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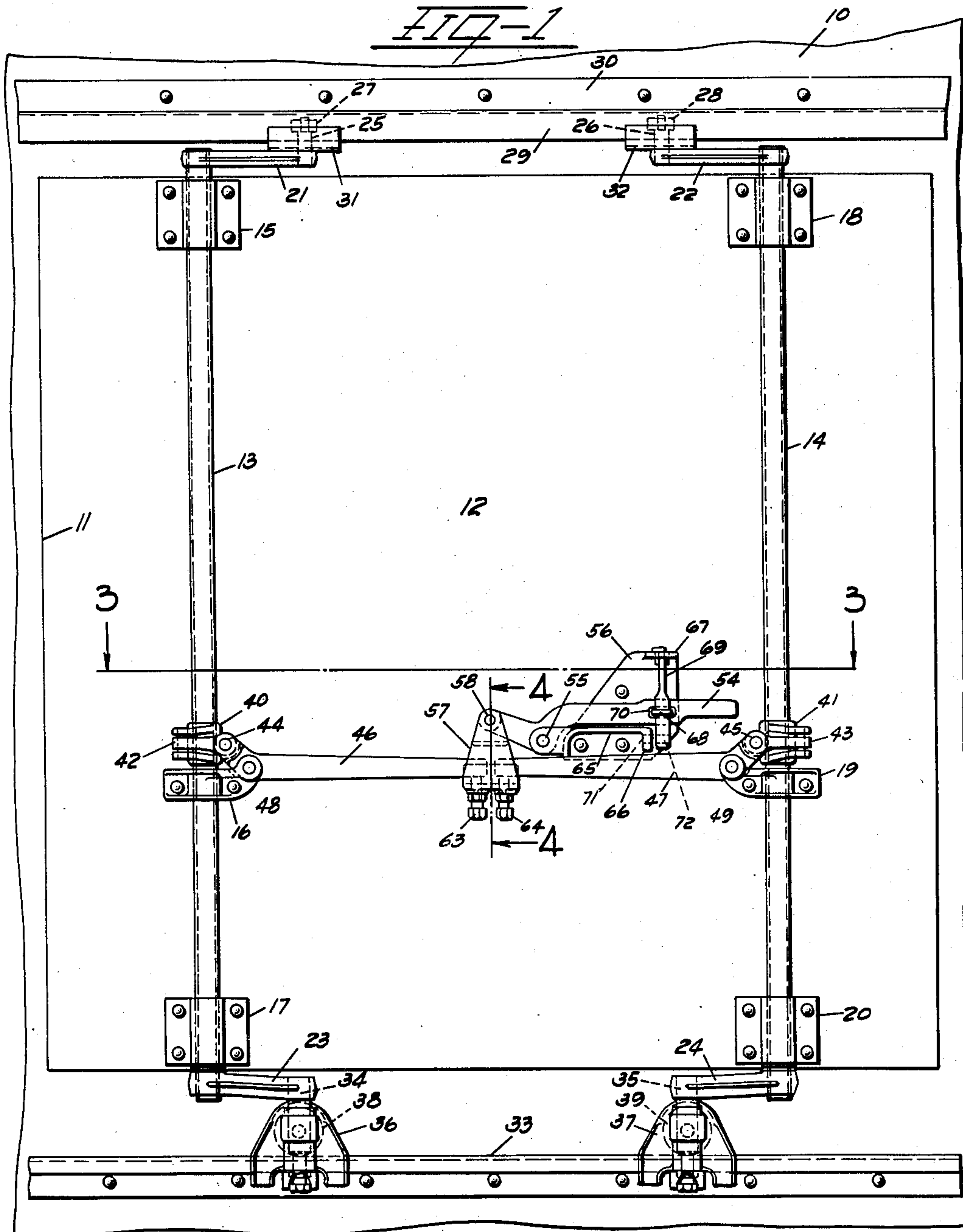
G. MADLAND

2,628,389

LATERALLY MOVABLE DOOR

Filed July 20, 1950

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

FIG - 2

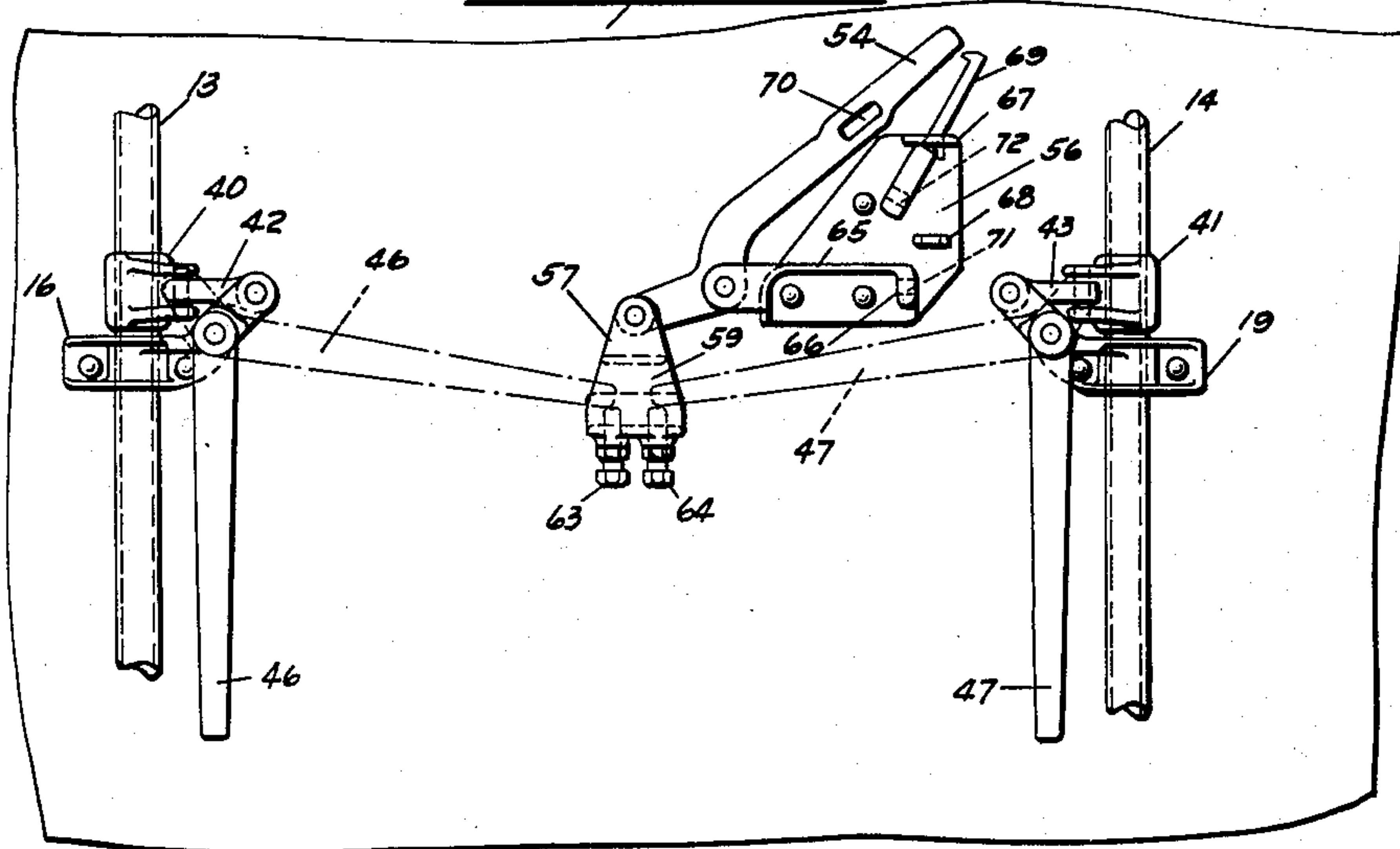


FIG - 3

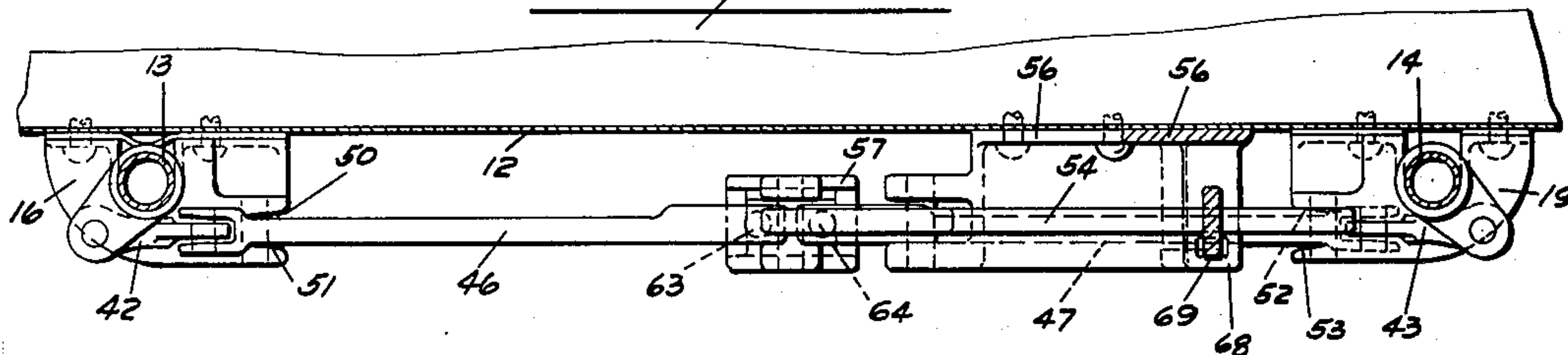
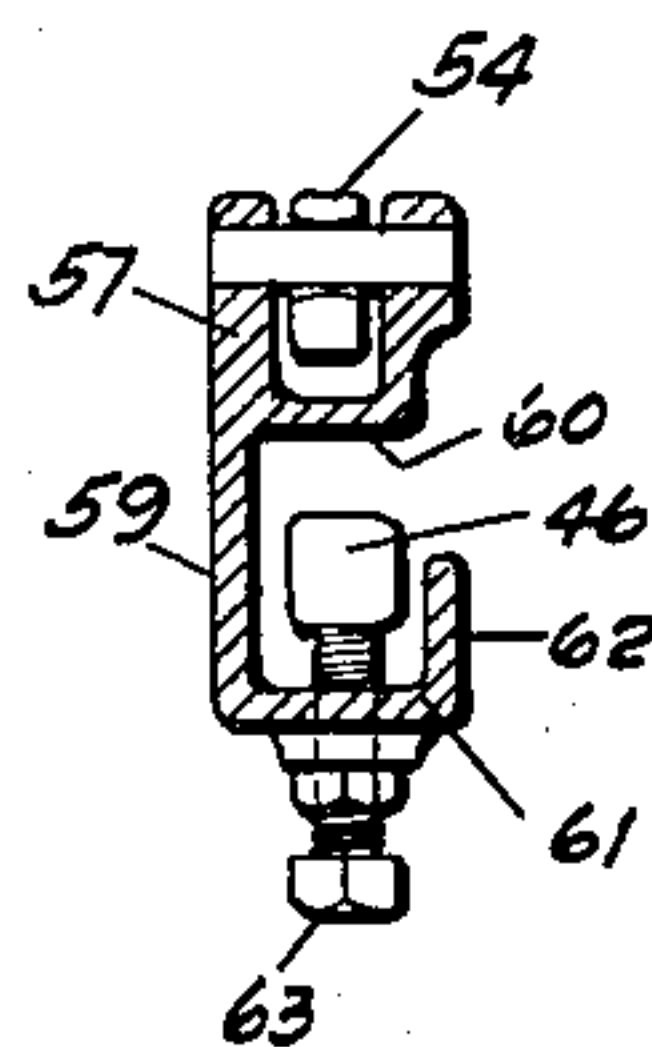


FIG - 4



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## UNITED STATES PATENT OFFICE

2,628,389

## LATERALLY MOVABLE DOOR

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7 Claims. (Cl. 20—23)

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This invention relates to laterally movable doors.

It is an object of this invention to provide laterally movable doors having means for imparting such movement which shall utilize levers whose distance from the door shall not be substantially increased during lateral movement of the doors.

A further object is to provide laterally movable doors having means for imparting such movement which shall be so constructed as to compensate for irregularities and wear.

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 refrigerator car equipped with doors having mechanism embodying the instant invention.

Fig. 2 is a fragmentary elevation of the door shown in Fig. 1 illustrating in dot and dash lines the position of the mechanism after the door has been moved partly out of the door opening and in full lines the position of the mechanism after the door has been moved completely out of the door opening.

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

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

Referring to the drawings wherein a preferred embodiment of the invention is illustrated the reference numeral 10 designates a portion of a side wall of a railway refrigerator car. The side wall is formed with a door opening 11 adapted to be closed by means of a door 12 mounted upon the wall for lateral movement into and from the door opening 11 and longitudinal movement along the outside of the wall. The door 12 which may be of any desired construction of refrigerator car door is usually flush with the outside and inside surfaces of the car wall. Since its construction forms no part of the instant invention, it will not be described in detail. However, reference is made to the patent to Beauchamp, No. 2,442,031, granted May 25, 1948, for an illustration of a refrigerator car door which may be employed. It will be understood by those skilled in the art that some form of sealing means is utilized in order to prevent passage of air between the exterior and interior of the car around the marginal edges of the door.

The door is mounted upon the car wall for the indicated movements by means of a plurality of bars 13 and 14 which are preferably formed of pipes. These bars are vertically disposed and ro-

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tatably mounted upon the door as by means of brackets 15, 16 and 17 and brackets 18, 19 and 20. Upper and lower crank arms 21 and 22 and 23 and 24 are secured respectively to the upper and lower ends of the bars 13 and 14. Upwardly extending spindles 25 and 26 are provided on the upper crank arms 21 and 22. These spindles carry rollers 27 and 28 which lie behind the depending flange 29 of a retaining and guiding member 30 secured to the car wall above the door opening. Retaining clips 31 and 32 loosely mounted on the spindles 25 and 26 overlap the depending flange 29 and prevent the door from falling inwardly toward the carside as the door is moved longitudinally. For such movement a track 33 is secured to the car wall below the door opening and the crank arms 23 and 24 are provided with spindles 34 and 35 journaled in roller carriages 36 and 37 which move along the track 33 upon rollers 38 and 39.

In accordance with the instant invention and for the purpose of moving the door laterally into and from the door opening the bars 13 and 14 carry clevises 40 and 41. Links 42 and 43 are pinned to the clevises 40 and 41 and are pivotally connected as indicated at 44 and 45 to the ends of levers 46 and 47 which are pivotally mounted as indicated at 48 and 49 upon the brackets 16 and 19.

It will be apparent from the hereinabove described manner of connecting the levers 46 and 47 to the clevises 40 and 41 that actuation of the clevises and consequent rotation of the bars 13 and 14 is obtained by movement of the levers 46 and 47 substantially in a plane parallel to the door. Slight movement of the levers 46 and 47 toward and from the door 12 is obtained for the purpose hereinafter indicated by means of the sloping surfaces 50 and 51 formed on the clevis 40 and 52 and 53 formed on the clevis 41.

Sufficient leverage is thus obtained to permit easy initial lateral movement of the door into the door opening until engagement between the door, the sealing means therefor and the door opening occurs. In order to obtain the additional mechanical advantage desired to complete the lateral closing movement of the door against the resistance offered by the sealing means for the door, the instant invention provides an additional lever 54 pivotally secured intermediate its ends as indicated at 55 upon a bracket 56 fastened to the door as by means of rivets. A member 57 referred to herein as a sling is pivotally suspended as indicated at 58 from one end of the lever 54. The sling 57 comprises an outer wall 59 and



spaced upper and lower substantially horizontal flanges 60 and 61 extending inwardly from the wall 59. A vertical flange 62 extends upwardly from the flange 61 and terminates a sufficient distance below the upper flange 60 to permit movement of the levers 46 and 47 to position between the vertical wall 59 and flange 62. It will be apparent from the foregoing description and the drawings that the lever 54 is movable in a plane substantially parallel to the door.

Irregularities of construction and wear normally occur in the manufacture of doors and cars and in their use. The instant invention accordingly provides means for obtaining adjustment of the structure hereinabove described in order to compensate for such irregularities of construction and wear. To this end adjusting bolts 63 and 64 are threaded upwardly through the lower flange 61 of the sling so as to extend into the space between the vertical wall 59 and flange 62 for engagement with the underside of the levers 46 and 47. In the event that improper seating of the door within the door opening occurs for any reason proper seating can be obtained merely by threading the bolts upwardly or downwardly in order to vary the movement of the levers 46 and 47. By such variation in the movement of the levers more or less rotation of the bars 13 and 14 is obtained with a consequent variation in the amount of the lateral movement of the door into the door opening. Adjustment of the bolts 63 and 64 also permits proper relation between the lever 54 and the bracket 56 so that the lever may be properly fastened to the bracket when the door has been closed.

To obtain such fastening the bracket 56 is provided with a flange having horizontal and vertical portions 65 and 66 which lie below the lever 54. The bracket 56 is also provided with vertically spaced staples 67 and 68 through which a locking pin 69 extends. The lever 54 is formed with an opening 70 through which the staple 68 is adapted to extend when the lever is in the position shown in Fig. 1 of the drawings so that the locking pin 69 is adapted to lie in front of the lever 54 to retain the latter in position. When the lever 54 is thus secured it is adapted to be sealed by means of a seal (not shown) passing through aligned seal slots 71 and 72 formed respectively in the vertical portion 66 and in the lower portion of the locking pin.

The door which is shown in closed position in Fig. 1 of the drawings may be moved laterally from the door opening for movement longitudinally along the track by first removing the seal, raising the locking pin so that it is disengaged from the lever 54 and then disengaging the latter from the staple 68. Thereupon the lever 54 is swung upwardly in a plane substantially parallel to the door so as to move the sling 57 downwardly. During such movement of the sling the upper wall 60 will engage the adjacent ends of the levers 46 and 47 moving them downwardly in a plane substantially parallel to the door and thereby imparting rotation to the bars 13 and 14 and initial movement of the door out of the door opening. The levers 46 and 47 are then disengaged from the sling by an inward movement through the space between the horizontal flange 60 and vertical flange 62 of the sling. This movement is permitted by the sloping surfaces 50, 51, 52 and 53. Subsequent movement of the levers 46 and 47 downwardly imparts further rotation to the bars 13 and 14 and completes the movement of the door out of the door opening. The door

may then be moved longitudinally so as to expose the door opening.

To move the door laterally into the door opening the levers 46 and 47 are swung upwardly until engagement between the door, the marginal sealing means therefor, and the door opening occurs. Thereupon the adjacent ends of the levers are positioned upon the adjusting bolts 63 and 64 and the lever 54 is pulled downwardly raising the sling 57 and causing the levers 46 and 47 to again resume the position shown in Fig. 1 of the drawings. The resistance to lateral movement of the door caused by the sealing means therefor is thus readily overcome and the door is properly seated within the door opening. Should interference arise preventing the proper seating of the door in the door opening the bolts 63 and 64 may be properly adjusted in order to obtain the desired position of the door within the door opening. Thereafter the lever 54 is secured to the bracket 56 by means of the pin 69 which is subsequently sealed to the vertical portion 66.

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 car having a wall provided with a door opening, a door for closing said door opening, means mounting said door for lateral movement into and from said door opening and longitudinal movement along said wall, said means comprising vertical bars rotatably mounted on said door, clevises secured to said bars for rotation therewith, levers, means pivotally mounting said levers on said door for swinging movement substantially parallel to said door, links pivotally connecting said levers and clevises, a third lever, a bracket intermediate said bars pivotally mounting said third lever on said door for swinging movement substantially parallel thereto and a sling pivotally carried by said third lever, said sling being adapted to receive the free ends of said first mentioned levers, said sling being movable substantially parallel to said door by said third lever to impart swinging movement to said first mentioned levers and rotation to said bars.

2. In a railway car having a wall provided with a door opening, a door for closing said door opening, means mounting said door for lateral movement into and from said door opening and longitudinal movement along said wall, said means comprising vertical bars rotatably mounted on said door, clevises secured to said bars for rotation therewith, levers, means pivotally mounting said levers on said door for swinging movement substantially parallel to said door, links pivotally connecting said levers and clevises, a third lever, a bracket intermediate said bars pivotally mounting said third lever on said door for swinging movement substantially parallel thereto, a sling pivotally carried by said third lever, said sling being adapted to receive the free ends of said first mentioned levers, said sling being movable substantially parallel to said door by said third lever to impart swinging movement to said first mentioned levers and rotation to said bars, and locking means for said third lever on said bracket.

3. In a railway car having a wall provided with a door opening, a door for closing said door opening, means mounting said door for lateral move-



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ment into and from said door opening and longitudinal movement along said wall, said means comprising a vertical bar rotatably mounted on said door, a clevis secured to said bar for rotation therewith, a lever, means pivotally mounting said lever on said door for swinging movement substantially parallel to said door, a link pivotally connecting said lever and clevis, a second lever, a bracket pivotally mounting said second lever on said door for swinging movement substantially parallel thereto and a sling pivotally carried by said second lever, said sling being adapted to receive the free end of said first mentioned lever, said sling being movable substantially parallel to said door by said second lever to impart swinging movement to said first mentioned lever and rotation to said bar.

4. In a railway car having a wall provided with a door opening, a door for closing said door opening, means comprising a vertical bar rotatably mounted on said door for imparting movement thereto into and from said door opening, a clevis secured to said bar for rotation therewith, a lever, means pivotally mounting said lever on said door for swinging movement parallel to said door, a link pivotally connecting said lever and clevis, a second lever, a bracket pivotally mounting said second lever on said door for swinging movement substantially parallel thereto and a sling pivotally carried by said second lever, said sling being adapted to receive the free end of said first mentioned lever, said sling being movable substantially parallel to said door by said second lever to impart swinging movement to said first mentioned lever and rotation to said bar.

5. In a railway car having a wall provided with a door opening, a door for closing said door opening, means mounting said door for lateral movement into and from said door opening and longitudinal movement along said wall, said means comprising vertical bars rotatably mounted on said door, clevises secured to said bars for rotation therewith, levers, means pivotally mounting said levers on said door for swinging movement substantially parallel to said door, links pivotally connecting said levers and clevises, a third lever, a bracket intermediate said bars pivotally mounting said third lever on said door for swinging movement substantially parallel thereto and a sling pivotally carried by said third lever, said sling embodying a vertical wall, spaced upper and lower horizontal flanges extending from said wall and a vertical flange extending upwardly from said lower horizontal flange in spaced relationship to said wall, said sling being adapted to receive the free ends of said levers between said wall and said vertical flange, said vertical flange being spaced from said upper horizontal flange a distance greater than the width of said ends of said levers.

6. In a railway car having a wall provided with a door opening, a door for closing said door open-

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ing, means mounting said door for lateral movement into and from said door opening and longitudinal movement along said wall, said means comprising vertical bars rotatably mounted on said door, clevises secured to said bars for rotation therewith, levers, means pivotally mounting said levers on said door for swinging movement substantially parallel to said door, links pivotally connecting said levers and clevises, a third lever, a bracket intermediate said bars pivotally mounting said third lever on said door for swinging movement substantially parallel thereto and a sling pivotally carried by said third lever, said sling embodying a vertical wall, spaced upper and lower horizontal flanges extending from said wall, a vertical flange extending upwardly from said lower horizontal flange in spaced relationship to said wall, and adjusting bolts extending upwardly through said lower horizontal flange, said sling being adapted to receive the free ends of said levers between said wall and said vertical flange, said vertical flange being spaced from said upper horizontal flange a distance greater than the width of said ends of said levers, said adjusting bolts being engageable with said ends of said levers for the purpose set forth.

7. In a railway car having a wall provided with a door opening, a door for closing said door opening, means mounting said door for lateral movement into and from said door opening and longitudinal movement along said wall, said means comprising vertical bars rotatably mounted on said door, clevises secured to said bars for rotation therewith, levers, means pivotally mounting said levers on said door for swinging movement substantially parallel to said door, links pivotally connecting said levers and clevises, a third lever, a bracket intermediate said bars pivotally mounting said third lever on said door for swinging movement substantially parallel thereto, a sling pivotally carried by said third lever, and vertical adjusting bolts carried by said sling, the free ends of said first mentioned levers being adapted to be received within said sling and upon said adjusting bolts, said sling being movable substantially parallel to said door by said third lever to impart swinging movement to said first mentioned levers and rotation to said bars.

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