

March 3, 1953

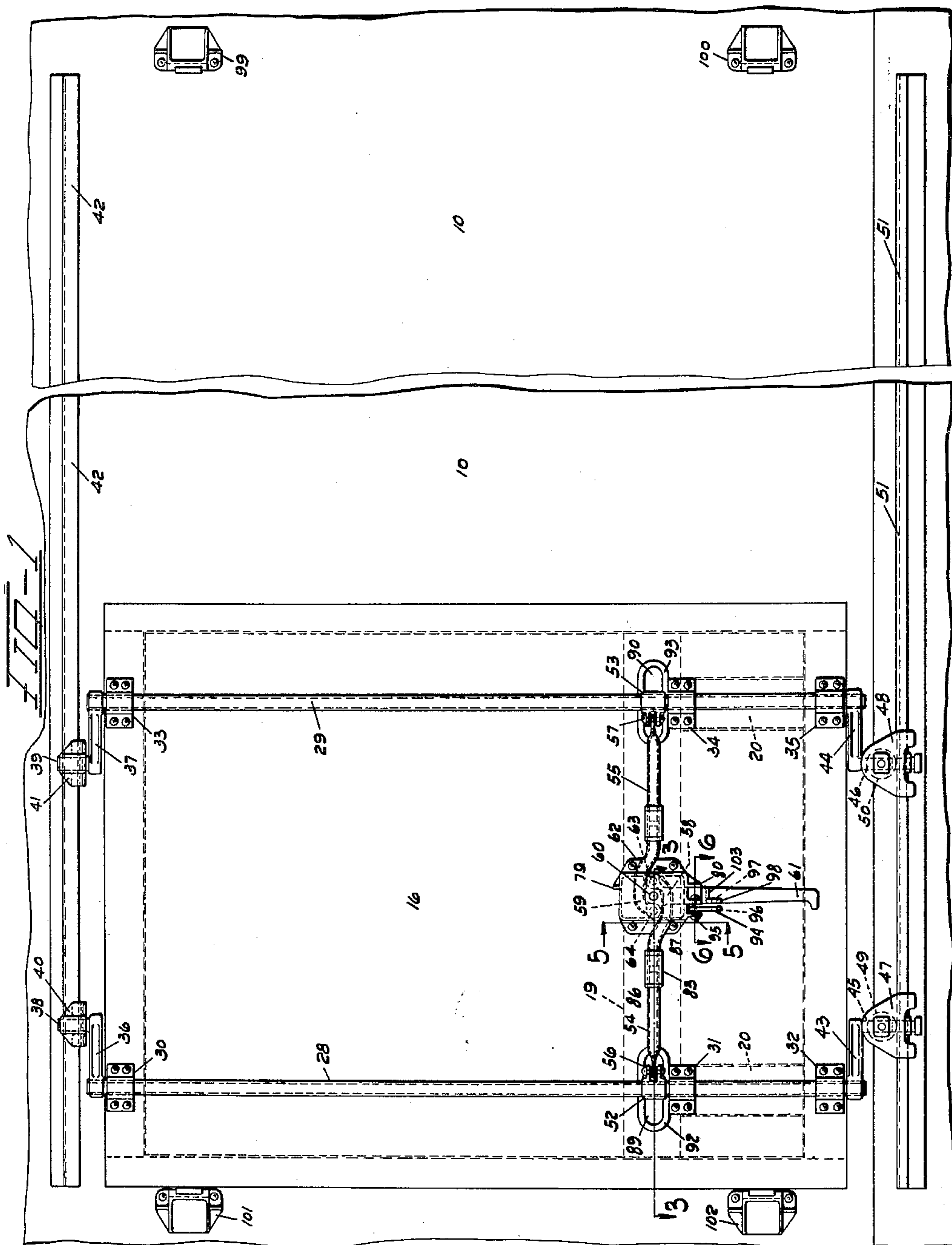
G. MADLAND

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LATERALLY MOVABLE CAR DOOR

Filed May 21, 1948

3 Sheets-Sheet 1



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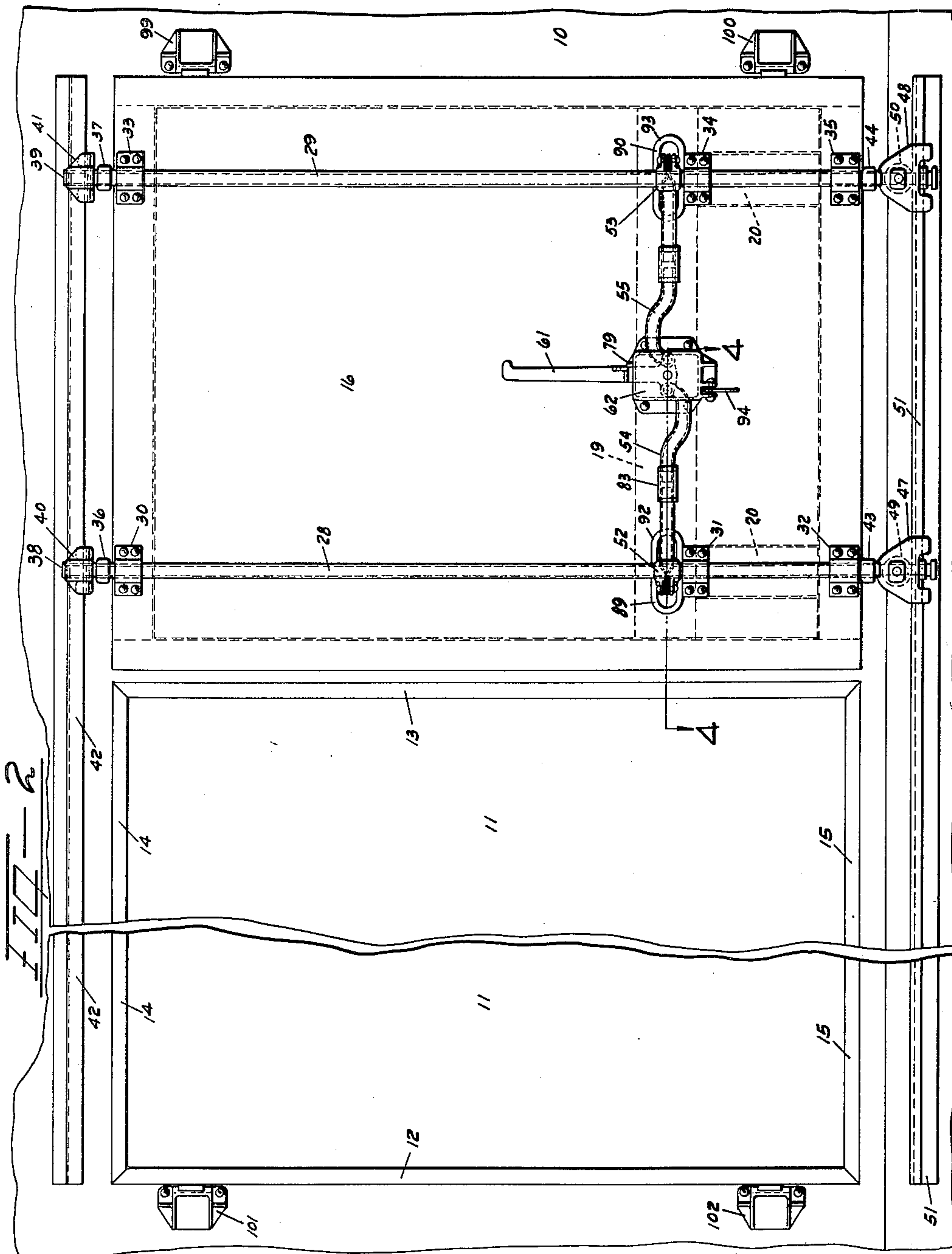
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3 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,629,901

LATERALLY MOVABLE CAR DOOR

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Ohio, a corporation of Ohio

Application May 21, 1948, Serial No. 28,410

11 Claims. (Cl. 20—23)

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This invention relates to laterally movable car doors and is concerned particularly with mechanism carried by the doors for forcing them into and from their door openings.

It is an object of this invention to provide door mechanism of the character described above which shall embody vertical rotatably mounted bars and be constructed and arranged as to obtain movement of doors into and from door openings by the operation of a single lever.

A further object is to provide mechanism of the character defined immediately above wherein the single operating lever is moved in a plane parallel to the doors.

A further object is to provide door mechanism carried by the doors for forcing them into and from door openings which shall embody vertical rotatably mounted bars and be constructed and arranged as to employ a single operating lever movable in a plane parallel to the doors and which shall be adjustable to compensate for wear of the mechanism and door members without removing any of the mechanism from the doors.

A further object is to provide door mechanism for forcing doors into and from door openings which will facilitate the initial fitting of the doors in the door openings.

A further object is to provide door mechanism applied to doors for forcing them into and from door openings which shall embody vertical rotatably mounted bars and a single operating lever swingable in a plane parallel to the doors and be capable of exerting a greater force than is now obtained by mechanisms of the same type.

A further object is to provide door mechanism of the character defined immediately above so constructed as to permit sealing of the lever even though the doors may swell and not be capable of proper seating in the door openings.

A further object is to provide door mechanism carried by the doors for forcing them into and from door openings which shall embody vertical rotatably mounted bars and be constructed and arranged as to employ a single operating lever movable in a plane parallel to the doors and associated with other parts of the mechanism in such manner as to obviate the need for means to latch the lever after the doors have been moved from the door openings.

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 railway car showing a laterally movable door equipped

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with mechanism embodying the instant invention, the door being illustrated seated in the door opening.

Fig. 2 is a view similar to Fig. 1 showing the door in open position.

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

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 2.

Fig. 5 is a vertical 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 fragmentary elevational detail illustrating how the operating lever automatically displaces the pivoted sealing member on the door as the lever is swung to its vertical depending position.

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

Referring to the drawings, the numeral 10 designates one of the side walls of a railway freight car of the refrigerator type. The side wall 10 is formed with a door opening 11, the edges of which may be inclined as indicated at 12, 13, 14 and 15. The particular structure of the car constitutes no part of the instant invention and may be any of the well known constructions employed for this type of car.

The door opening 11 is adapted to be closed by means of a door 16 which is adapted when in closed position to be seated within the door opening 11 so as to be flush with the outer and inner faces of the car wall 10. The door preferably embodies a rectangular shaped metallic frame formed of angular members one of which is shown at 17. A metallic panel 18 is secured in any desired manner upon the frame and is reinforced by means of horizontal and vertical substantially channel-shaped members 19 and 20. The reinforcing member 19 embodies a web 21, legs 22 and 23 and outturned flanges 24 and 25 which are secured as by means of rivets 26 and 27 to the door panel 18. The vertical reinforcing member 20 is similar in construction to the horizontal reinforcing member. The structure of the remainder of the door forms no part of the instant invention and any one of the well known types of refrigerator car door constructions may be utilized to complete the illustrated door. For example, the remainder of the door construction may be similar to that illustrated in the patent to Heitner, No. 2,170,053, granted August 22, 1939, to which reference is here made.

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As hereinabove indicated and as illustrated in Fig. 3 of the drawings, when the door 16 is in closed position it is seated within the door opening 11. In order to move the door to open position lateral movement is first imparted thereto. This movement carries the door out of the door opening and in spaced relationship with the car wall 10 so that it may be moved longitudinally of the car to expose the door opening. This is accomplished by means of mechanism carried by the door.

This mechanism embodies spaced vertical bars 28 and 29 shown in the form of pipes which are rotatably mounted upon the door by means of brackets 30, 31, and 32, and brackets 33, 34, and 35. The upper ends of the bars 28 and 29 are secured to one end of members 36 and 37, the opposite ends of which are formed with spindles 38 and 39 rotatably seated in carriages 40 and 41 which slidably engage a Z-shaped track 42 secured to the car wall 10 above the door opening. The lower ends of the bars 28 and 29 are similarly secured to members 43 and 44, the opposite ends of which are formed with spindles 45 and 46 rotatably supported in carriages 47 and 48. These carriages carry rollers 49 and 50 which are adapted to roll upon a substantially channel-shaped track 51 secured to the car wall below the door opening when the door is being moved longitudinally of the car. The particular construction of the portion of the door mechanism immediately above set forth forms no part of the instant invention but constitutes the subject matter of the pending application of Thorvald Madland, Serial No. 754,675, filed June 14, 1947, now Patent No. 2,559,447.

Upon rotation of the bars 28 and 29 in the proper directions, lateral movement of the door into and from the door opening is obtained. To secure rotation of the bars the instant invention provides clevises 52 and 53 which are secured respectively to the bars 28 and 29 in any desired manner for rotation therewith. The remote ends of connecting members 54 and 55, which are preferably in the form of pipes having flattened ends, are pivotally secured to the clevises 52 and 53 as indicated at 56 and 57. The adjacent ends of the connecting members 54 and 55 are formed into goose-neck shaped portions as shown at 58 and 59. As illustrated in Figs. 1 and 5 of the drawings, the portion 58 lies below and extends beyond the pivotal connection 60 of a normally vertically depending operating lever 61 carried by a bracket 62 secured to the door between the vertical bars 28 and 29. The portion 58 is pivotally connected as indicated at 63 to the lever 61. Similarly, the portion 59 of connecting member 55 extends above and beyond the pivotal connection 60 of the lever and is pivotally secured to the lever as indicated at 64.

The bracket 62 which carries the operating lever 61 is preferably in the form of a casting and embodies a base 65 having attaching flanges 66 and 67 by means of which the bracket is secured to the door as through rivets 68 and 69. The bracket 62 also embodies outwardly extending side walls 70 and 71 and an outer wall 72 spaced from the base 65 and forming therewith and with the side walls a housing within which the upper end of the lever and the adjacent ends of the connecting members 54 and 55 are received. For this purpose the side walls 70 and 71 are formed with openings 73 and 74. Similarly, openings 75 and 76 are formed in the top and bottom walls 77 and 78 of the bracket 62. The opening 75 in the top wall terminates at a

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stop flange 79 and the opening 76 in the bottom wall terminates at a stop flange 80.

In accordance with the instant invention the connecting members 54 and 55 are formed in two sections as is more clearly shown in Figs. 1 and 3. The adjacent ends of the sections of connecting member 54 are oppositely threaded as shown at 81 and 82 and are secured together by means of a nut 83 similarly provided with oppositely threaded portions 84 and 85. Jam nuts 86 and 87 are provided to maintain the nut 83 in any adjusted position. The adjacent ends of the sections of the connecting member 55 are threaded and connected together as hereinabove described for the connecting member 54 and no further description thereof is believed to be necessary.

It will be apparent from the drawings that the pivotal connections 60, 63 and 64 lie in the same horizontal line and that these connections preferably lie in the plane of the axes of the horizontal members 54 and 55 and in alignment with the pivotal connections 56 and 57.

It is an object of the instant invention to secure rotation of the operating lever 61 through 180° in order to move the door laterally into and out of the door opening 11. This is achieved by the openings provided in the top and bottom walls and in the left-hand side wall 70 of the bracket 62. Furthermore, during the swinging movement of the operating lever the remote ends of the connecting members 54 and 55 move horizontally between the vertical bars 28 and 29 and the door. To accomplish this the remote ends of the connecting bars are bent as indicated at 88 adjacent to their pivotal connections with the clevises 52 and 53. Also, the metallic panel 16 of the door is recessed, as indicated at 89 and 90, in order to provide pockets within which the remote ends of the connecting bars may move. To form these recesses, the portions of the door lying behind the clevises 52 and 53 are cut away as indicated at 91 in alignment with the horizontal reinforcing channel 19. These copes in the door panel are covered by means of substantially channel shaped members 92 and 93 which are secured to the door panel as by means of welding and which are depressed inwardly within the channel reinforcing member 19 and secured to the web 21 thereof as by means of welding.

When the door is in the closed position illustrated in Figs. 1 and 3 of the drawings, the operating lever 61 depends vertically from its pivot within the bracket 62 and is prevented from swinging in counter-clockwise direction by means of the stop flange 80 of the bracket. Swinging movement of the lever in clockwise direction is also prevented by means of a substantially rectangularly shaped member 94 pivotally suspended as indicated at 95 from bracket 62. In this position of the lever it may be sealed by means of a seal (not shown) extending through aligned seal slots 96 and 97 formed respectively in the member 94 and in a seal lug 98 formed on the lever.

When it is desired to open the door, the seal is removed and the member 94 swung outwardly out of the path of swinging movement of the lever. The lever is then swung upwardly in clockwise direction through 180° being limited in such movement by engagement with the stop flange 79 on the bracket. During this swinging movement of the operating lever, thrust is applied to the connecting members 54 and 55 which is translated into rotation of the vertical bars 28 and 29 through the connection of the connecting mem-

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bers with the clevises 52 and 53 secured to said bars. Rotation of the bars 28 and 29 causes the door to move laterally out of the door opening and to be spaced from the car wall 10. Thereupon the door may be moved longitudinally to open position, being supported during such movement by means of the rollers 49 and 50 and the carriages 40 and 41 and their associated tracks. During the lateral movement of the door the remote ends of the connecting bars move in the recesses 99 and 90 formed in the door, such movement for the remote end of the connecting member 54 being illustrated in Figs. 3 and 4 of the drawings. By reason of the horizontal alinement of the pivotal connections of the lever and adjacent ends of the connecting members the lever 61 will remain in its upstanding vertical position without the need for additional latching means to retain it in such position. The longitudinal opening movement of the door is limited by means of the upper and lower back stops 99 and 100.

To close the door it is moved longitudinally until it assumes the position illustrated in Fig. 4 of the drawings in front of the door opening. Such longitudinal movement of the door is limited by means of the front stops 101 and 102. At the completion of this movement the operating lever is swung in counter-clockwise direction so as to impart a pull upon the connecting members 54 and 55 and rotation to the vertical bars 28 and 29. This rotation will cause the door to move laterally and to be seated within the door opening 11 whereupon the lever is sealed in its depending position. This position of the lever is obtained without manual manipulation of the seal member 94. For this purpose the lever 61 is formed with an inclined flange 103 which engages the seal member 94 and automatically displaces it outwardly so as to permit the lever to be swung to its vertical depending position.

It will be apparent from the foregoing description and from the drawings that applicant's door mechanism eliminates the need for means to latch the lever when it has been swung in clockwise direction to move the door laterally from the door opening. It will be apparent, moreover, that as a result of the construction of the connecting members 54 and 55, much greater ease of proper initial seating of the door within the door opening is obtained since any required adjustment is readily secured by adjustment between the sections of the connecting members. In addition, the structure of the connecting members makes it possible to compensate for any wear which may occur in the parts of the mechanism and as well in the portions of the door which engage the edges of the door opening without the necessity of removing any of the mechanism from the door. Moreover, sealing of the lever in its vertical depending position is insured despite warping or swelling of the door. Should the door be seated to the maximum extent within the door opening before the lever is in the vertical position illustrated in Fig. 1 of the drawings, it is only necessary to actuate the nuts 83, 86 and 87 so as to separate the sections of each of the connecting members to a greater extent in order to permit the lever to assume such position. Furthermore, by reason of the angular movement of the operating lever 61, the instant invention permits the application of a far greater force in the operation of the mechanism than has heretofore been possible with mechanisms of the same type. These accomplishments are obtained by mecha-

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nisms utilizing a single operating lever swingable in a plane parallel to the door.

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 sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars in offset relationship to the axis of rotation of said bars, a vertical lever, means pivotally suspending said lever upon said door between said bars for swinging movement through an angle of substantially 180° in a plane parallel to said door, the adjacent ends of said members extending beyond said lever pivot means and being bent upwardly and downwardly respectively, and means pivotally securing said adjacent ends to said lever, said pivot means for said lever and for said adjacent ends of said members lying in a horizontal line, said lever being swingable through said angle of substantially 180° to move said door into and from said door opening.

2. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars in offset relationship to the axis of rotation of said bars, a vertical lever, means pivotally suspending said lever upon said door between said bars for swinging movement through an angle of substantially 180° in a plane parallel to said door, the adjacent ends of said member extending beyond said lever pivot means and being bent upwardly and downwardly respectively, means pivotally securing said adjacent ends to said lever, said lever being swingable through said angle of substantially 180° to move said door into and from said door opening, and means connected to said members for increasing or decreasing the length of said members, said last mentioned means being operable to maintain the vertical position of said lever independently of said bars.

3. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, a clevis secured to each of said bars, recesses formed in said door behind said bars, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said clevises, a vertical lever, means pivotally suspending said lever upon said door between said bars for swinging movement through an angle of substantially 180° in a plane parallel to said door, the adjacent ends of said members extending beyond said lever pivot means and being bent upwardly and downwardly

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respectively, and means pivotally securing the adjacent ends of said members to said lever, said lever being swingable through said angle of substantially 180° to move said door into and from said door opening, said clevises and said remote ends of said connecting members moving in said recesses during operation of said lever.

4. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, a clevis secured to each of said bars, recesses formed in said door behind said bars, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said clevises, a vertical lever, means pivotally suspending said lever upon said door between said bars for swinging movement through an angle of substantially 180° in a plane parallel to said door, the adjacent ends of said members extending beyond said lever pivot means and being bent upwardly and downwardly respectively, means pivotally securing the adjacent ends of said members to said lever, said lever being swingable through said angle of substantially 180° to move said door into and from said door opening, said clevises and said remote ends of said connecting members moving in said recesses during operation of said lever, and means connected to said members for increasing or decreasing the length of said members, said last mentioned means being operable to maintain the vertical position of said lever independently of said bars.

5. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door for supporting said door for movement along said wall and laterally into and from said door opening, a clevis secured to each of said bars, recesses formed in said door behind said bars, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said clevises, a lever, means pivotally mounting said lever upon said door between said bars for swinging movement in a plane parallel to said door, and means pivotally securing each of the adjacent ends of said connecting members to said lever, said clevises and said remote ends of said connecting members moving in said recesses during operation of said lever.

6. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars, a bracket disposed between said bars and having a base secured to said door and an outer wall spaced from said base, a vertical lever, means pivotally securing said lever between said base and said outer wall for swinging movement through an angle of substantially 180° in a plane parallel to said door, said lever depending below said bracket, the adjacent ends of said members extending between said base and said outer wall of said bracket and beyond said lever pivot means, said adjacent ends being bent upwardly and downwardly respectively, means pivotally securing said

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adjacent ends to said lever beyond said lever pivot, said pivot means for said lever and for said adjacent ends lying in a horizontal line, said lever being swingable between said base and outer wall through said angle of substantially 180° to move said door into and from said door opening, and means on said bracket engageable with said lever for limiting said swinging movement of said lever to substantially 180° .

7. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars, a bracket secured to said door between said bars and having a base secured to said door and an outer wall spaced from said base, a vertical lever, means pivotally securing said lever between said base and said outer wall for swinging movement through an angle of substantially 180° in a plane parallel to said door, said lever depending below said bracket, the adjacent ends of said members extending between said base and said outer wall of said bracket and beyond said lever pivot means, said adjacent ends being bent upwardly and downwardly respectively, means pivotally securing said adjacent ends to said lever, said pivot means for said lever and for said adjacent ends lying in a horizontal line, said lever being swingable between said base and outer wall through an angle of substantially 180° to move said door into and from said door opening, means on said bracket engageable with said lever for limiting said swinging movement of said lever to substantially 180° , means on said bracket adapted to engage said lever for preventing swinging movement thereof in one direction when said lever is in depending position, means pivotally supported by said bracket for lateral swinging movement, and a sloping flange on said lever, said sloping flange engaging and automatically displacing said pivotally supported means during swinging movement of said lever to depending position, said pivotally supported means being adapted to engage said lever when the lever is in depending position to prevent swinging movement thereof in the opposite direction.

8. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars, a bracket secured to said door between said bars, a vertical lever pivotally mounted on said bracket for swinging movement in a plane parallel to said door, said lever depending below said bracket, means pivotally securing the adjacent ends of said members to said lever, means pivotally supported by said bracket for lateral swinging movement, and a sloping flange on said lever, said flange engaging and automatically displacing said swingable means during swinging movement of said lever to depending position, said laterally swingable means being adapted to engage said lever when said lever is in depending position to prevent swinging movement thereof in one direction, and means on said bracket adapted to en-

gage said lever in said position for preventing swinging movement thereof in the opposite direction.

9. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal members lying substantially parallel to said door and pivotally connected to said bars, a vertical lever pivotally mounted on said door between said bars for swinging movement in a plane parallel to said door, said lever being suspended from said pivotal mounting means pivotally connecting said members to said lever, and means connected to said members for increasing or decreasing the length of said members, said last mentioned means being operable to maintain the vertical position of said lever independently of said bars.

10. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for supporting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars in offset relationship to the axis of rotation of said bars, a vertical lever, means pivotally suspending said lever upon said door between said bars for swinging movement through an angle of substantially 180° in a plane parallel to said door, the adjacent ends of said members extending beyond said lever pivot means and being bent upwardly and downwardly respectively, and means pivotally securing said adjacent ends to said lever, said lever being swingable through said angle of substantially 180° to move said door into and from said door opening.

11. In a sliding door for railway cars having a wall provided with a door opening, means embodying vertical bars rotatably mounted on said door between the vertical edges thereof for sup-

porting said door for movement along said wall and laterally into and from said door opening, horizontal connecting members lying substantially parallel to said door, means pivotally securing the remote ends of said members to said bars, a bracket secured to said door between said bars, a vertical lever pivotally mounted on said bracket for swinging movement through an angle of substantially 180° in a plane parallel to said door, said lever depending below said bracket, the adjacent ends of said members extending beyond said lever pivot means, said adjacent ends being bent upwardly and downwardly respectively, means pivotally securing said adjacent ends to said lever, said lever being swingable through said angle of substantially 180° to move said door into and from said door opening, means on said bracket engageable with said lever for limiting said swinging movement of said lever to substantially 180°, means on said bracket adapted to engage said lever for preventing swinging movement thereof in one direction when said lever is in depending position, means pivotally supported by said bracket for lateral swinging movement, and a sloping flange on said lever, said sloping flange engaging and automatically displacing said pivotally supported means during swinging movement of said lever to depending position, said pivotally supported means being adapted to engage said lever when the lever is in depending position to prevent swinging movement thereof in the opposite direction.

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