed comprises a pulley 12 engaged with a wheel 14 of the car and operably connected to the fans 2 by means of a belt 15; miter gears 17 below the floor D of the car; a vertically extending shaft 18 and miter gears 20 connecting the upper end of the vertical shaft 18 with the horizontally extending shaft 21 upon which the fans 2 are mounted.

The accompanying drawings illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof, within the scope of the claims, will occur to persons skilled in the art.

I claim:

1. In combination with spaced apart walls and the roof of a refrigerator car, spaced apart refrigerant containers below the roof, means cooperating with each of said containers to form an air cooling passage adjacent the container, means to form a vertically extending duct between said containers, air circulating means in the upper part of the car, a return air conduit leading to said air circulating means disposed above said duct and having a perforated lower side and flue means arranged to receive air from said air circulating means and to discharge the air into said passages distributively along the length thereof.

2. In combination with spaced apart walls and the roof of a refrigerator car, spaced apart refrigerant containers below the roof, means cooperating with each of said containers to form an air cooling passage adjacent the container, means to form a vertically extending duct between said containers, air circulating means in the upper part of the car, a return air conduit leading to said air circulating means disposed above said duct and having a perforated lower side and a discharge flue disposed on either side of said conduit arranged to receive air from said air circulating means and to discharge the air into said passages.

3. In combination with spaced apart walls and the roof of a refrigerator car, spaced apart refrigerant containers below the roof, means cooperating with each of said containers to form an air cooling passage adjacent the container, said means comprising a drip pan spaced below the container and an upstanding member spaced from a wall of the container, the members being spaced apart to form a duct, air circulating means, a return air conduit leading to said air circulating means substantially coextensive with said duct and arranged to receive air therefrom and flue means arranged to receive air from said air circulating means and to discharge the air into said passages.

4. In combination with spaced apart walls and the roof of a refrigerator car, spaced apart refrigerant containers below the roof, means cooperating with each of said containers to form an air cooling passage adjacent the container, said means comprising a drip pan spaced below the container and an upstanding member spaced from a wall of the container, the members being spaced apart to form a duct air circulating means, a return air conduit leading to said air circulating means disposed above said duct and having a perforated lower side, a discharge flue disposed on either side of said conduit arranged to receive air from said air circulating means and branch conduits depending from said flues between said containers and said members and arranged to discharge air into said passages.

5. In combination with spaced apart walls and the roof of a refrigerator car, spaced apart refrigerant containers below the roof, means cooperating with each of said containers to form an air cooling passage adjacent the container, means to form a vertically extending duct between said containers, air circulating means in the upper part of the car, a return air conduit leading to said air circulating means substantially coextensive with said duct and arranged to receive air therefrom and flue means arranged to receive air from said air circulating means and to discharge the air into said passages, said air circulating means disposed adjacent an end of the car and said duct, conduit and flue means extending substantially along the longitudinal center line of the car.

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