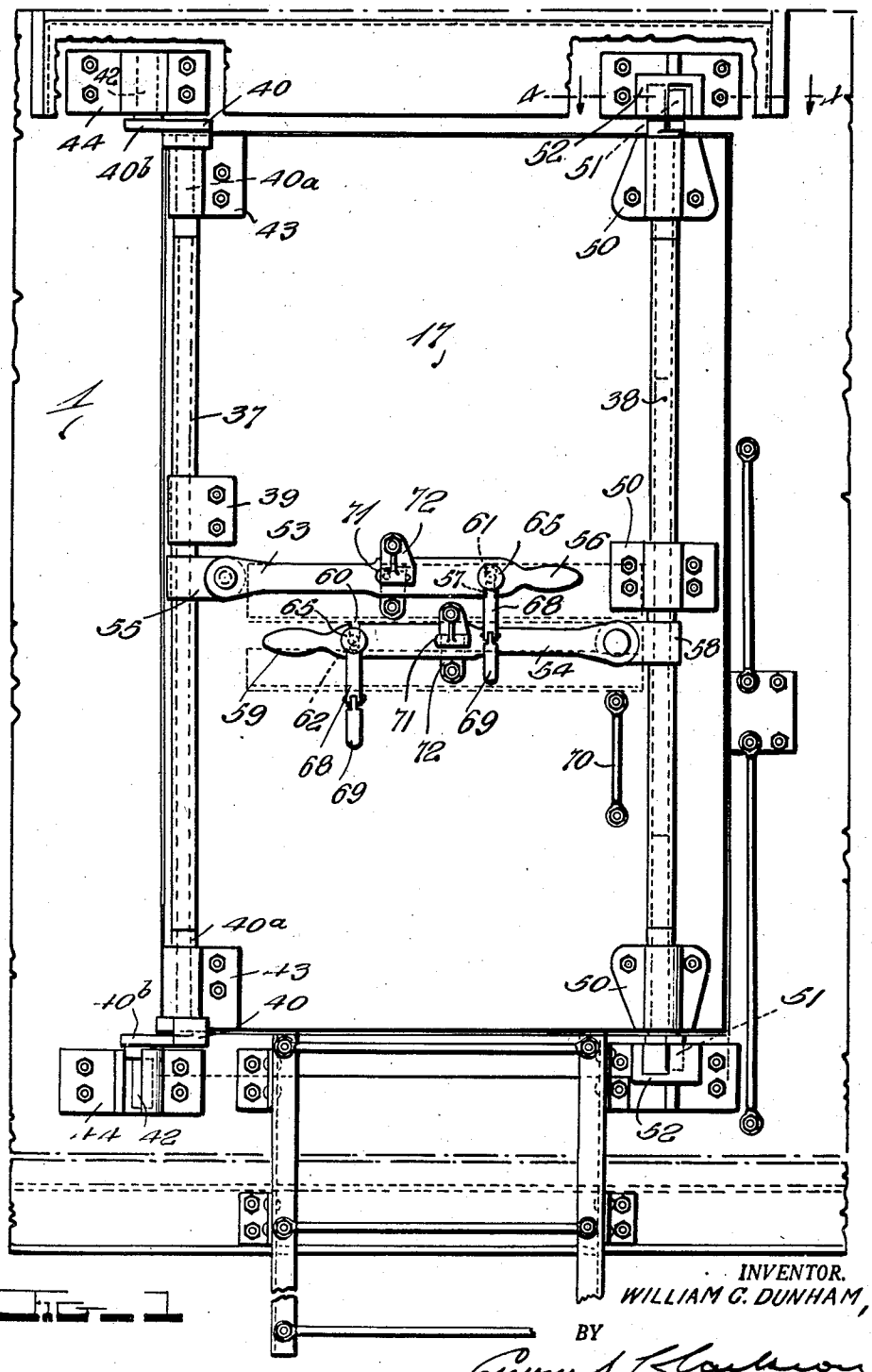
Oct. 6, 1942. W. C. DUNHAM 2,298,259

SIDE DOOR CONSTRUCTION FOR DRY ICE SERVICE REFRIGERATOR CARS

Original Filed Jan. 29, 1941 5 Sheets-Sheet 1



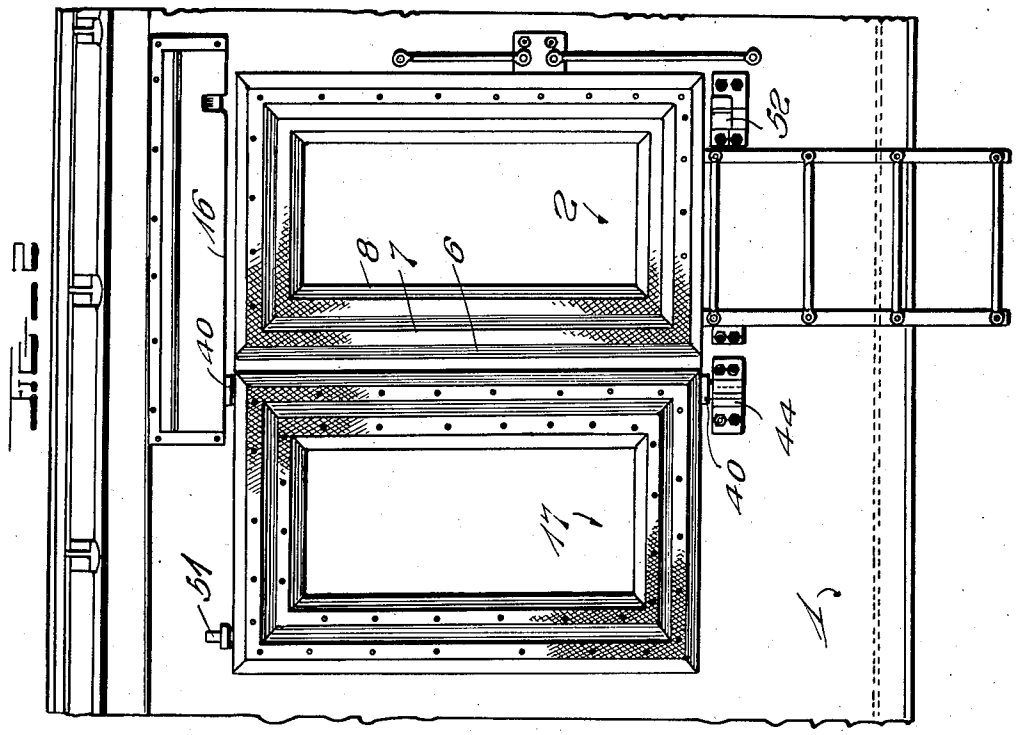
INVENTOR.
WILLIAM C. DUNHAM,
BY
ATTORNEY

Oct. 6, 1942. W. C. DUNHAM 2,298,259

SIDE DOOR CONSTRUCTION FOR DRY ICE SERVICE REFRIGERATOR CARS

Original Filed Jan. 29, 1941 5 Sheets-Sheet 2

FIG. 2



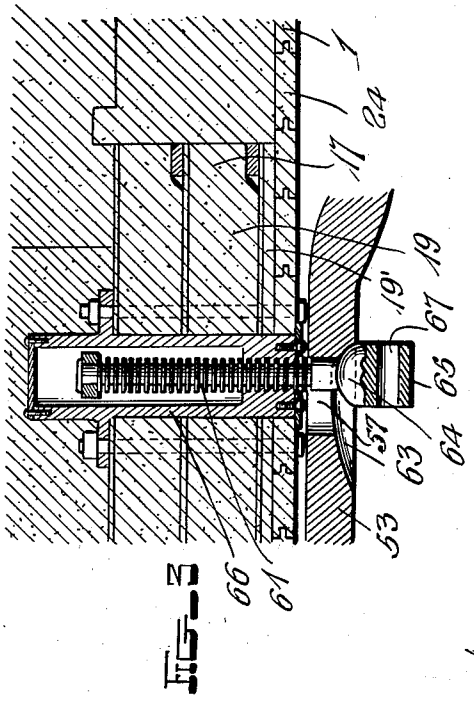


FIG. 3

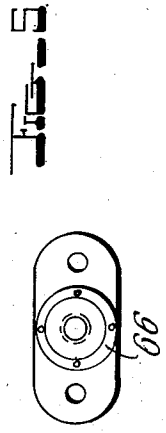


FIG. 5

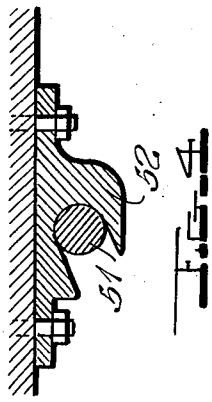


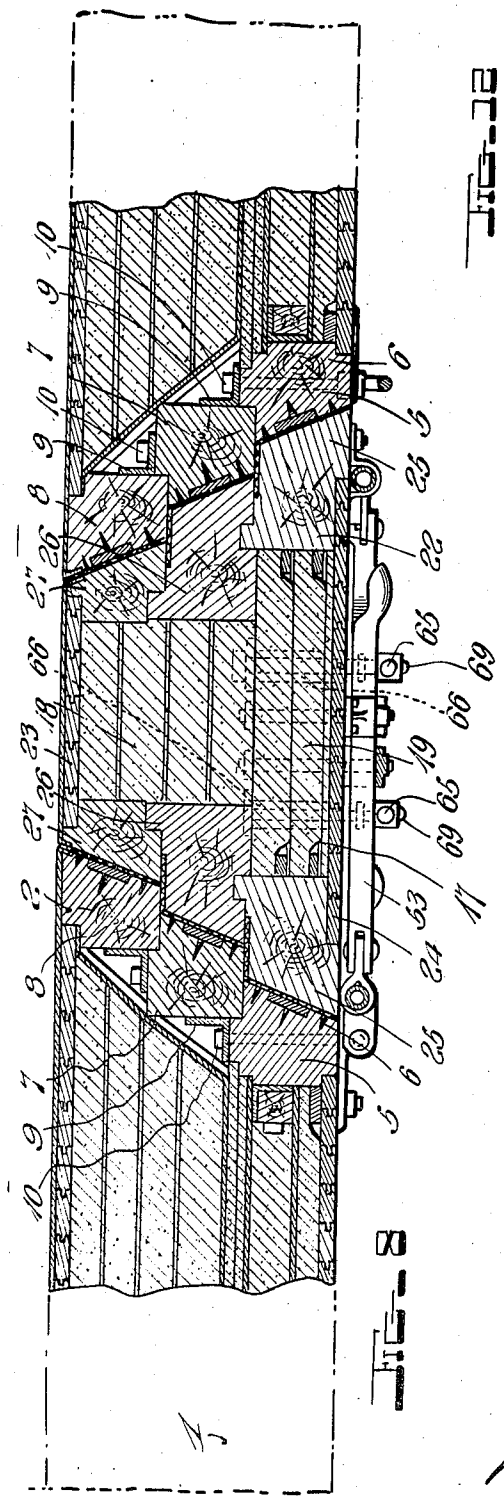
FIG. 4

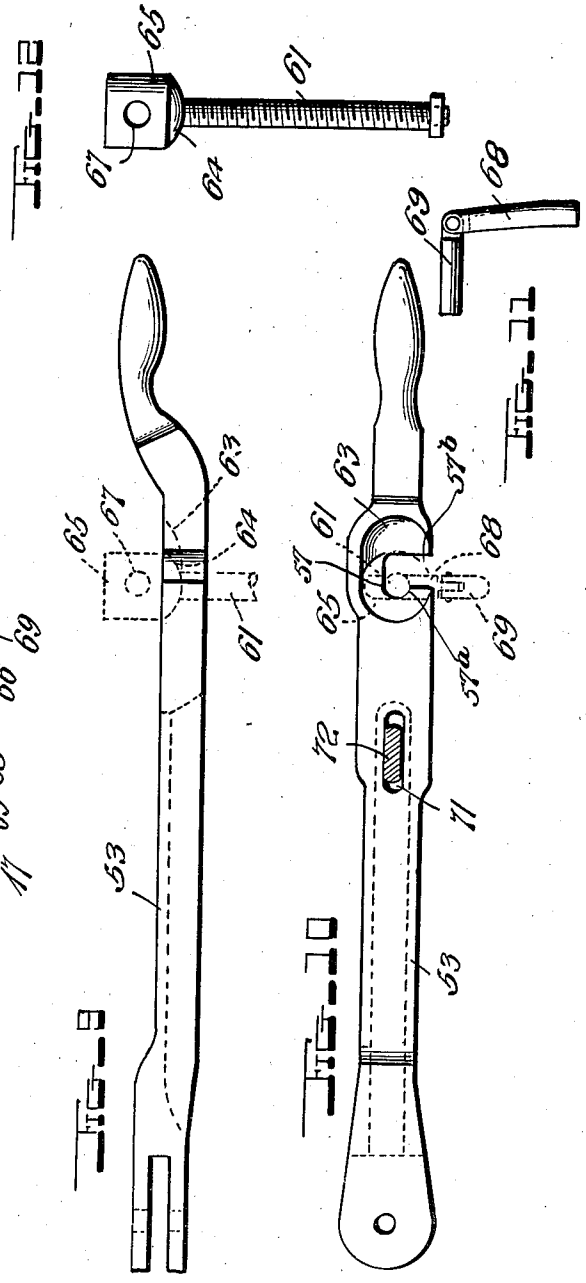
INVENTOR.
WILLIAM C. DUNHAM,
BY
ATTORNEY

Oct. 6, 1942. W. C. DUNHAM 2,298,259

SIDE DOOR CONSTRUCTION FOR DRY ICE SERVICE REFRIGERATOR CARS

Original Filed Jan. 29, 1941 5 Sheets-Sheet 3



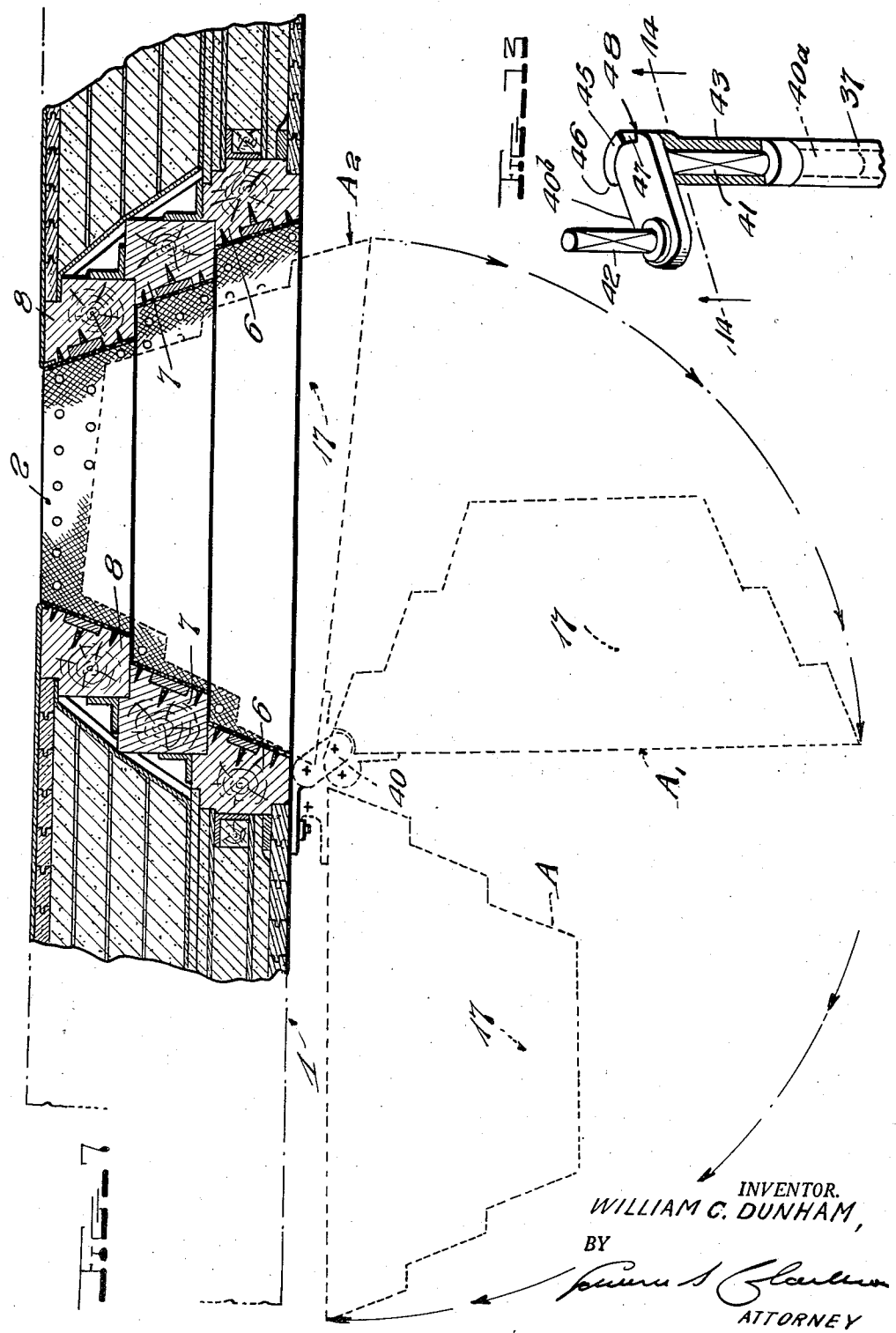


INVENTOR.
WILLIAM C. DUNHAM,
BY
ATTORNEY

Oct. 6, 1942. W. C. DUNHAM 2,298,259

SIDE DOOR CONSTRUCTION FOR DRY ICE SERVICE REFRIGERATOR CARS

Original Filed Jan. 29, 1941 5 Sheets-Sheet 4



INVENTOR.
WILLIAM C. DUNHAM,
BY
ATTORNEY

Oct. 6, 1942. W. C. DUNHAM 2,298,259

SIDE DOOR CONSTRUCTION FOR DRY ICE SERVICE REFRIGERATOR CARS

Original Filed Jan. 29, 1941 5 Sheets-Sheet 5

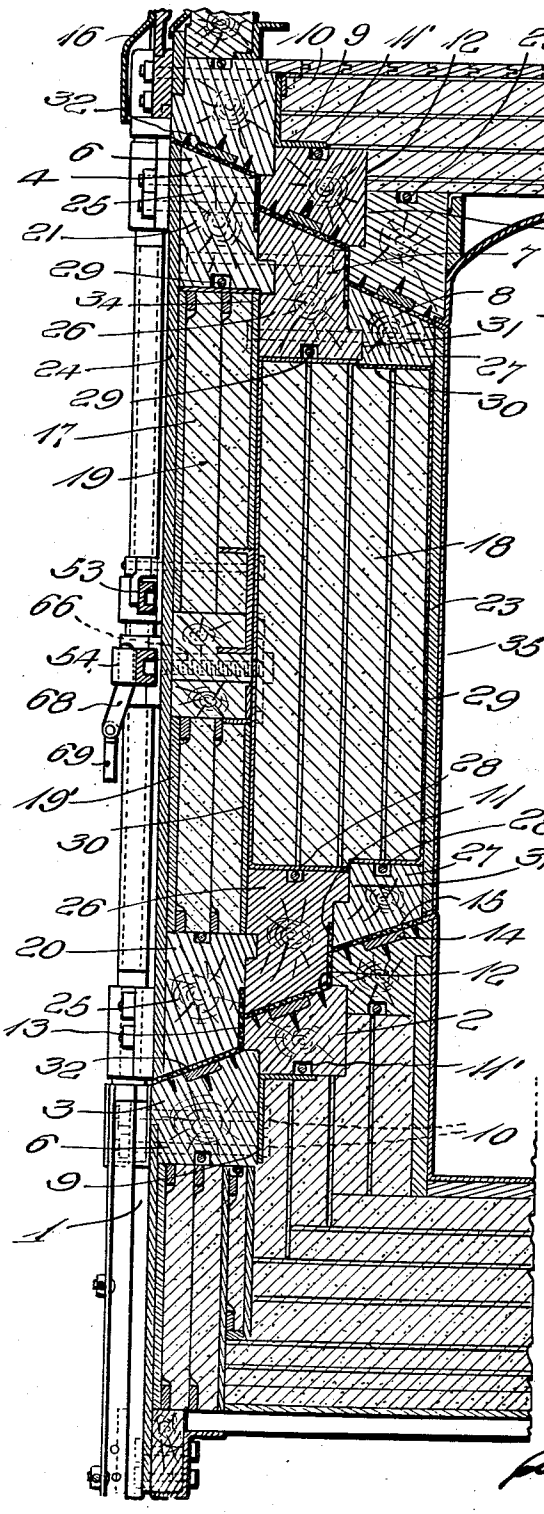


FIG. 6

FIG. 14

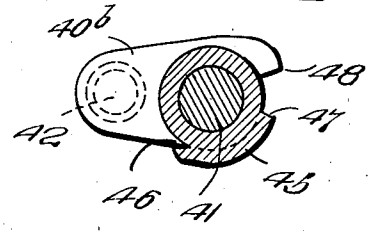


FIG. 15

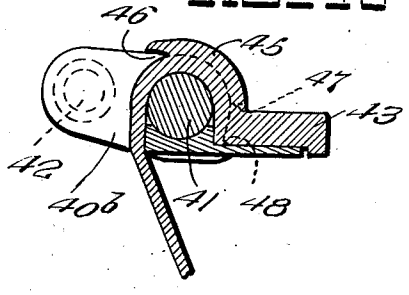
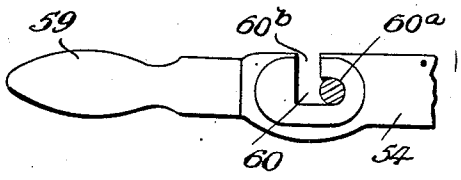


FIG. 10a



INVENTOR.
WILLIAM C. DUNHAM,
BY
ATTORNEY

Patented Oct. 6, 1942

2,298,259

UNITED STATES PATENT OFFICE

2,298,259

SIDE DOOR CONSTRUCTION FOR DRY ICE SERVICE REFRIGERATOR CARS

William Courtland Dunham, Fairport, N. Y., assignor to Despatch Shops, Inc., a corporation of New York

Original application January 29, 1941, Serial No. 376,533. Divided and this application May 22, 1941, Serial No. 394,698

2 Claims. (Cl. 292—218)

This is a division of my application filed January 29, 1941, Serial No. 376,533.

This invention relates to a novel and improved side door construction for dry ice service refrigerator cars.

Heretofore side door constructions for cars of this character have commonly been made of a single inner door and a pair of outer doors. The inner door member of such doors, ordinarily 7⅝" thick and having 6" of insulation, is arranged to close against a shoulder on an inner face of the door frame, said shoulder being provided with a Jarrow gasket to form a joint seal. The outer door of such door constructions consists of two door members of conventional refrigerator side door type, each 7⅝" thick and having 6" of insulation, said door members being arranged to close against a shoulder on the outer face of the door frame, said shoulder being provided with a Jarrow gasket to form a point seal. When these doors are closed a void or space of 5⅝" is left between the outer face of the inner door and the inner faces of the outer doors.

The end walls, floor and roof of the car are heavily insulated and commonly each side wall is 20 15/16" thick and contains 14" of insulation, and these portions of the car have been found adequate to prevent heat exchange causing undue evaporation of the dry ice and escape of cold carbon dioxide gas from the interior of the loaded car. However, it has been found that prior side door constructions of the type described are inefficient and faulty to the extent of causing serious trouble and loss of dry ice. Owing to inadequate door insulation and to the presence of the above-mentioned void or space, cold carbon dioxide gas leakage through the inner door into the space and warm outer atmospheric air leakage through the outer doors into the space occurs, with the result that the walls of the space are chilled and the warm air from the outside striking these walls produces a heavy frost in the space and upon the wall surfaces. This not only causes the doors to bind so that they cannot be opened without tearing the frozen gaskets loose, but results in the interior temperature of the car being raised, permitting evaporation of the ice and depreciation in the size of the ice cakes within the car. This may result to such an extent that many ice cakes are reduced to an unusable size for the purposes intended and must be discarded as waste.

The main object of my invention is to provide a door construction which eliminates these objections.

A further object of the invention is to provide a single door construction of the same thickness as the side wall and which gives the same amount of insulating effect, and which at the same time prevents frosting about or between the joints and securely seals the door opening against gas and air leakages.

A still further object of the invention is to provide novel and improved means for mounting the door to adapt it to be easily opened and closed and for holding the door closed under pressure to securely seal the door opening.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:

Fig. 1 is a view in side elevation of a portion of a refrigerator dry ice service car embodying my improved side door construction and showing the door closed.

Fig. 2 is a similar view showing the door thrown open.

Fig. 3 is a horizontal section through a portion of the door showing particularly the compression sleeves.

Fig. 4 is a section through the locking trunnion keeper on line 4—4 of Fig. 1.

Fig. 5 is an end elevation of the compression sleeve.

Fig. 6 is a vertical transverse section through the side wall of the car and closed door on a line through the center of the door.

Fig. 7 is a sectional plan view through the side wall showing the doorway construction, and also showing in dotted lines the door in fully open and partly open positions and in position to be closed.

Fig. 8 is a view similar to Fig. 7 showing the door closed.

Fig. 9 is a side view of one of the hand levers and associated clamping and compression screw.

Fig. 10 is a front elevation of the same.

Fig. 10A is a fragmentary side view of the lever for operating the latch rod or shaft.

Fig. 11 is a view of the handle for operating the clamping and compression screw.

Fig. 12 is a view of one of the clamping and compression screws.

Fig. 13 is a perspective view of the upper end of the hinge rod or shaft and its pivotal connection.

Fig. 14 is a section on line 14—14 of Fig. 13.

Fig. 15 is a top plan view of the trunnion hinge bearing and insert on door.

Referring now more particularly to the drawings, 1 designates a side wall of a refrigerator car of the type described and 2 the doorway therein. The wall 1 is or may be of conventional construction and of the usual thickness and containing the amount of insulation specified, or it may be of any suitable general construction with the addition of my improvements.

In accordance with my invention I provide an oblong rectangular doorway and door which are respectively coextensive in depth and thickness with the side wall. The doorway structure 2 is also of novel character and comprises a frame formed of a bottom or threshold portion 3, a top or lintel portion 4 and side portions or jambs 5, each consisting of a plurality of bars or beams 6, 7 and 8, arranged in stepped relation so that the doorway is of frusto-pyramidal form and of greatest height and width at its front or where it opens through the outer side of the wall 1 and of least height and width where it opens through the inner side of the wall 1 into the body of the car. These bars are notched at 11 so as to breakjoint and overlap one another and are suitably fastened to the side wall body and may be united where desired to each other and to adjacent portions of the wall structure by angle steel bracing beams 9 and bolts 10 so as to reinforce the bars and provide a rigid door frame structure. Tie rods 11' may be employed to firmly connect the component parts 6, 7 and 8 together. As shown, the outer faces of the bars are beveled to form inclined or sloping abutment surfaces 12 leading to and from abutment shoulders 13 formed by the overlapping front portions of the blocks. The surfaces 12 are rabbeted to form seat recesses to receive insulation packing blocks 14 which are suitably secured in the recesses, and each surface 12 is provided with a lining or covering 15 of a suitable sheet material which is suitably secured thereto. The blocks 14 preferably consist of nitrogen gassed rubber which is resilient and not affected by the (110° F. below zero) temperature of the dry ice compartment of the car. The lining 15 may consist of canvas of a strong and durable character. The packing blocks 14 are adapted to be compressed tightly against the coacting surfaces of the closed door, as hereinafter described, to provide tight compression seals proof against the leakage of carbon dioxide gas outwardly or atmospheric air inwardly. Overhanging the top of the door opening is a hood 16 to protect certain parts of the door mechanism from the action of the elements.

The door 17 is of a shape conforming to and adapted to close with a sealing fit within the doorway or opening. This door is formed of a rear body or core section 18, a front body or core section 19, of relatively small and large depths and surface dimensions, bottom, top and side or stile rim sections 20, 21 and 22, and inner and outer sheathing layers 23 and 24. The section 18 consists of layers of cork insulation and the section 19 of a layer of hair felt insulation, between which and the sheathing 24 is placed a layer 19' of Celotex insulation board, while the rim sections 20, 21 and 22 each consists of a plurality of bars or beams 25, 26 and 27 similar to the bars or beams 6, 7 and 8 of the doorway structure. These parts are united in any suitable manner to make the door structure strong and rigid and tie rods 28 are extended through the door body between the stile sections to firmly tie the same together. The layers 18 are sealed in with asphalt, as shown at 29, and similarly the layer 19 is sealed in with asphalt, as shown at 30. As shown, the rim bars 25, 26 and 27 of each set are tongued and grooved, as at 31, to breakjoint and the bars are arranged in stepped relation and beveled on their outer faces so as to provide inclined abutment surfaces 32 to bear with a wedging fit against the abutment surfaces 12 of the door frame and abutment shoulders 33 to bear against the abutment shoulders 13 of the door frame in the closed position of the door. The arrangement is also such that the intermediate bars 26 present front abutment surfaces 34 against which the rear face of the front core section 19 bears, whereby a compact assemblage of the door forming parts is produced to provide with the features above described a door of great strength and durability and proof against passage of carbon dioxide gas or air. The inner face of the door may be provided with a rust-proof metal lining 35 to lie flush when the door is closed with adjacent portions of the usual metal lining 36 on the interior of the car.

From the foregoing it will be seen that when the door is closed the doorway will be fully closed by a door equal in thickness to the side wall and having the same or even a greater amount of insulation. Also, it will be seen that the door and doorway frame are provided with a plurality of closing surfaces arranged at intervals between the outer and inner sides of the doorway and which not only breakjoint with each other, but are provided with sealing means to securely seal the joints against outward passage of cold carbon dioxide gas or inward passage of warm outside atmospheric air, so that the formation of frost about the door and doorway and in the sealing joints will be prevented and the normal temperature in the car will be preserved to prevent undue evaporation of and reduction in size of the dry ice cakes. The door construction described furthermore obviates the necessity of using troublesome multiple doors of the character heretofore in use and provides a single door free from the defects of such prior multiple door and more economical in construction and maintenance while, for reasons stated, preventing cargo losses. These and other advantages of my improved car door structure will be readily apparent to those versed in the art without further recitation.

I further provide a novel and improved means for mounting the door for opening and closing movements and locking it under sealing pressure in closed position. The door carries adjacent to one of its side edges a combined hinging rod or shaft 37, and the door carries adjacent to its opposite side edges a latching rod or shaft 38. The shaft 37 comprises a hollow pipe journaled in a center bearing 39 on the door and into the upper and lower ends of which are fitted and welded the shank portions 40*a* of trunnion castings 40, each comprising a body plate or link arm 40*b* having at one end a journal pin or portion 41 and at its opposite end a pivot pin 42. The journal portions or pins 41 of the trunnion castings are disposed between and connect their trunnion portions 40*a* with their link plates. These journal portions or pins 41 are journaled in upper and lower bearings 43 on the door, while the pivot pins 42 are journaled in bearings 44 on the sides of the car adjacent the top and bottom of the doorway. Each bearing 43 has a limited rotary movement with respect to shaft 37. To this end each bearing 43 is formed with a seg-

mental extension 45 terminating at one end in a stop face or shoulder 46 and at its opposite end with a stop shoulder 47. The shoulder 46 is adapted during the final portion of closing movement of the door to engage the inner longitudinal edge of the arm 40b, while the stop face or shoulder 47 is adapted on a preliminary outward movement or the unseating of the door to engage a stop shoulder 48 on the arm 40b. This construction provides a coupling connection between the shaft 37 and the hinge members or trunnions which adapt the door to have a preliminary substantially straight line opening movement from its closed position to unseat it from the doorway surfaces before it is swung on an arc to partly open or fully open position and to adapt it to have a substantially straight line final closing movement or seating action when it is positioned, at the end of an inward swinging movement to be seated in the doorway, under a seating pressure, as hereinafter described.

The latch rod or shaft 38 is journaled in bearings 50 on the door and is provided at its upper and lower ends with offset portions forming crank-like fastening pins 51 which are movable by oppositely rotatable movements of the shaft into and out of keeper slots or sockets formed in the keeper members 52 fixed to the side wall. In one direction of rotation of the shaft 38 the pins are moved into the keepers and exert a jamming pressure thereon to force the adjacent side of the door tightly to its door seat. In the opposite direction of rotation of the shaft the pins move out of the keepers to release the door for outward swinging movement.

Hand levers 53 and 54 are provided for operating the shafts 37 and 38. Lever 53 is pivoted at one end to a fixed bracket 55 on shaft 37 so that it may be swung upwardly and downwardly, and it is provided at its opposite or free end with a handgrip 56 adjacent to which it is formed with a slot 57 having a locking shoulder 57a at its end nearer its pivoted end and having an entranceway 57b at its end nearer its handle end, said entranceway opening outward through the lower edge of the lever. Lever 54 is similarly pivoted at one end to a fixed bracket 58 on shaft 38 so that it may be swung downwardly, and it is provided at its opposite or free end with a hand grip 59 adjacent to which it formed with a slot 60 having a locking shoulder 60a at its end nearer its pivoted end and having an entranceway 60b at its end nearer the handle end of its lever, which entranceway opens outward through the upper edge of the lever. The said slots 57 and 60 in levers 53 and 54 are adapted to be engaged with the outer ends of compression screws 61 and 62 carried by the door and the outer surface of the levers are formed with concavities 63 intersecting the slots for the reception of and bearing engagement with convex surfaces 64 of fixed heads 65 on the outer ends of the screws. Each of these concavities is of varying depth, being shallowest adjacent the outer or entranceway ends of the slots and increasing in depth toward and being of maximum depth at the locking shoulder ends of the slots. The screws 61 and 62 extend into the door 17 and are mounted for inward and outward travel in threaded passages formed in bearing sleeves or housings 66 fixed within the body portion of the door, each screw having a stop head to limit its outward movement. Each head 65 is formed with an opening 67 to receive an operating element comprising a rod or bar 68 having a pivoted handle 69 which may be normally arranged to lie parallel with the door, but may be turned to a position at right angles to the rod 68 to serve as an operating crank whereby the head 65 may be rotated to adjust the screw. When the door is closed and held under compression by the screws 61 and 62 the convex surfaces of the heads 65 bear against the deep portions of the concavities 63 at the locking ends of the slots 57 and 60, or at the ends of the slots provided with the shoulders 57a, 60a and nearer the pivoted ends of the levers, as shown in Figures 3 and 10A, thus holding the levers 53 and 54 clamped tightly against the face of the door. In releasing the door for opening movement the screws 61 and 62 are turned outwardly to their extreme outward limit, thus releasing the levers 53 and 54 so that they may be swung on their pivots free from engagement with the screws so that they may be operated to unlock the door and unseat it from the doorway. In the operation of seating the door and locking it at the end of a closing movement the levers 53 and 54 are swung on their pivots to engage their slots 57 and 60 with the outwardly projected screws 61 and 62 in rear of their heads 65, at which time the screws will lie in the entrance ends of the slots and, owing to the angular relation of the levers with respect to the screws, the concaved surfaces of the heads 65 will engage the shallowest portions of the concavities 63 adjacent such ends of the slots. Thus when the screws are turned inward to force the levers 53 and 54 against the door and to place the seated door under holding compression the levers are permitted to swing inward under pressure of the heads 65, in which operation the screws will shift from the entrance ends of the slots to the locking ends of the slots and engage the locking shoulders 57a, 60a, and the convex faces of heads 65 will ride along the concavities faces 63 to shift the heads from the shallower to the deeper ends of the concavities and bring the parts to the clamping position shown in connection with lever 53 in Figure 3.

The lever 53 is provided for operating the shaft 37 for door releasing and final closing movements, while lever 54 is provided as stated for operating the latch shaft 38. Both levers are also used to force the door tightly into sealing position and cooperate with the compression screws and their operating means to place the closed door under compression to hold it sealed against any disturbing forces. A stationary handle 70, however, is provided for swinging the door when released to open position and from open position into the doorway for a final closing movement.

Assuming the door to be in the fully open position A or partly open position A' shown in Fig. 7, it will be understood that in a closing operation the door is swung by handle 70 to position A2 in which it is partly moved into the doorway 2, and in which operation the door and links arms 40b swing on pivot pins 42 with levers 53 and 54 in outwardly swung position and ends 46 of flanges 45 in contact with the inner sides of link arms 40b. When the door has reached position A2 lever 54 is grasped and swung inwardly, thus engaging pins 51 in keepers 52. Lever 53 is then swung inwardly, thus swinging the link arms 40b outwardly and shifting their inner surfaces out of engagement with ends 46 of flanges 45. The levers 53 and 54 are then brought into engagement with the compression screws 61 and

62 which are rotated by means of the hand levers 68 to cause the heads 65 of the screws to force the levers 53 and 54 tightly against the door, as a result of which the door is not only bodily moved inwardly but forced tightly into seating position by engagement of the pins 42 and 51 against the outer walls of their keepers 44 and 52, pins 51 in this action jamming against the cam surfaces of keepers 52 to transmit a seating pressure to the swinging side of the door and the shoulders 46 of link plates 40b and flanges 45 being brought together in this action to transmit a seating pressure to the hinged side of the door. This operation forces all sides of the door, under pressure, into seating position. The compression forces so exerted not only hold the door tightly closed to bring the sealing packings under compression but render the door rigid so that its sealing surfaces cannot be jarred out of position by disturbing forces in the travel of the car.

In opening the door the levers 54 and 53 are released, by screwing out the compression screws and disengaging the levers therefrom, lever 54 is then swung outward to rotate shaft 38 to unlock the door and lever 53 swung outward to move ends 47 of flanges 45 into engagement with shoulders 48 of link bars 40b. This releases the pressure of these parts upon the door and causes the unseating and outward movement of the door to the position A2 shown in Fig. 7. By means of lever 53 the outward movement of the door may then be continued to bring the door to any open position, in which it swings fully on pivot pins 42.

Slots 71 may be provided in levers 53 and 54 to receive any suitable type of locking or sealing means, generally indicated at 72, carried by the door.

From the foregoing description, taken in connection with the drawings, the construction, mode of use and advantages of my improved side door construction for dry ice service refrigerator cars will be readily understood and appreciated by those versed in the art without a further and extended description. While the structural organization of the door and its parts herein disclosed is preferred, it will, of course, be understood that changes in the form, proportions, construction and arrangement of the parts, falling within the scope of the appended claims, may be made without departing from the spirit of the invention.

What I claim is:

1. In a car door latch mechanism, a latch member comprising a latch operating rock shaft mounted on the door adjacent to its swinging edge, a housing on the door disposed at a point between its swinging and hinging edges and having a threaded passage opening at its outer end through the face of the door, a compression screw mounted for inward and outward travel in said passage in the housing and having an outwardly extending end, a lever having a handle end for operating it and coupled at its opposite end to the shaft for horizontal swinging movements toward and from the door so as to rotate the shaft in opposite directions for latching and unlatching actions, and also coupled at its latter named end to the shaft for swinging movements vertically toward and from the screw, said lever being provided adjacent its handle end with a longitudinally extending slot to receive the screw, said slot having a locking shoulder at its end nearer the coupled end of the lever to interlock with the screw and having an entranceway at its end nearer the handle end of the lever opening outwardly through one of the longitudinal edges of the lever to permit the lever to be swung into and out of engagement with the screw, said screw being movable in the slot between its entranceway and locking shoulder to permit relative movements of the lever and screw longitudinally of the lever to adapt the lever when engaged with the screw to be swung toward and from the door to rock the shaft for latching and unlatching actions, and means on the screw for rotating it and moving the lever when engaged with the screw into and out of engagement with the door and locking engagement with the screw, and for clamping the lever in locked position against the door.

2. In a car door latch mechanism, a latch member comprising a latch operating rock shaft mounted on the door adjacent to its swinging edge, a housing on the door disposed at a point between its swinging and hinging edges and having a threaded passage opening at its outer end through the face of the door, a compression screw mounted for inward and outward travel in said passage in the housing and having an outwardly extending end, a lever having a handle end for operating it and coupled at its opposite end to the shaft for horizontal swinging movements toward and from the door so as to rotate the shaft in opposite directions for latching and unlatching actions and also coupled at its latter named end to the shaft for swinging movements vertically toward and from the screw, said lever being provided adjacent its handle end with a longitudinally extending slot to receive the screw, said slot having a locking shoulder at its end nearer the coupled end of the lever to interlock with the screw and having an entranceway at its end nearer the handle end of the lever opening outwardly through one of the longitudinal edges of the lever to permit the lever to be swung into and out of engagement with the screw, and said lever also having a concavity in its outer face intersecting the slot and of progressively increasing depth between the entranceway and locking end of the slot, said screw being movable in the slot between its entranceway and locking shoulders to permit relative movements of the lever and screw longitudinally of the lever to adapt the lever when engaged with the screw to be swung toward and from the door to rock the shaft for latching and unlatching actions, and a head on the screw for rotating it and moving the lever when engaged with the screw into and out of engagement with the door and locking engagement with the screw and for clamping the lever in locked position against the door, said head having a convex face to seat in and ride along the concavity in the relative shifting movements between the lever and screw.

WILLIAM COURTLAND DUNHAM.