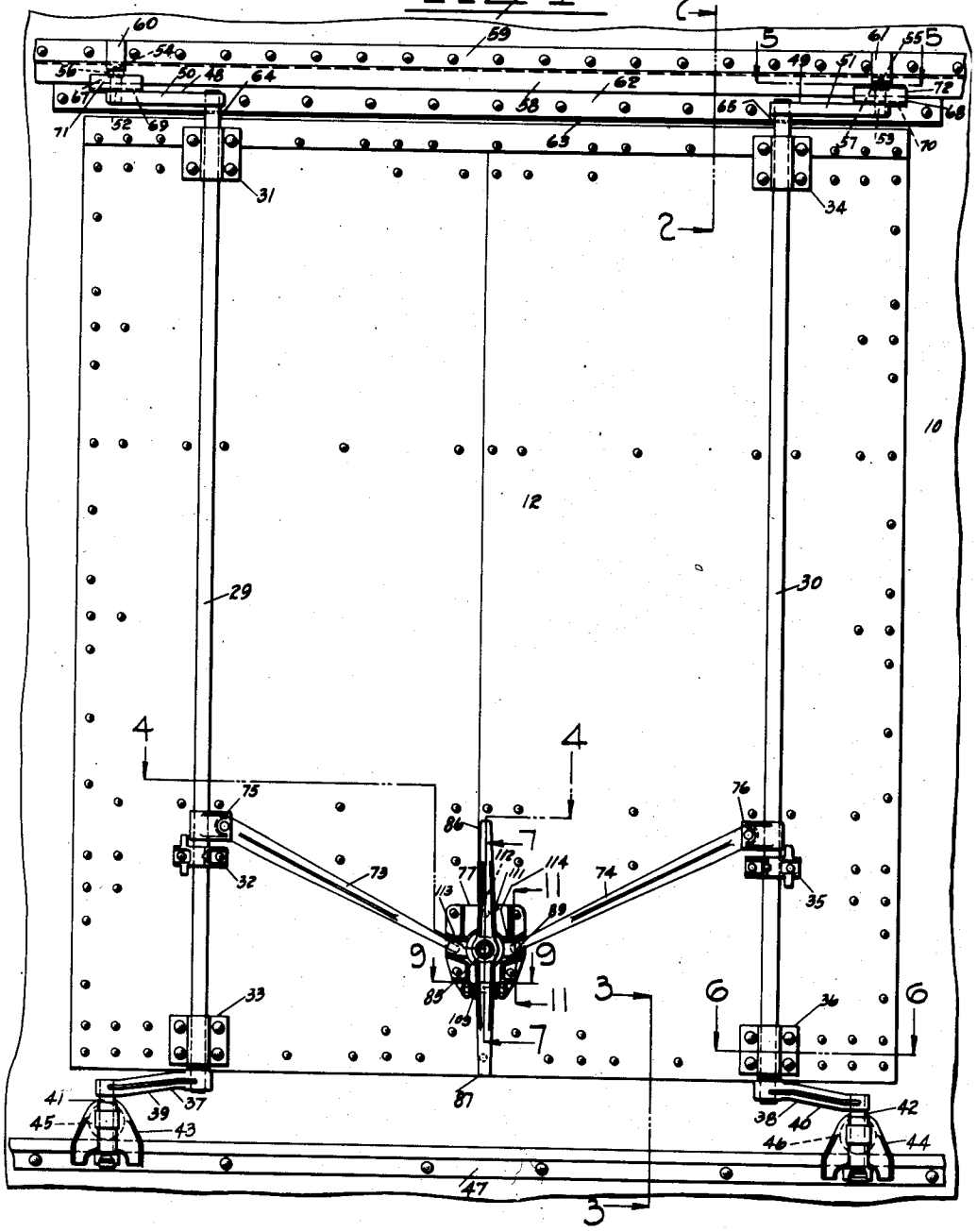
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LATERALLY MOVABLE DOOR

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FIG-1



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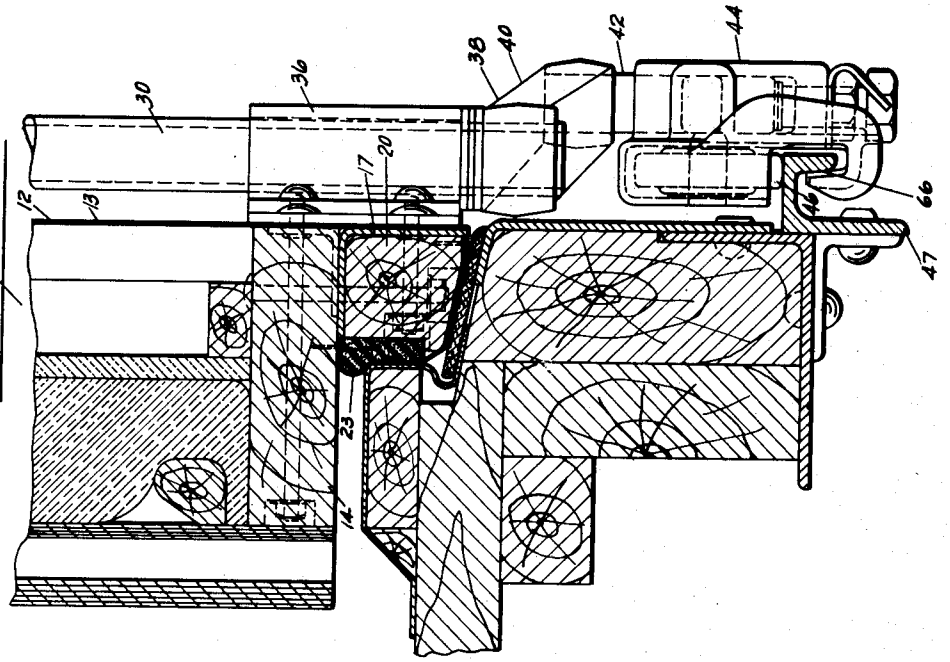
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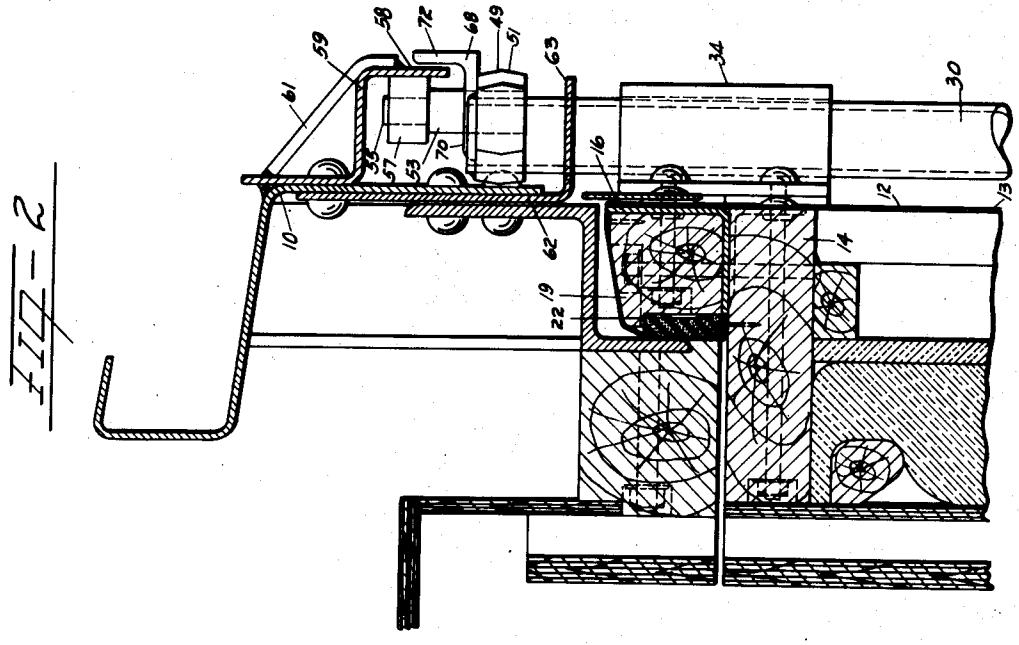
LATERALLY MOVABLE DOOR

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FIG—3



FIG—2



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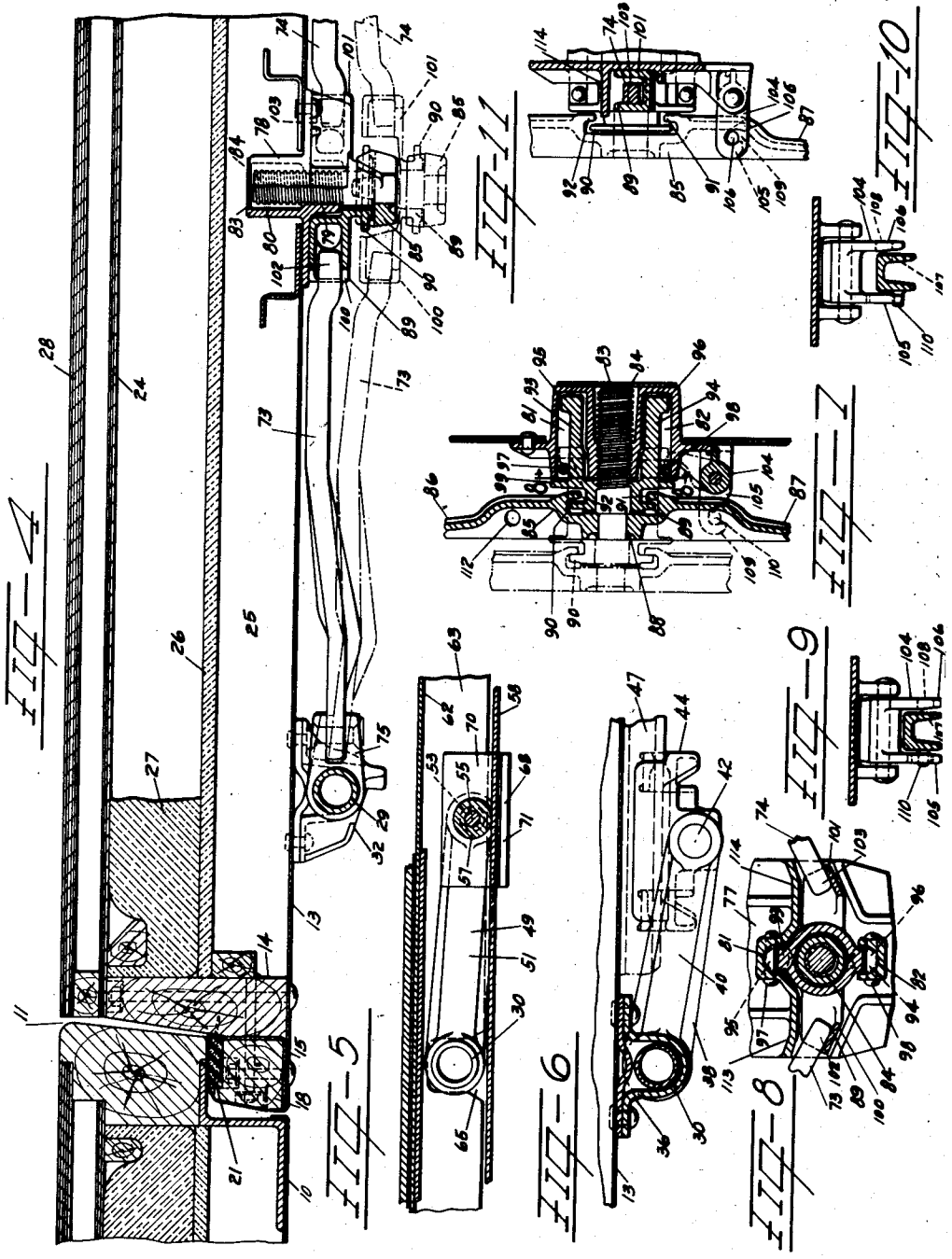


FIG-4

FIG-5

FIG-6

FIG-7

FIG-8

FIG-9

FIG-10

FIG-11

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UNITED STATES PATENT OFFICE

2,658,243

LATERALLY MOVABLE DOOR

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Application June 1, 1950, Serial No. 165,512

8 Claims. (Cl. 20—23)

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This invention relates to laterally movable doors and more particularly to sliding flush doors of refrigerator cars and the operating mechanism for such doors.

Sliding flush doors for refrigerator cars now in use are very heavy, commonly weighing about 850 lbs. Movement of such doors laterally into and out of their door openings and longitudinally along supporting tracks is very difficult. This difficulty is increased substantially when operation of the doors must be accomplished from the ground instead of a platform by reason of the relative inaccessibility of the operating mechanism. Ease of movement of the doors along their tracks has been substantially increased, accessibility of the operating mechanism provided, movement of the doors into and out of their door openings simplified and accomplished by a mechanism which can readily be reached from the ground and which overcomes the defects of prior mechanism and proper seating of the doors in the door openings obtained.

It is accordingly an object of this invention to provide laterally and longitudinally movable doors for refrigerator cars operable by mechanism readily accessible both from the ground and from platforms which shall permit an effective application of force to obtain operation.

A further object is to provide structure of the character described above in which the ruggedness of the mechanism is substantially increased and danger of breakage and loss of parts eliminated.

A further object is to provide easily laterally and longitudinally movable doors for refrigerator cars which shall be properly guided into and out of their door openings and whose upper portions shall be prevented from falling inwardly against the sides of the cars during longitudinal movement by means which shall not impede the ease of such latter movement.

A further object is to provide easily laterally and longitudinally movable doors for refrigerator cars which shall carry vertical pipes rotatably mounted thereon and provided with cranks at their upper and lower ends for movement of the doors into door openings upon rotation of the pipes wherein the cranks shall be so constructed and arranged as to insure proper seating of the upper portions of the doors in the door openings.

A further object is to provide laterally movable doors having mechanism which shall embody a plate member adapted to be secured to a door and a follower slidably associated therewith wherein the plate member and the follower are so constructed and arranged as to limit lateral movement of the door into and from the door opening.

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A further object is to provide laterally movable doors having mechanism which shall embody a plate member adapted to be secured to a door and a follower slidably associated therewith wherein the plate member and follower are formed with guide members and recesses for insuring proper movement of the follower during movement of the doors into and from the door openings.

A further object is to provide laterally movable doors having mechanism which shall embody vertical pipes rotatably mounted on the doors and operable by levers secured to the pipes, a plate member adapted to be secured to a door and a follower adapted to receive the ends of the levers, wherein the plate member shall cooperate with the follower to prevent disengagement of the levers from the follower as the doors are being moved into and from the door openings.

A further object is to provide laterally movable doors having mechanism which shall embody an actuating lever mounted on and rotatable in a plane parallel to the door and means pivotally mounted on the door engaged with the lever for preventing rotation thereof, wherein the lever and means are so constructed and related as to prevent sealing of the lever and means before the door is properly seated in a door opening.

Other objects of the invention will become clear as the description thereof proceeds.

In the drawings forming part of this specification:

Fig. 1 is a fragmentary elevation of a side wall of a refrigerator car equipped with a sliding flush door embodying the instant invention.

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1.

Fig. 3 is a vertical section taken on line 3—3 of Fig. 1.

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 1.

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 1.

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 1.

Fig. 7 is a vertical section taken on line 7—7 of Fig. 1.

Fig. 8 is a vertical section taken on line 8—8 of Fig. 7.

Fig. 9 is a horizontal section taken on line 9—9 of Fig. 1.

Fig. 10 is a view similar to Fig. 9 showing the position of the parts when the door is not fully closed.

Fig. 11 is a vertical section taken on line 11—11 of Fig. 1.

In the drawings the numeral 10 indicates a portion of a side wall of a refrigerator car. A door opening 11 is formed in the side wall 10 and is adapted to be closed by means of a sliding flush door 12 whose inner and outer surfaces lie in the same plane with the inner and outer surfaces of the wall 10 as is more clearly illustrated in Fig. 4 of the drawings.

The construction of the door 12 does not per se form any part of the instant invention. It may be described briefly as comprising an outer metallic panel 13 secured upon and projecting outwardly beyond a rectangular wooden frame 14. The projecting portions of the metallic panel are reinforced by means of vertical angle members one of which is indicated at 15 and top and bottom horizontal angle members 16 and 17. Vertical nailing strips, one of which is indicated at 18, and top and bottom horizontal nailing strips 19 and 20 are secured to the reinforcing angles and to the wooden frame of the door and serve to provide means for the securement of vertical sealing strips such as 21 and horizontal sealing strips 22 and 23 as is more clearly shown in Figs. 2, 3 and 4 of the drawings.

An inner lining member 24 formed of plywood is secured upon the wooden door frame 14 in spaced relationship to the metallic panel 13. The space between these members contains an insulating air pocket 25 and insulating media 26 and 27. To obtain a flush relationship between the inner face of the door and the inner face of the car wall a further plywood lining 28 is secured in spaced relationship to the lining 24 on the door frame. The lining 28 is usually referred to as the cold wall of the door and is open at the top and the bottom to permit circulation of cold air adjacent to the lining 24.

When the door is closed it is seated within the door opening 11. To so position the door and to move the door out of the door opening for longitudinal movement on the outside of the car the instant invention provides a mechanism which is easily accessible and operable both from the ground and from platforms. This mechanism embodies spaced vertical pipes 29 and 30 rotatably mounted on the metallic panel 13 of the door by means of brackets 31, 32 and 33 and brackets 34, 35, and 36. Cranks 37 and 38 are secured to the lower ends of the pipes 29 and 30. The arms 39 and 40 of these cranks carry spindles 41 and 42 which are journalled in carriages 43 and 44 provided with rollers 45 and 46 adapted to roll upon a track 47 secured to the car wall 10. This construction which is more fully illustrated in Fig. 3 of the drawings is adapted in conjunction with the structure hereinafter described to support the door for lateral movement into and from the door opening and for longitudinal movement along the car wall. The angularity of the crank arms 39 and 40 is more clearly shown in Fig. 3 of the drawings.

The upper ends of the vertical pipes 29 and 30 are provided with cranks 48 and 49 embodying crank arms 50 and 51 carrying upwardly extending spindles 52 and 53. The upper portions of the spindles are reduced in diameter as indicated at 54 and 55 and rollers 56 and 57 are rotatably mounted upon the reduced portions of the spindles. These rollers are adapted to lie behind the depending flange 58 of a door retainer and guide member 59 secured to the wall of the car above the door opening. The member 59 is reinforced by means of straps 60 and 61 welded to it at the points where the rollers 56 and 57 bear against the depending flange 58 during the lateral movement of the door into the door opening. The angularity of the crank arms 50 and 51 relative to the car wall is different from the angularity of the crank arms 39 and 40 relative to the car wall and is more clearly illustrated in Figs. 2 and 3 of the drawings.

A weather guard 62 is carried by the car wall above the door opening and is formed with an outwardly extending flange 63. The flange 63 is provided with slots 64 and 65 extending inwardly from the outer edge of the flange and serving to cooperate with the upper portions of the vertical pipes 29 and 30 to properly guide the door as it is moved laterally inwardly into the door opening.

The lower portion of the door is guided and retained upon the door track during longitudinal movement by the hooked engagement shown at 66. The upper portion of the door is guided and prevented from falling inwardly of the car wall during longitudinal movement of the door by means of angle members 67 and 68. The horizontal legs 69 and 70 of these angle members are seated upon the crank arms 50 and 51 and are loosely retained thereon by the spindles 52 and 53 which extend through the horizontal legs 71 and 72 of these angle members lie upon the outside of and overlap the depending flange 58 of the guide and retaining member 59.

In order to impart rotation to the vertical pipes 29 and 30 and movement of the door into and from the door opening 11 the pipes are provided with normally downwardly inclined levers 73 and 74 pivotally mounted upon the clevises 75 and 76 welded to the pipes. A plate member 77 preferably formed of cast steel is secured upon the outer face of the metallic door panel 13 as by means of rivets. The plate member 77 is formed with a hub 78 having an internally threaded portion 79 which projects outwardly from the metallic panel 13 and an inwardly projecting portion 80 which terminates within the door 12. The plate member 77 is also formed with vertically spaced recesses 81 and 82 lying above and below the hub 78. The inner end of the hub 78 is closed by means of a plate 83.

An externally threaded screw member 84 has threaded engagement with the internally threaded portion 79 of the hub and is adapted to extend into the inwardly extending portion 80 thereof when the door is closed. An actuating lever 85 provided with oppositely extending handles 86 and 87 is welded as shown at 88 to the outer end of the threaded member 84, for the purpose of imparting rotation to the threaded member. By this construction it will be apparent that the threaded member 84 and the lever 85 act as a unit.

A follower 89 is slidably mounted upon the threaded member 84 and is associated in interlocking rotatable relationship with the lever 85 by means of a flange 90 formed on the follower and similar upwardly and downwardly extending flanges 91 and 92 formed on the lever. To properly guide the follower in its inward and outward movement relative to the plate member 77 it is formed with inwardly projecting upper and lower members 93 and 94 which are received within the recesses 81 and 82 formed in the plate member. The inner end of the upper projecting member 93 is formed with an upstanding lug 95 while the inner end of the lower projecting member is formed with a downwardly extending lug 96. These lugs are adapted to engage pins

97 and 98 extending across the recesses 81 and 82 in order to limit outward movement of the follower. Inward movement of the follower is limited by the engagement between a flange 99 formed on the follower and the outer ends of recesses 81 and 82.

The follower is also provided with oppositely extending substantially horizontal wings 100 and 101 which are substantially U-shaped in section and adapted to receive the outwardly bent ends 102 and 103 of the levers 73 and 74.

When the door is fully closed the handles 86 and 87 of the actuating lever are arranged to lie vertically. In the closed position of the door accidental rotation of the actuating lever 85 is prevented by means of a substantially channel-shaped member 104 pivoted upon plate member 77 so as to swing vertically. In the closed position of the door the arms 105 and 106 of the member 104 lie on opposite sides of the handle 87 thus preventing rotation of the lever. A seal (not shown) is then passed through the alined openings 107 and 108 formed respectively in the handle 87 and in the arm 106 of the member 104.

In order to insure proper alinement between the seal slots and thereby that the door is fully closed prior to sealing, the arm 105 of the member 104 is formed in the shape of a hook 109 which when the door is fully closed is adapted to have hooked engagement with a stud 110 projecting from the handle 87. In the event that the door is not fully closed the hook-shaped arm 109 will merely rest upon the lug 110 and not have the hooked engagement illustrated in Fig. 7 of the drawings. At this time the seal slots 107 and 108 will be out of alinement so that the door cannot be sealed. This will indicate to the operator that the hooked engagement illustrated in Fig. 7 must be obtained in order to seal the door. Proper sealing of the door will thus automatically be obtained.

In order to obtain this result regardless of which handle happens to extend downwardly when the door is closed, a lug 111 extending oppositely from the lug 110 is provided upon the handle 86 which is also provided with a seal slot 112 disposed on the opposite side from the seal slot 107.

In order to move the door outwardly from the door opening and dispose it for longitudinal movement along the track the seal (not shown) is broken and the member 104 swung upwardly in order to disengage the arms thereof from the handle 87. The lever 85 is then rotated in counter-clockwise direction which causes it and the threaded member 84 to move outwardly relative to the door. Such movement of the lever and the member 84 causes the follower 89 to move outwardly guided by the recesses 81 and 82 and the projections 93 and 94. Such outward movement of the follower is limited by the engagement of the lugs 95 and 96 with the pins 97 and 98. The outward movement of the follower 89 produces an outward movement of the adjacent ends of the levers 73 and 74 and rotation of the pipes 29 and 30 which through the upper and lower cranks forces the door partly outwardly from the door opening. The ends of the levers are then lifted out of the wings 100 and 101 and swung outwardly to further rotate the pipes and complete the movement of the door from the door opening. The door may then be moved longitudinally upon the track to open position.

In order to force the door into the door opening it is first moved until it is positioned opposite the door opening. The levers 73 and 74 are then swung toward the plate member 77 thereby producing rotation of the pipes 29 and 30 and inward movement of the door until contact is established between the car wall and the weatherstrips secured to the door. The door is guided during inward movement by the cooperation between the pipes 29 and 30 and slots 64 and 65. The adjacent ends of the levers 73 and 74 are then disposed within the substantially U-shaped wings 100 and 101 of the follower 89. Thereupon the handles 86 and 87 are rotated in clockwise direction so that the lever 85 and the threaded member 84 move inwardly relative to the door. Such inward movement of these members causes the follower to move inwardly and in the latter movement the follower is guided and prevented from tilting by the cooperation between the inwardly extending projections 93 and 94 and the recesses 81 and 82. Inward movement of the lever, the threaded member and the follower is limited by the engagement of the flange 99 on the follower and the outer ends of recesses 81 and 82. During such inward movement of the follower the adjacent ends of the levers 73 and 74 are moved inwardly producing rotation of the pipes 29 and 30 and forcing the door readily into the door opening against the resistance offered by the compression of the door sealing strips.

Because of this resistance it has been observed during the operation of prior constructions that the adjacent ends of the levers 73 and 74 popped out of the wings 100 and 101. This is avoided in the instant construction by the cooperation between the recesses 81 and 82 and the projections 93 and 94 on the follower 89 which prevents tilting of the follower. When the door is properly seated in the door opening the member 104 is swung downwardly so as to straddle the handle 87 and a seal is then passed through the alined seal slots 107 and 108. At this time the wings and the ends of the levers are covered by the outwardly extending flanges 113 and 114 formed on plate member 77.

The heretofore mentioned relative angularity between the lower crank arms 39 and 40 and the upper crank arms 50 and 51 is more clearly shown in Figs. 5 and 6 of the drawings. By means of this relative angularity the invention provides for the leading of the upper portion of the door into the door opening in advance of movement of the lower portion of the door into the door opening. The resultant pressure thereby exerted upon the upper portion of the door insures that it will be tightly closed when the door is seated within the door opening.

It will be apparent that numerous changes and modifications in the details of the invention will be clear to those skilled in the art. It is intended, therefore, that all such modifications and changes be comprehended within this invention which is to be limited only by the scope of the claims appended hereto.

I claim:

1. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means comprising vertical bars rotatably mounted on said door for mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall and levers secured to said bars for imparting rotation thereto, the combination comprising a plate member se-

cured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably and non-rotatably mounted on said threaded member, means on said latter lever and follower having interlocking and rotatable engagement, means on said follower and plate member for limiting outward movement of said follower, means on said follower and plate member for limiting inward movement of said follower, and wings on said follower adapted to engage and impart swinging movement to said first mentioned levers and rotation to said bars.

2. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means comprising vertical bars rotatably mounted on said door for mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall and levers secured to said bars for imparting rotation thereto, the combination comprising a plate member secured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably mounted on said threaded member, means on said latter lever and follower having interlocking and rotatable engagement, cooperating means on said follower and plate member for guiding and preventing rotation of said follower, and wings on said follower adapted to engage and impart swinging movement to said first mentioned levers and rotation to said bars.

3. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means comprising vertical bars rotatably mounted on said door for mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall and levers secured to said bars for imparting rotation thereto, the combination comprising a plate member secured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably mounted on said threaded member, means on said latter lever and follower having interlocking and rotatable engagement, cooperating means on said follower and plate member for guiding and preventing rotation of said follower, means on said cooperating guide means for limiting outward movement of said follower, and wings on said follower adapted to engage and impart swinging movement to said first mentioned levers and rotation to said bars.

4. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means comprising vertical bars rotatably mounted on said door for mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall and levers secured to said bars for imparting rotation thereto, the combination comprising a plate member secured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably mounted on said threaded member, means on said latter lever and follower having interlocking and rotatable engagement, guide recesses provided on said plate member, extensions on said follower positioned in said recesses and cooperating therewith to guide and prevent rotation of said follower, and wings on said follower adapted to engage and impart swinging movement to said first mentioned levers and rotation to said bars.

5. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means comprising vertical bars rotatably mounted on said door for mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall and levers secured to said bars for imparting rotation thereto, the combination comprising a plate member secured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably mounted on said threaded member, means on said latter lever and follower having interlocking and rotatable engagement, guide recesses provided on said plate member, extensions on said follower positioned in said recesses and cooperating therewith to guide and prevent rotation of said follower, lugs on said extensions, pins extending across said recesses, said lugs being engageable with said pins to limit outward movement of said follower, and wings on said follower adapted to engage and impart swinging movement to said first mentioned levers and rotation to said bars.

6. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means comprising vertical bars rotatably mounted on said door for mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall and levers secured to said bars for imparting rotation thereto, the combination comprising a plate member secured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably and non-rotatably mounted on said threaded member, means on said latter lever and follower having interlocking and rotatable engagement, means limiting outward movement of said follower, means limiting inward movement of said follower, and wings on said follower adapted to engage and impart swinging movement to said first mentioned levers and rotation to said bars, said wings being substantially U-shaped in cross section, the ends of said latter levers being positioned in said wings.

7. In a railway freight car having a wall provided with a door opening, a door for closing said opening, means embodying a vertical bar rotatably mounted on said door for imparting movement thereto into and from said door opening and a lever secured to said bar for imparting rotation thereto, the combination comprising a plate member secured upon said door, an internally threaded hub on said plate member, an externally threaded member meshing with said hub, a lever secured to said threaded member for imparting rotation thereto, a follower slidably and non-rotatably mounted on said threaded member, means on said latter lever and fol-

lower having interlocking and rotatable engagement, means on said follower and plate member for limiting outward movement of said follower, and means on said follower and plate member for limiting inward movement of said follower, said follower being engageable with said first mentioned lever to impart swinging movement thereto and rotation to said bar.

8. In a railway freight car having a wall provided with a door opening, a door for closing said opening and means mounting said door upon said wall for lateral movement into and from said door opening and longitudinal movement along said wall, the combination comprising means cooperating with said first mentioned means for imparting lateral movement to said door, said latter means comprising a lever mounted on said door for rotation in a plane parallel to said door, means on said door engageable with said lever in the vertical position thereof to prevent rotation of said lever when said door is closed, said last mentioned means being pivotally mounted on said door for vertical swinging movement and embodying spaced flanges adapted to lie on opposite sides of said lever, one of said flanges being hook-shaped, the other of said flanges and said lever having seal slots, said seal slots being alined when said hook-shaped flange is in hooked engagement with said lever.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
243,866	Dobson	July 5, 1881
277,001	Chapin	May 8, 1883
411,846	Webber	Oct. 1, 1889
1,720,933	Tobin et al.	July 16, 1929
1,787,468	Bittorf et al.	Jan. 6, 1931
1,900,254	Nystrom	Mar. 7, 1933
2,108,224	Haseltine	Feb. 15, 1938
2,442,031	Beauchamp	May 25, 1948
2,511,425	Beauchamp	June 13, 1950