June 29, 1954 W. F. DIETRICHSON 2,682,075

DOOR LIFT MECHANISM

Filed Jan. 25, 1952

3 Sheets-Sheet 1

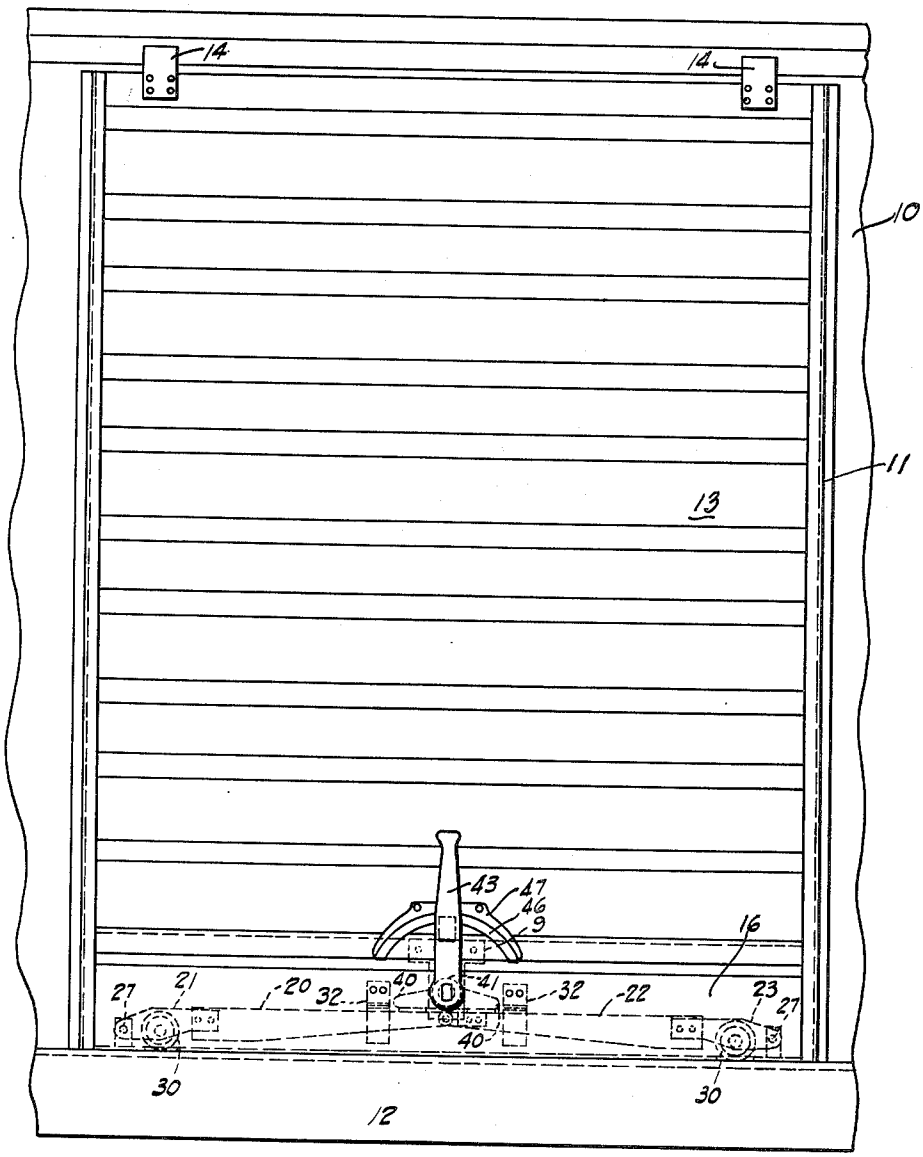

Fig. 1

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Filed Jan. 25, 1952 3 Sheets-Sheet 2

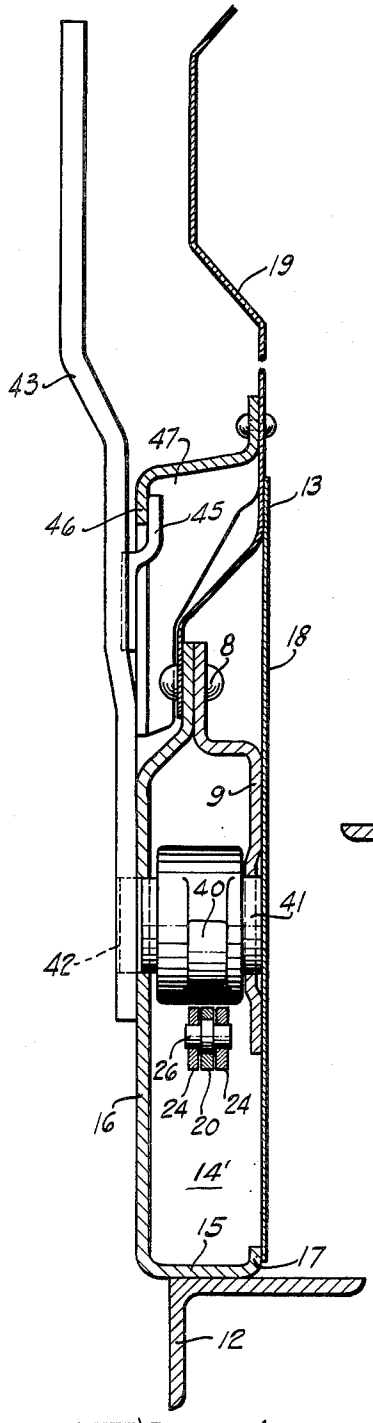

Fig-4

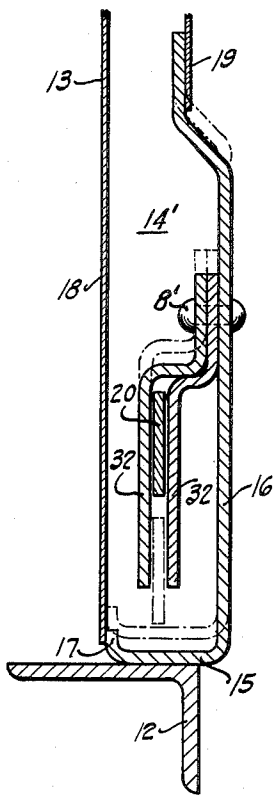

Fig-5

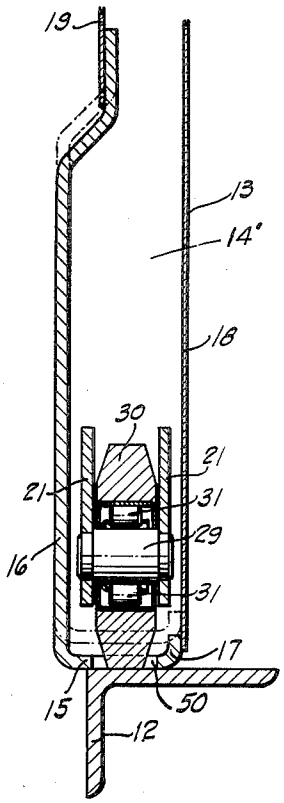

Fig-6

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DOOR LIFT MECHANISM

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3 Sheets-Sheet 3

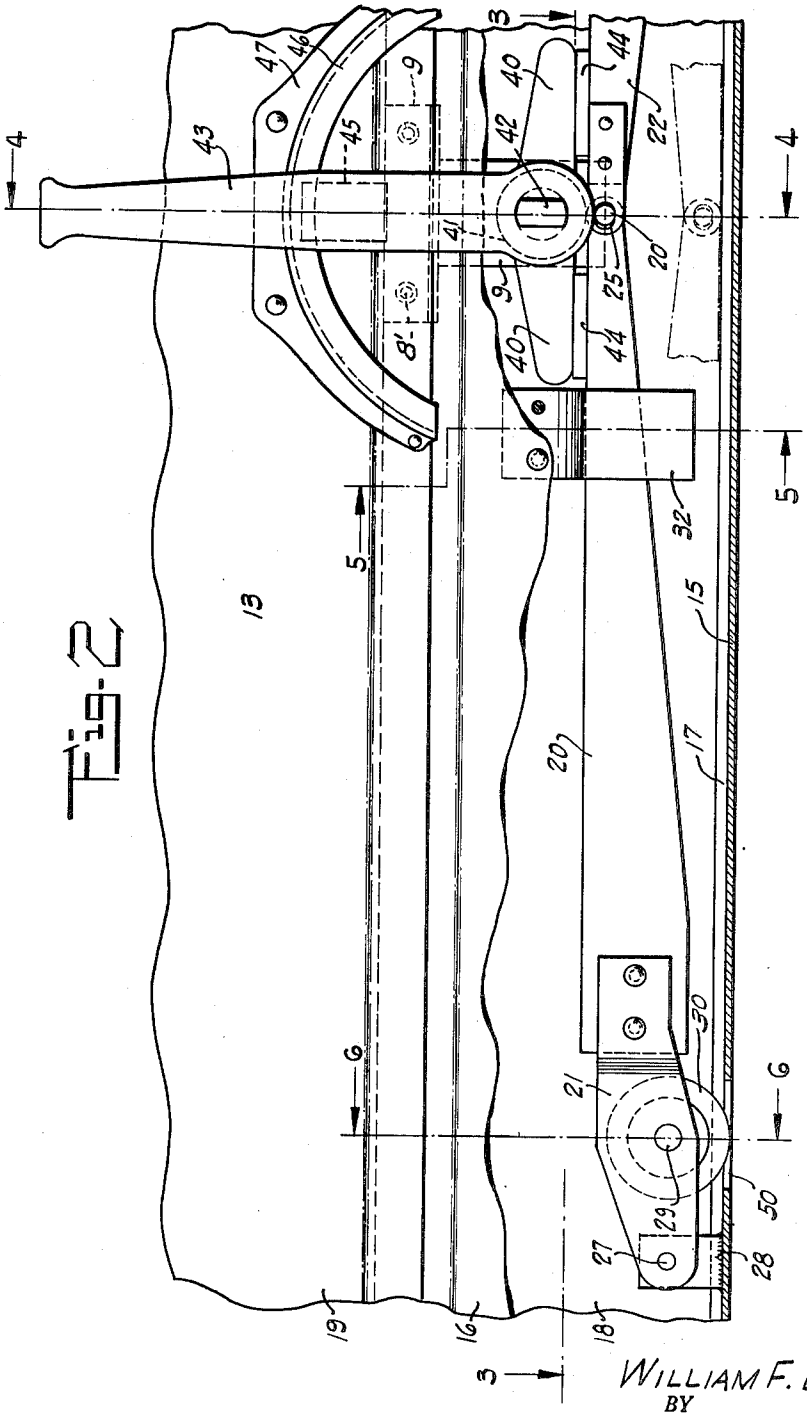

Fig. 2

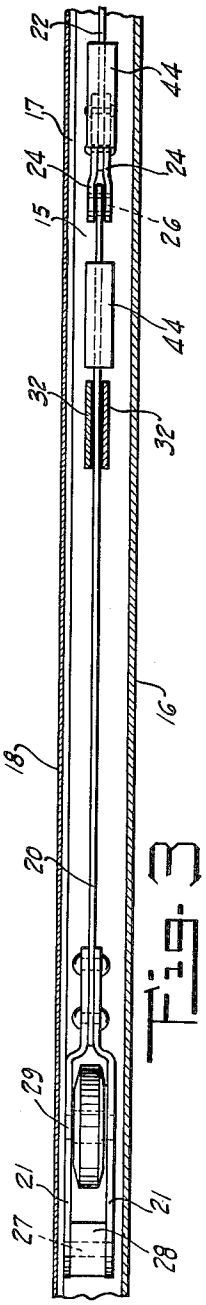

Fig. 3

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UNITED STATES PATENT OFFICE

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DOOR LIFT MECHANISM

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3 Claims. (Cl. 16—99)

1

This invention relates to lift mechanism for car doors and more particularly to mechanism that can be actuated manually to lift and shift a car door.

The invention comprises the novel structure and combination of parts hereinafter described and more particularly pointed out and defined in the appended claims.

In the accompanying drawings which illustrate a preferred form of the invention:

Fig. 1 is a side elevation of a door and lift mechanism associated with a portion of a car side wall.

Fig. 2 is a side elevation of the lift mechanism associated with a fragment of the door, a wall of the door being broken away.

Fig. 3 is a sectional view through the door taken on line 3—3 of Fig. 2 showing the lift mechanism in plan.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2 showing the actuator lever and guide means associated with the lift lever.

Fig. 5 is a sectional view through the door taken on line 5—5 of Fig. 2 showing the guide means for one of the lift lever structures.

Fig. 6 is a sectional view through the door taken on line 6—6 of Fig. 2 showing a bearing roller and its connection with one of the lift lever structures.

Referring now to the drawings by characters of reference, the box car side wall 10 is provided with opening 11 and secured to the outside face of the wall is a door supporting track 12 extending longitudinally of the car below and beyond the ends of the opening. Door 13 is mounted to be lifted and moved longitudinally on the supporting track into positions covering or uncovering wall opening 11. Conventional guide and retainer structures 14 are associated with the top of the door and the adjacent car side wall.

The door can be formed in a conventional manner with a suitable frame and vertical wall structure. The preferred form of door includes a hollow base housing 14' coextensive with the width thereof having a bottom wall 15 with upstanding side flanges 16 and 17 and an inner closure plate 18. Corrugated metal panel 19 forms the vertical wall of the door and is secured along its lower edge to the top portion of the outer flange 16 of the base housing by rivets 8.

2

T-shaped metal carrier plate 9 is arranged in the base housing and is also secured to the upper end portion of flange 16 by certain of the rivets 8. The depending leg portion of carrier plate 9 extends adjacent cover plate 18 in spaced relation with flange 16. Cover plate 18 is secured to flange 17 and panel 19, preferably by welding.

The weight of the door normally causes the base wall 15 to rest directly on track 12. Manually operable mechanism is associated with the door for lifting it above the track and for moving it along the track longitudinally of the car to cover or uncover the wall opening 11.

A pair of longitudinally extending and aligned lift lever structures are arranged in the door base housing with their adjacent ends overlapping and hinged together. One of such lever structures comprises a sheet metal bar 20 having spaced extensions 21 secured to the outer end thereof and the other lever structure includes a sheet metal bar 22 having spaced extensions 23 fixed to its outer end and spaced extensions 24 fixed to its inner end. Extensions 24 are formed with registering elliptical openings 25 into which the ends of pin 26 extend, such openings being of larger diameter than the pin. The pin is carried by the inner end of bar 20 which lies between extensions 24. Outer end extensions 21 and 23 of the lever structures are pivotally mounted adjacent their outer ends on pins 27 extending through the legs of inverted U-shaped brackets 28 lying within the housing and welded to the housing base 15. Pins 29 extend transversely of and are fixed to the spaced end extensions 21 and 23 and serve as mountings for rollers 30, roller bearings 31 being arranged between the rollers and pins. The inner portions of bars 20 and 22 extend between the lower spaced ends of angular guide plates 32 that are suitably secured by rivets 8' to the inner surface of the outer flange 16 of the bottom housing.

The lift lever structures are actuated by oppositely extending arms 40 lying within the lower door housing and fixed to rock shaft 41. This shaft is rotatably carried by members 16 and 9 of the lower door housing and the outer end of the shaft has a flatted end 42 projecting outside of member 16 on which hand lever 43 is fixed. Bars 20 and 22 have bearing plates 44

fixed to the top thereof beneath the arms **40**. Hand lever **43** is provided with a retainer member **45** engaging behind an arcuate depending flange **46** of guide member **47** that is suitably fastened to the door.

It will be noted that the overall length of the lift lever structures is slightly less than the width of the door and that the rollers **30** are carried close to the pivoted outer ends of the lever structures. The arrangement of pin **26** through the elliptical openings **25** in extensions **24** of bar **22** permits vertical movement of the pivoted-together inner ends of the lift lever structures. Hand lever **43** is several times longer than actuator arms **40** so that the force applied to the arms upon rocking of the lever is multiplied. Likewise, the length of the bars **20** and **22** is several times the distance between rollers **30** and pivot pins **27** so that the force exerted in pivotal movement of the bars is multiplied at the lifting ends.

The base wall **15** of the bottom door housing is provided with slots **50** so that the rollers can project therethrough to bear on track **12** when the hand lever **43** is moved sufficiently away from upright position. When lever **43** is rocked either clockwise or counter-clockwise, one of the arms **40** will be rocked to exert a downward force against its bearing plate **44**, thereby moving the associated lever structure therewith about pivot **27** and carrying the roller thereon through slot **50** into bearing engagement on track **12**. Because of the pivotal connection between the lever structures they will be moved together regardless of the clockwise or counter-clockwise movement of hand lever **43**. As the inner ends of the lever structures move downwardly, they will locate the rollers **30** on track **12** and will pivot on the rollers to hoist the door upwardly away from the track. Pressure against the hand lever longitudinally of the car, while shifted out of vertical position, will push the door along the track on the rollers to desired position. Upon reaching the desired position, the hand lever is released and the weight of the door will move it downwardly to rest on the track. Such movement will reverse the action of the lift structures and actuating mechanism thereby raising the rollers above the track and returning the hand lever to vertical position.

The invention may be modified in various respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

What is claimed is:

1. In a railway box car having a door supporting track on one side wall beneath a door opening, a door formed to provide a housing co-extensive with the lower portion thereof having an integral inturned bottom wall adapted to normally rest on said track, said bottom wall of the door housing being formed with slots, a pair of aligned lift lever structures extending longitudinally substantially the width of the door within said housing, one of said lever structures being provided with spaced extensions fixed to its inner end formed with registering elliptical openings, the inner end of the other lever structure being arranged between said spaced extensions and carrying pivot means extending through said elliptical openings, means pivotally connecting the outer ends of the lever structures to the door, rollers carried by the lever structures adjacent said outer end pivot means and adapted to be projected through the slots in the bottom wall of said door housing to engage said track, angular plates secured to a wall of the door housing having spaced-apart depending guide portions embracing said lever structures, a rock shaft journalled in the door housing above the pivoted inner ends of said lever structures having one end extending beyond the outer wall of the housing, oppositely longitudinally directed arms fixed to said rock shaft, and a hand lever fixed to the end of said rock shaft exteriorly of said door housing swingable in opposite directions to selectively engage either of said arms with the lever structures adjacent their inner end pivotal connection whereby to move the same downwardly together and engage the rollers with said track, said rollers while engaging the track acting as fulcrums for the lever structures in lifting said door.

2. In a railway box car having a door supporting track on one side wall beneath a door opening, a door formed to provide a housing coextensive with the lower portion thereof having an integral inturned bottom wall adapted to normally rest on said track, said bottom wall of the door housing being formed with slots, a pair of aligned lift lever structures extending longitudinally substantially the width of the door within said housing, one of said lever structures being provided with spaced extensions fixed to its inner end formed with registering elliptical openings, the inner end of the other lever structure being arranged between said spaced extensions and carrying pivot means extending through said elliptical openings, means pivotally connecting the outer ends of the lever structures to the door, rollers carried by the lever structures adjacent said outer end pivot means and adapted to be projected through the slots in the bottom wall of said door housing to engage said track, a carrier plate secured to and spaced from the outer wall of the door housing, a rock shaft journalled in said plate and said housing outer wall having one end extending through and beyond the latter, oppositely directed arms fixed to said rock shaft and overlying the pivoted inner end portions of said lever structures, and a hand lever fixed to the end of said rock shaft exteriorly of said door housing swingable in opposite directions to selectively engage either of said arms with the tops of the pivoted inner end portions of the lever structures whereby to move the latter downwardly together to engage the rollers with said track, said rollers while engaged with the track acting as fulcrums for the lever structures in lifting of said door.

3. In a railway box car having a door supporting track on one side wall beneath a door opening, a door formed with a housing along its lower portion and extending the full width thereof having a bottom wall adapted to normally rest on said track, said bottom wall of the door housing being formed with slots, a pair of aligned lift lever structures extending longitudinally substantially the width of the door within said housing, means pivotally connecting together the inner ends of the lever structures in relation permitting vertical movement thereof, bearing plates fixed on the tops of said lever structures adjacent their inner end pivotal connection, means pivotally connecting the outer ends of the lever structures to the door, rollers carried by the lever structures adjacent said outer end pivot means and adapted to be projected through the slots in the bottom wall of said door housing to engage said track, angular plates secured to a wall of the door housing hav-

ing spaced-apart depending guide portions embracing said lever structures, a carrier plate secured to and spaced from the outer wall of the door housing, a rock shaft journalled in said plate and said housing outer wall having one end extending through and beyond the latter, oppositely directed arms fixed to said rock shaft and normally engaging said bearing plates on the lever structures, and a hand operating lever fixed to the end of said rock shaft exteriorly of said door housing swingable in opposite directions to selectively actuate either of said lever structures

whereby to move the latter downwardly in unison and the rollers into track-engaging position acting as fulcrums for the lever structures in lifting said door.

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