Sept. 6, 1955 E. W. TEST 2,716,872

VENTILATED CONTAINER SYSTEM OF TRANSPORTATION

Filed Dec. 31, 1948 6 Sheets-Sheet 1

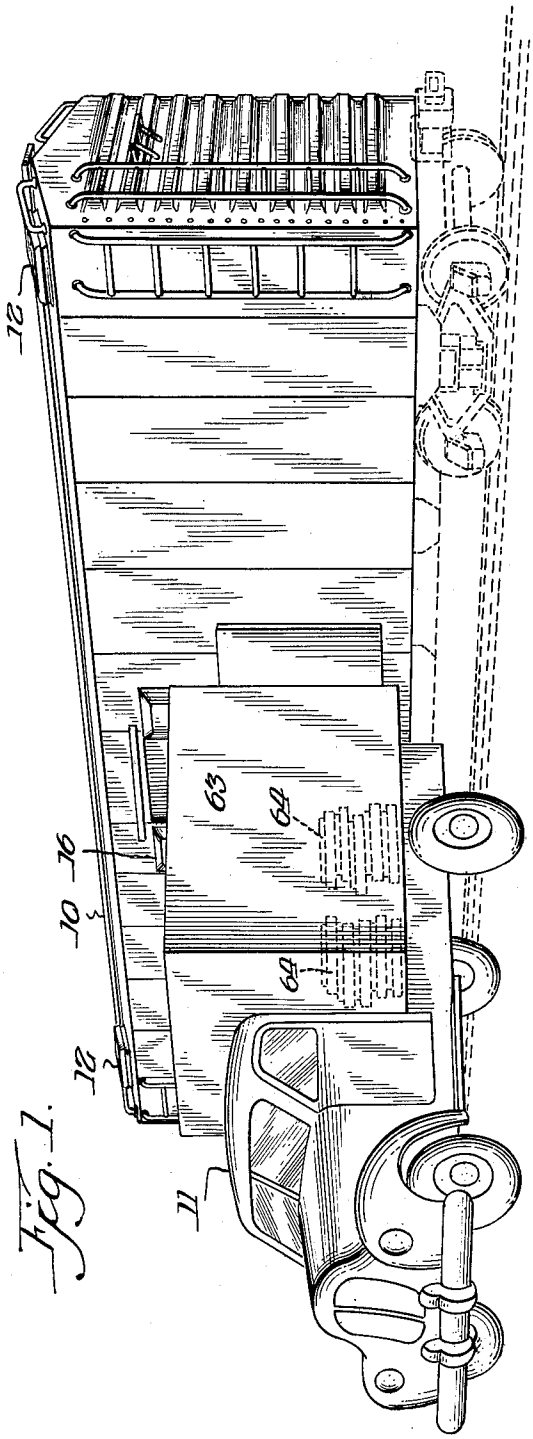

Fig. 1.

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Filed Dec. 31, 1948 6 Sheets-Sheet 2

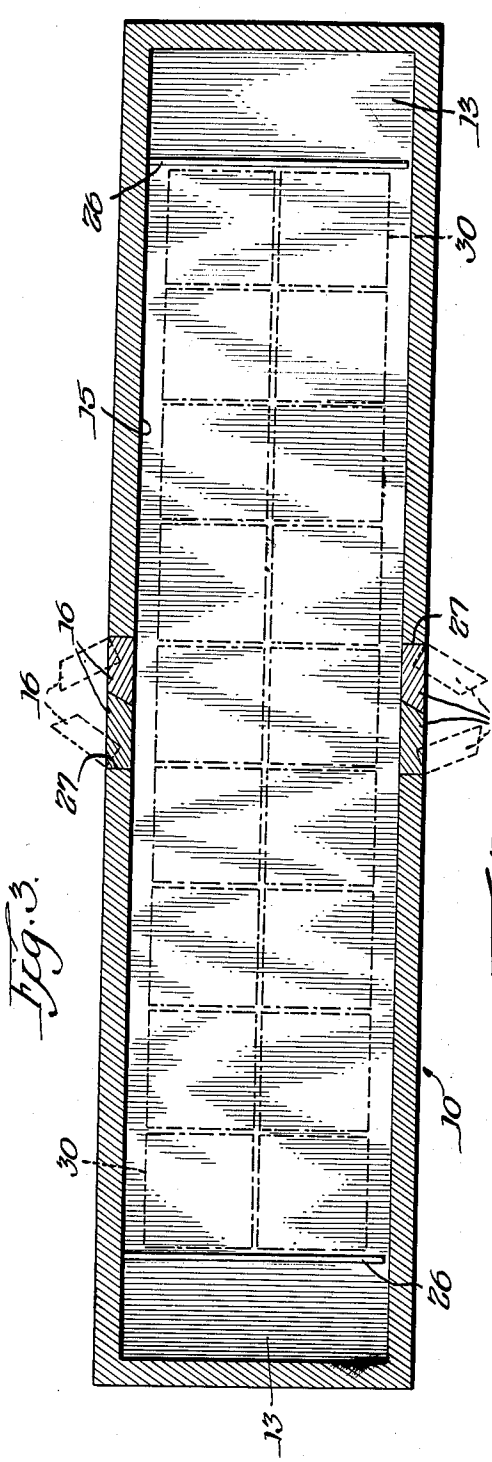

Fig. 3.

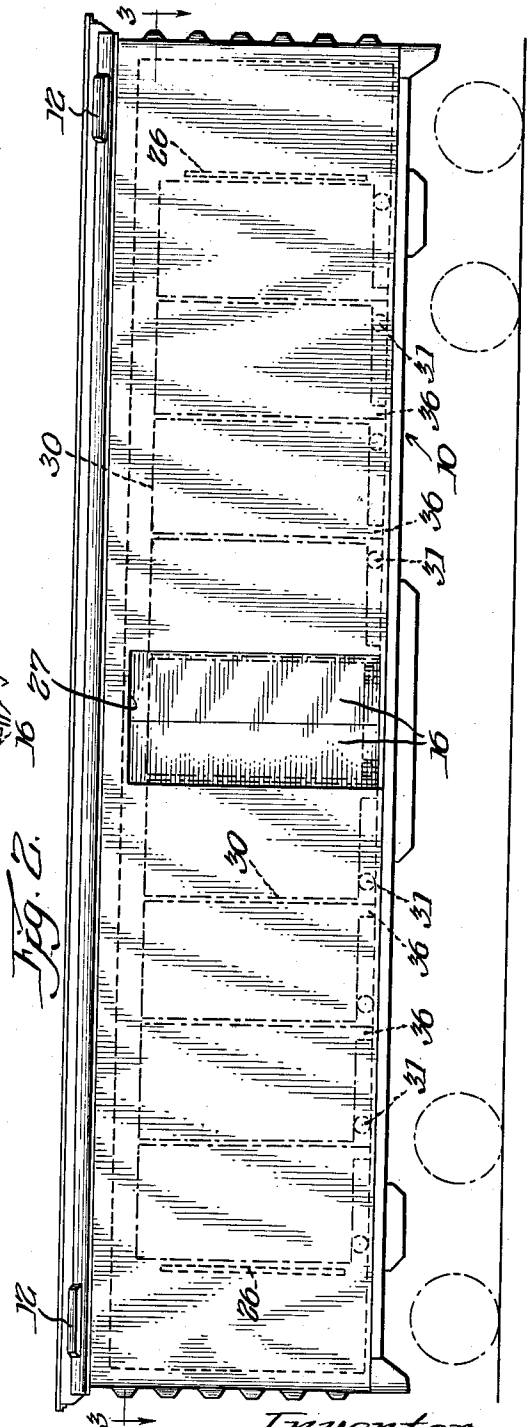

Fig. 2.

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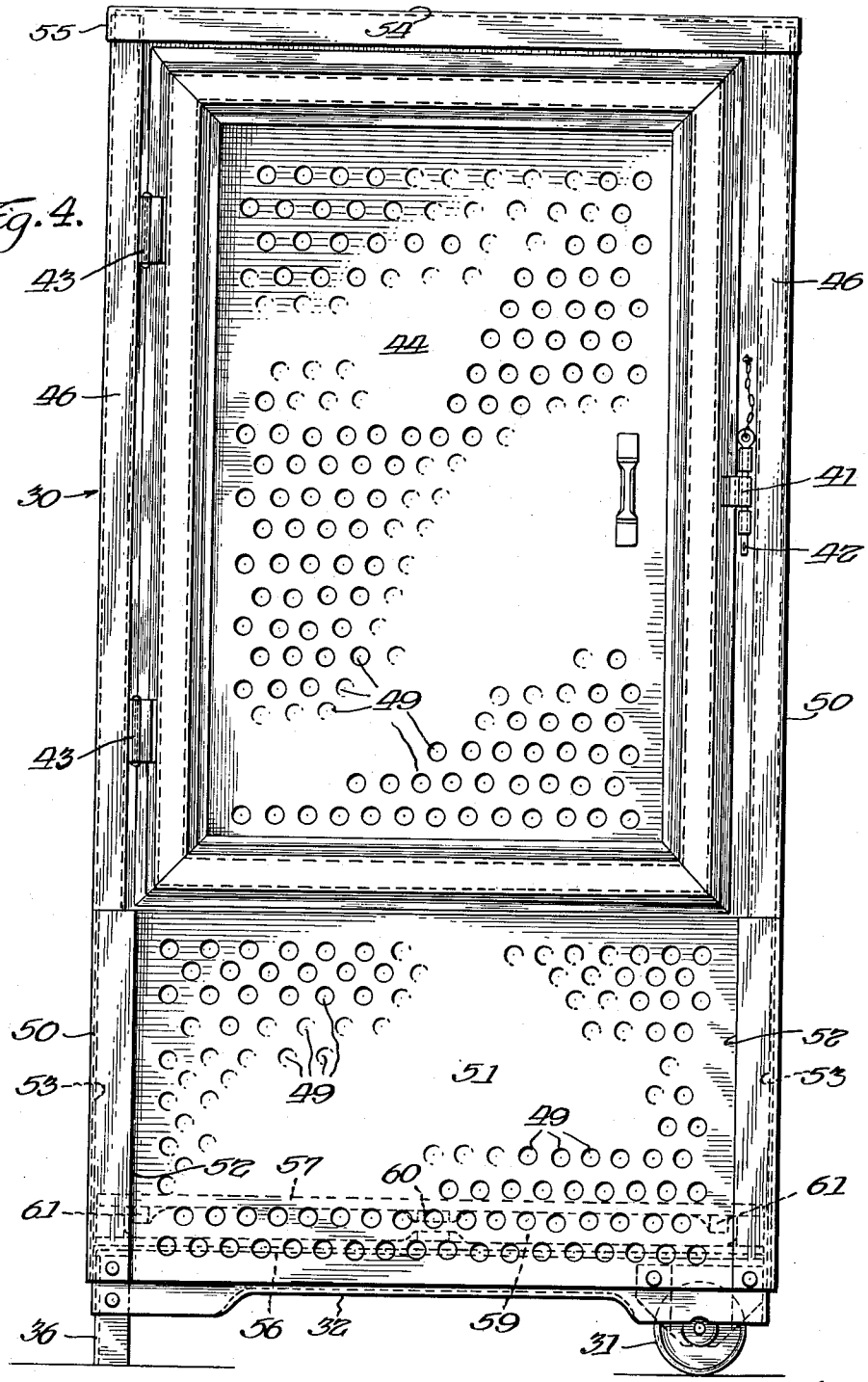
Fig. 4.



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VENTILATED CONTAINER SYSTEM OF TRANSPORTATION

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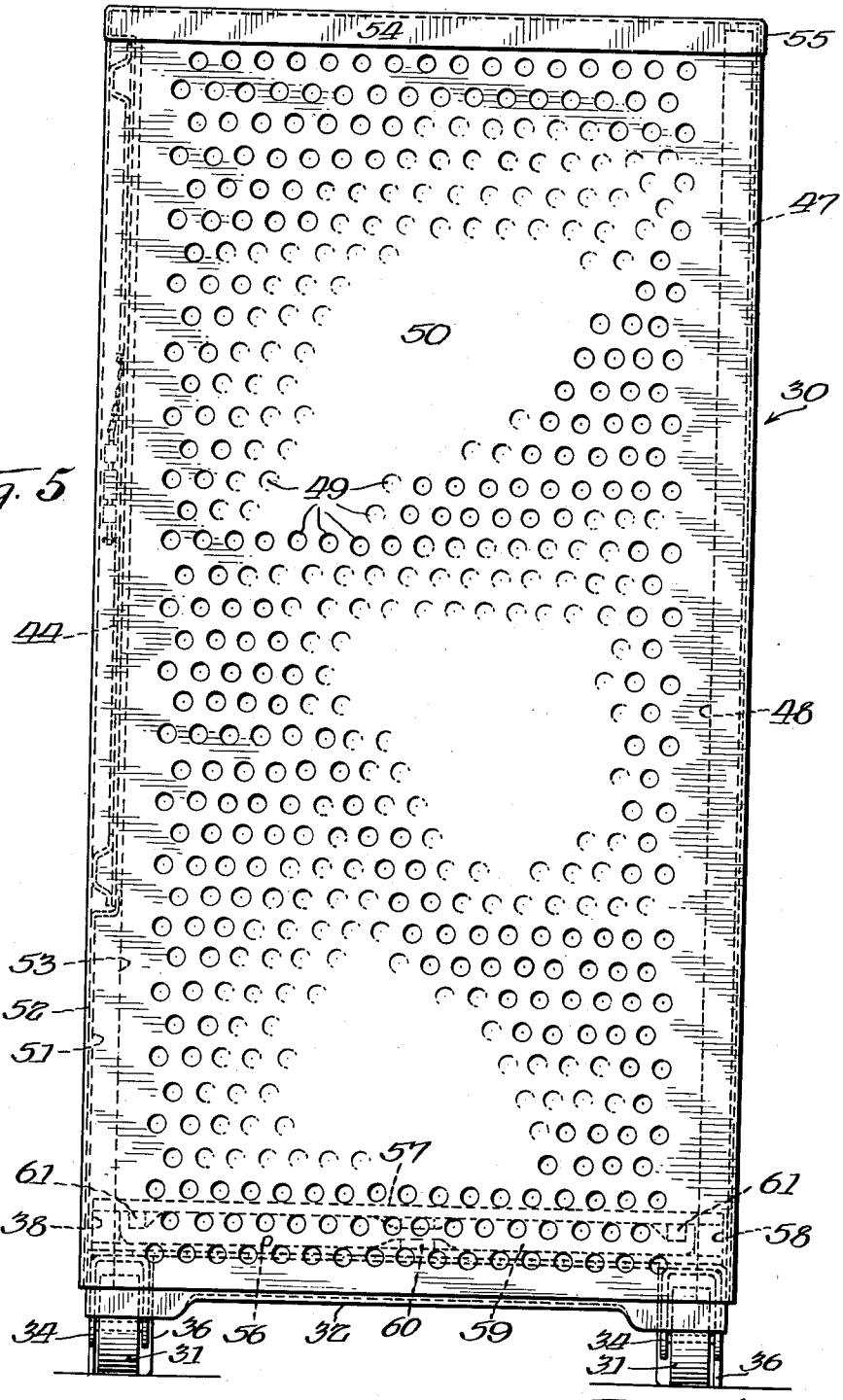
Fig. 5



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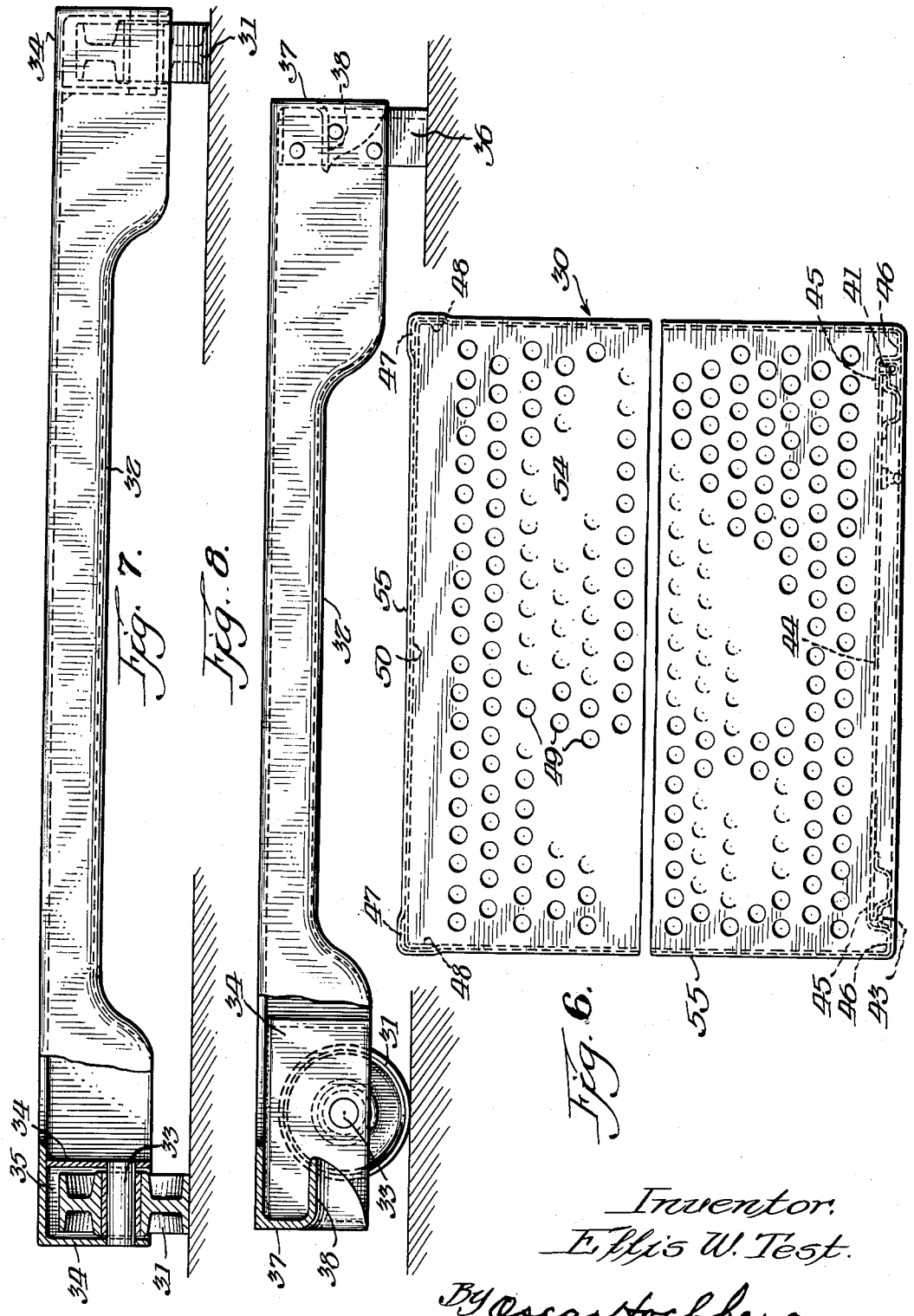
VENTILATED CONTAINER SYSTEM OF TRANSPORTATION

Filed Dec. 31, 1948 6 Sheets-Sheet 5



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VENTILATED CONTAINER SYSTEM OF TRANSPORTATION

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Fig. 10.

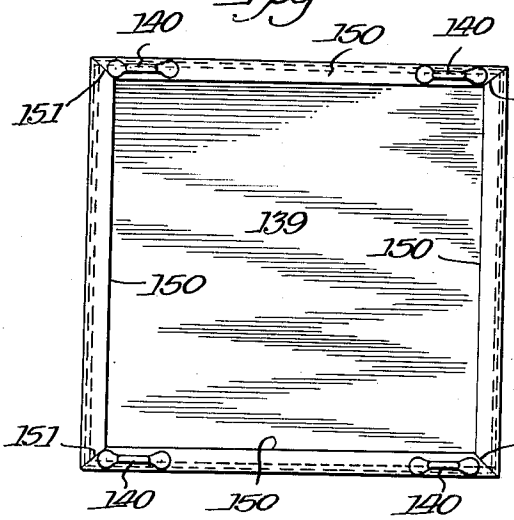


Fig. 11.

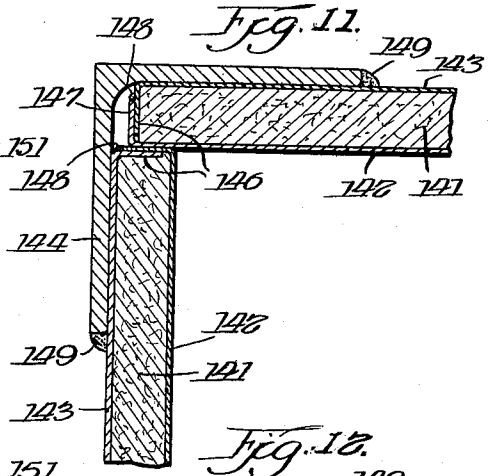


Fig. 12.

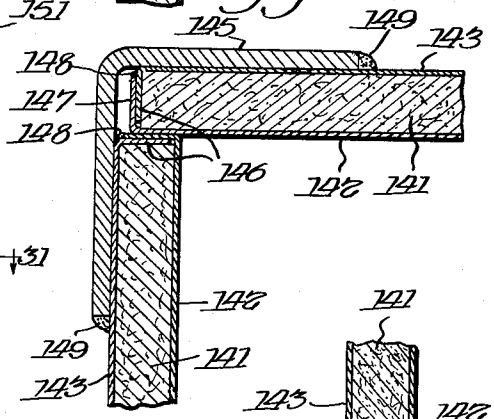


Fig. 9.

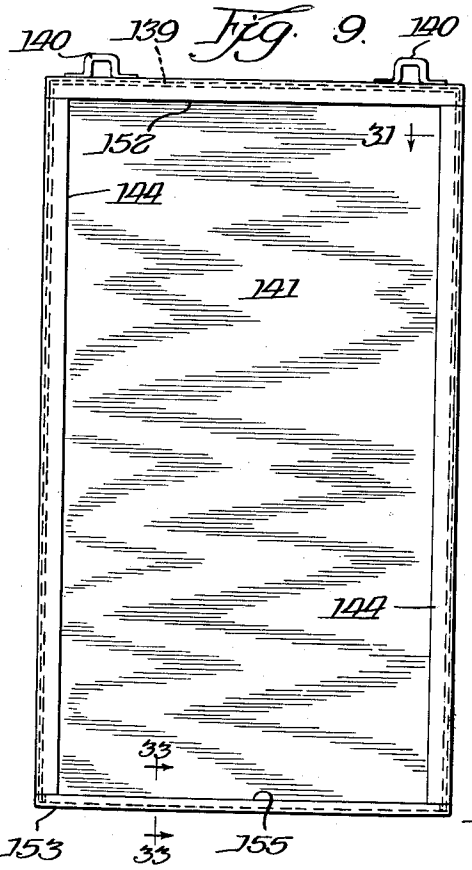


Fig. 13.

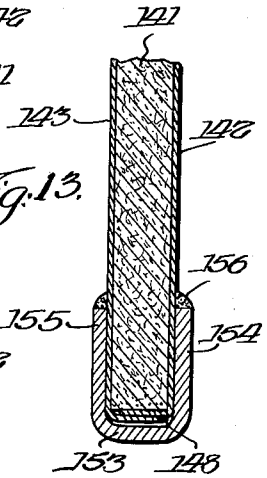
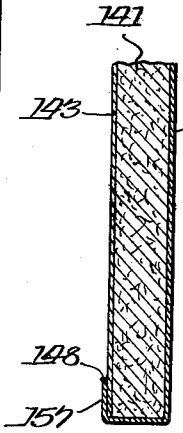


Fig. 14.



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United States Patent Office 2,716,872 Patented Sept. 6, 1955

2,716,872

VENTILATED CONTAINER SYSTEM OF TRANSPORTATION

Ellis W. Test, Hinsdale, Ill., assignor to Pullman-Standard Car Manufacturing Company, Chicago, Ill., a corporation of Delaware

Application December 31, 1948, Serial No. 68,688

2 Claims. (Cl. 62—171)

The invention relates to the transportation of perishable commodities, such as fresh fruits and vegetables, and frozen foods of various kinds, carried in individual containers open to the atmosphere of the cars transporting them and provided with means to prevent exposure of the contents during transfer of the containers to road vehicles for delivery to their respective destinations.

The existing method of transporting perishable commodities from producing areas to distant consignees is by rail in refrigerator cars, by motor truck, and in refrigerator containers designed for rail and road vehicle transit. Where commodities are transferred in bulk from refrigerator cars to road vehicles at terminal points, for further transit in warm weather to consignee at a distance from terminals, it is necessary to carry them in vehicles properly insulated and equipped to protect the lading from the effects of heat in summer and cold in winter in order that the goods in transit may be delivered to the consignee in the best possible condition. In the construction of refrigerator containers currently employed in L. C. L. operations (less than car load lot service), the containers must be insulated to at least the value of the insulation requirements of the standard refrigerator rail car employing like primary refrigerants and must be fitted each with its own cooling equipment individually serviced to maintain the operating efficiency of the units during rail transit and by road vehicle to its ultimate destination. The space devoted to the refrigerating installation in this type of container adds substantially to the overall bulk of the unit which in length may not exceed the width of the ordinary freight car adapted for the transportation of L. C. L. units, the container being of such size and weight as to require the installation of special handling equipment at terminal points, thus further reducing the revenue capacity of these units to an unprofitable minimum. It is the particular province of this invention to overcome this objection to the use of containers for the shipment of perishables and to utilize to the full the economies afforded by the use of containers with existing types of refrigerator cars.

The principal object of the invention is to provide for the shipment of perishable commodities in refrigerator cars by means of individual containers adapted to subject their contents to the car atmosphere during rail shipment and thereafter to be sealed against further exposure of the contents when the containers are removed from the car for transfer to road vehicles for further transit.

The foregoing and other objects and advantages are attained by the mechanisms described in the specification and illustrated in the accompanying drawings, in which

Fig. 1 is a view in perspective showing a refrigerator car with its side doors open to a road vehicle standing by to receive containers with their contents exposed and with a supply of hoods adapted to cover the containers as they are transferred from car to vehicle;

Fig. 2 is a side elevational view of a refrigerator car having an ice bunker at each end and access doors in the middle and showing in broken lines the manner of disposing one embodiment of a type of container herein contemplated;

Fig. 3 is a horizontal sectional view through the body of the car taken on line 3—3, of Fig. 2, with the roof removed, showing ice bunkers at the ends of the car and access doors at the middle of the car and indicating in broken lines the placement of containers of the type herein contemplated between the bunker bulkheads;

Figs. 4, 5 and 6, respectively, show the front, side or rear walls in elevation, and a plan view of the ventilating top wall, of a type of container suitable for use in the system of transportation herein contemplated, constructed of aluminum sheets perforated to permit circulation therethrough and its contents, of the air of the refrigerator car in which the container is carried, the container, in the embodiment shown, having a floor insulated to supplement other means designed to insure complete protection of the contents during transit by truck from car to consignee;

Figs. 7 and 8, show respectively, the rear end and a side of the supporting base frame used in connection with the container embodiment shown in Figs. 7, 8 and 9, having rollers journaled at the rear end of the frame and rigidly mounted supporting legs at the opposite or front end of the frame with the peripheral members crimped between their ends to provide floor clearance for the lifting jack trucks handling the containers;

Fig. 9 is an elevational view of a rigid type of container hood made up of top and side wall panels of insulating board with stainless steel sheets bonded to the sides of each panel and stainless steel corner post angles connecting them;

Fig. 10 is a view in plan of the top wall panel of the hood showing the rectangular configuration of the hood and the placement of hood lifting loops adjacent the corners of the panel;

Fig. 11 is a horizontal sectional view taken on line 31—31, of Fig. 29, showing one form of wall panel and connecting corner post assembly;

Fig. 12 is a similar view showing a modified form of wall panel and connecting corner post assembly;

Fig. 13 is a vertical cross-sectional view taken on line 33—33, of Fig. 29, showing a channel-shaped wearing member for the bottom edges of the side wall panels of the hood;

Fig. 14 is a similar view showing a modified arrangement of the metal sheathing at the bottom edges of the hood wall panels.

Shipments of perishables are moved in refrigerator cars affording refrigerating, ventilating, and heating facilities, depending upon weather conditions and character of the commodities transported. Refrigeration of the air in the cars is usually obtained by any one of a number of ice bunker installations extensively used in this service and circulation of the air facilitated, if necessary, by the use of fans operable during car movement. The ice bunkers may be of the overhead type, not shown, in which the air after chilling moves downwardly at the sides of the car to the floor and the lading, or the cars may be fitted with ice bunkers at the ends, as indicated in Figs. 1 and 2. For use in less than car load lot (L. C. L.) service, the car interiors may be divided into two or more compartments, by means of insulated partitions arranged transversely of the car and intermediate its ends, with ice bunkers disposed upon opposite sides thereof. In the installations shown the ice bunkers are constructed with bulkheads designed to separate the bunkers from the lading and to permit passage of relatively warm recirculated air in the upper part of the car over the tops of the bulkheads downwardly through the ice for chilling, thence outwardly beneath the respective bulkheads and to the lading. In service of the type noted,

the cars are usually iced to bunker capacity and the supply replenished at icing stations enroute.

Certain of the perishables may be shipped in refrigerator cars under weather conditions providing desired temperatures without resorting to refrigeration or use of artificial heat. In this type of service the roof hatches over the ice bunker positions are open during transit and hatch plugs removed to take advantage of whatever cooling is possible by admitting outside air, while certain other of the commodities may require that the hatches be closed when the outside temperature approaches the freezing level before the cars reach their respective destinations.

When making shipments of perishables in refrigerator cars during the winter season or periods of very cold weather at temperatures based on prevailing or anticipated weather conditions, precautions are taken to prevent damage to the lading by freezing. For this purpose, various systems of heating have been established whereby the temperature of the lading is effectively maintained by the circulation of warm air from heaters on the car. Such heaters may be in the form of burners customarily placed upon the gratings in the ice bunkers where they are accessible for servicing without the attendant having to enter the loading space of the car, or heaters may be of the built-in type mounted outside the car in a receptacle beneath the floor and thermostatically controlled to maintain inside air at a uniform minimum temperature. Circulation of the heated air, as in the case of air chilled by ice in the bunkers in refrigerating service, may also be facilitated by the use of fans operable during car movement, when required, depending upon the nature of the lading.

In the drawings, **10** represents a railroad refrigerator car of a type adapted to the container system of transportation herein contemplated, in position for loading or unloading a road vehicle **11** and equipped with the usual roof hatchways **12** providing access to the ice bunkers **13** at the ends of the car, as indicated in Figs. 1, 2 and 3, or intermediate the car ends, if desired. Access to the lading compartment **15** of a car with end bunkers may be had through doors **16** arranged upon opposite sides of the car. The cars are equipped with the customary floor racks pivotally mounted on hinge brackets at the car sides. In the practice of the invention, the floor racks are raised against the adjacent car walls to provide room between them for the accommodation of containers **30** supported upon the car floor and disposed in pairs across the car.

The containers are loaded upon the car and unloaded through door openings **27** and separated from the ice bunkers **13** by the bulkheads **26** which also function to prevent unauthorized entry to the lading space through the hatchways **12**. With the exception of certain types of containers hereinafter noted, those employed in the service herein contemplated, are fitted each with a chassis base, preferably of the type best shown in Figs. 7 and 8, wherein is provided a pair of rollers **31** at one end of the base frame **32** journaled upon individual shafts **33** fixed against rotation in framing members **34** forming roller pockets **35** at that position, and fixed supporting legs **36** rigidly connecting adjacent side and end framing members at the opposite end of the frame, as indicated in Fig. 8. Thus equipped, with a chassis base fitted each with pairs of supporting legs and rollers, the containers are held raised from the floor to permit unimpeded circulation of the air in the car about the containers.

To facilitate handling of the containers in loading, unloading and placement operations, the base angle member at the stationary leg end of the base framing **32** is formed with its depending flange portion **37** deflected inwardly to provide a raising jack-engaging portion **38** to accommodate a roller-mounted swiveling jack of the type commonly used in freight handling service. In the placement of the containers on the cars, the containers are moved to position by jacking up the leg end thereof and guiding them along on the rollers. The containers then would be disposed with their roller ends toward the ends of the car, as shown in Fig. 2, except that the pair of containers at the door openings would be positioned with their rollers directed transversely of the car, as indicated.

The types of refrigerator cars and methods of refrigeration used are dependent upon the particular freight classification of the contents of the containers to be carried, which obviously may be of a character wholly foreign to perishables in food categories, though requiring the facilities and advantages afforded by transportation of the goods in refrigerator cars, requiring exposure to air in compartments having proper heat exchange with the prime refrigerant in the bunkers. Other commodities of a perishable nature, such as packing house and dairy products, frozen fruits and vegetables, poultry, etc., requiring refrigeration at below freezing temperatures, may be carried in containers in refrigerator cars having compartments equipped to provide Dry Ice refrigeration to keep a fairly equable concentration of CO_2 in the compartment to maintain a constant cold surface area and a rate of evaporation which will be uniform and controlled and suitable for the contents of the containers in transit, or salt may be added to the water ice in the bunkers to effect the desired below freezing temperatures for commodities of this nature in situations where the refrigerator cars available are not equipped to provide Dry Ice refrigeration.

In accordance with the invention, the containers **30** may be constructed with body panel portions fabricated of foraminous plates as depicted in Figs. 4, 5 and 6. The container illustrated in Fig. 4, is made up with its wall panels **50** provided with perforations **49** designed to expose the contents of the container to the air in the car during transit. The perforations extend preferably throughout the area of the panels and are sufficient as to size and number to permit circulation therethrough of the ambient air. In the embodiment shown, the body is of aluminum for lightness and the perforations account for the removal of about one third of the metal in the panel areas resulting in a further reduction in the weight of the container.

As shown, the container body may be formed of plates having integral connecting flange portions **48** on one of the side wall panels **50**, and contiguous front and rear wall panels having connecting flanges **47** secured to the side wall, the opposite edges of said front and rear wall panels having flanges **46** offset inwardly to form recessed door abutment flanges **45** for door **44** pivotally supported by hinges **43** and giving access to the container. As indicated in Fig. 7, the door **44** is arranged to lie flush with the container side and held closed by latch **41** with lock seal **42**. The side wall panel portion **51** below the door **44** extends downwardly for attachment to the chassis frame **32** and terminating with its upper edge at the lower ends of the offset flanges **46** on the front and rear wall panels **50**. Said front and rear panels at edges below their respective offset door abutment flange portions **46** are secured to panel **51** by side flanges **52**, and the panel **51** to said front and rear panels by side flanges **53**, all of said panels being connected together and to said chassis frame, as best shown in Figs. 8 and 9.

The container is provided with a top panel section **54** having also the apertures **49** for ventilation purposes. The panel is pan shaped to fit over the upper edges of the body wall panels **50** and secured thereto by means of the perimeter flanges **55** adapted to maintain said panels in rectangular relationship, as best shown in Fig. 6. However, the base portion of the container is insulated to prevent the circulation of air therethrough for a purpose hereinafter to appear, and incorporates the chassis frame **32** to which the container body is secured, as before outlined. Upon this frame is placed the insulation unit preferably comprising, in the embodiment indicated, a base

layer 56, of plywood or the like, an upper course of floor boards 57 spaced from the bottom board 56 by the wood furring strips 58, and enclosing a filler of insulating material 59, held in position by the cleats 60 at an intermediate point, and cleats 61 adjacent the furring strips 58, as best shown in Figs. 4 and 5. The insulation unit thus constructed, renders the base of the container impervious to the passage of air.

In rail transit, the contents of containers built as described, will be exposed to the action of the air circulating in the car, with or without refrigeration, depending upon the character of the lading, and conditions attending the shipment at the point and time of loading. On the other hand, if the perishables are delivered in volume unconfined at the terminal for shipment after having been exposed to temperatures detrimental to the preservation of the product, they too, upon loading, would be subjected to the air in the car at temperatures controlled properly to protect them from deterioration during the period required to carry them to unloading points enroute, but destined to undergo the additional hazard of further undesirable exposure of the products when transferred, perhaps in chilled condition, to road vehicles for transportation from terminal to consignee in outside temperatures unsuited to the maintenance of the lading in proper condition for consumption unless the vehicle itself be specially equipped to protect the lading from the weather. Conversely, the same hazard would attend the transfer of such goods from cold storage, warehouse or field by road vehicle to the point of shipment by rail, unless some provision is otherwise made to protect the perishables from exposure to the air at temperatures injurious to the lading.

Although fleets of such vehicles are currently in operation by large shippers of perishable commodities, they are not at all times available to the individual producer or shipper since ownership of an adequate number of such vehicles would entail an unduly large capital investment out of all proportion to his needs, and rendering the operation and maintenance of such equipment prohibitive for the limited requirements of the small shipper. In order to insure more economical and abundant means for utilizing existing road vehicle equipment, open type or closed, for the transportation of goods to and from the railroad terminal in containers without exposing the contents to the atmosphere and to prevent the infiltration of outside air to containers of the type herein contemplated, the containers are shielded and their contents protected by complemental means in the form of hoods, made impervious to the passage of air and providing insulation properties against heat transmission, and adapted to fit over the body of the container to cover the ventilating perforations.

Since only the base of the container body is impervious to the passage of air and transmission of heat, the hood will function to supplement the base portion to seal in the container air at temperatures approximating that of the contents of the container attained during transit by rail and to insulate the contents against an abrupt variation in temperature when unloaded from the car. Thus applied, the hood will function to retard any appreciable change of temperature in the contents of the container and prevent deterioration thereof during the period of transportation by truck for delivery to the consignee, or conversely, as will be obvious, by truck from producer's warehouse to railroad terminal where the hood will be removed from the container before loading upon the car so that the contents may be exposed to the air of the car during rail transit.

The containers described may be shielded by insulating hoods of the rigid type, as shown in Figs. 9 to 14, where facilities for handling them, are available. Because of the weight and bulk of such hoods, provision for lifting them from or mounting them upon a container would take the form of a crane or other load lifting equipment, and include hoisting loops 140 secured to top panel 139 at the corners of the hood, as indicated in Figs. 9 and 10, preferably by welding. The hood of the instant embodiment comprises a plurality of side wall panels 141 made up of a thickness of insulating board of plywood, or the like, and inner and outer sheets of metal 142 and 143, preferably stainless steed, bonded to the insulating board upon its opposite faces and about its edges to prevent the entry of moisture to the boards to avoid possible distortion of the panel from that cause. The panels 141 are interconnected by means of corner post angles 144 of a standard rolled section, preferably of stainless steel, as shown in Fig. 11, or bent plate angles 145, also preferably of stainless steel, as shown in Fig. 12. The panel outer sheets 143 are flanged about the panel edges as shown at 146, and the inner sheets 142 have their edge flanges 147 overlapping flanges 146 and soldered, as indicated at 148 to provide air-tight and water proof seals at the joints. The panels are assembled with their vertical edges disposed in the relationship shown in Figs. 11 and 12, with the soldered flange 147 of one panel in abutting engagement with the inner sheet 142 of the contiguous panel, and rigidly held by adjacent corner post angles 144 or 145, connected to the outer sheets 143 of the panels by arc welds 149 at the flanges of the respective angles.

The upper panel 139 of the hood is framed by peripheral angle members 150 connected at the corners of the frame by mitered joints 151, preferably by welding, the frame being proportioned to permit its depending flanges 152 to slidably engage the flanges of the corner posts and be connected thereto further to preserve the rectangular configuration of the hood. Similarly, the lower portion of the hood is held from distortion and protected from damage by edge members 153 of general U shape straddling the edges of the respective side wall panels 141 with their inside and outside flanges 154 and 155 secured, respectively, to the inside sheathing 142 of the panels, and to outside sheathing 143, preferably by arc welding as indicated at 156, in Fig. 13. It may be that the protection afforded by the U-shaped wearing pieces 153 may be dispensed with where it is found that the steel sheathing plates 142 and 143 with the encased board of plywood, provide sufficient strength and rigidity to the panels to prevent distortion in that part of the hood, in which event the outer sheathing plates 143 may terminate at the ends of the respective panels and the inside sheathing 142 extended to fold about the panel ends, thence upwardly over the lower edge of the outer sheathing plates 143 by flanges 157 and secured by soldering at 148, as shown in Fig. 14. The hood of this embodiment may be applied to or removed from the container with equal facility because of the unobstructed metallic interior wall surfaces inherent in the hood structure and is impervious to the transmission of heat. In operation, the hood rests with its upper panel 139 upon the top of the container, and its side walls 141 extending downwardly to completely envelop the ventilating panels of the container to protect its contents. In Fig. 1, there are shown insulating hoods 64 carried in the road vehicle 11. These hoods are collapsible, being generally of bellows construction so that they may be extended to enclose the containers in use and collapsed to small compass for storage or transport.

What is claimed is:

1. For use in a system of container transportation in railway refrigerator cars with containers constructed to expose the contents thereof to the temperature of the air of the car and operative to enclose the container to insulate the contents from outside temperatures during transfer of the container from the car to destination, a protective hood affording a rigid structure having metallic framing members marginally enclosing an insulating panel forming the top wall of the hood adapted to rest upon the upper wall of the container, depending side wall framing members secured to said top wall framing pro-

viding corner post members for the hood structure and insulating side wall panels connecting said corner posts, and a lower marginal rigidifying loop member securing the lower ends of said posts and wall panels.

2. A method of maintaining lading in refrigerated condition during transportation thereof, which comprises disposing lading in a ventilated pilferage-preventing container having a heat-insulating base, conveying the container with the lading therein to a point en route in a refrigerated vehicle while refrigerating the lading by subjection to the temperature of the atmosphere of said vehicle, disposing a heat-insulating hood on said base over the laden container and the refrigerated vehicle atmosphere adjacent thereto at said point, transferring to an unrefrigerated vehicle the lading in the container and refrigerating atmosphere enclosed by the hood and base for conveyance from said point, and maintaining the lading under refrigeration by said atmosphere in the hood and base while conveying the lading in the unrefrigerated vehicle.

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