Nov. 30, 1943. F. DITCHFIELD 2,335,397

DOOR LIFT MECHANISM

Filed Sept. 3, 1942 2 Sheets-Sheet 1

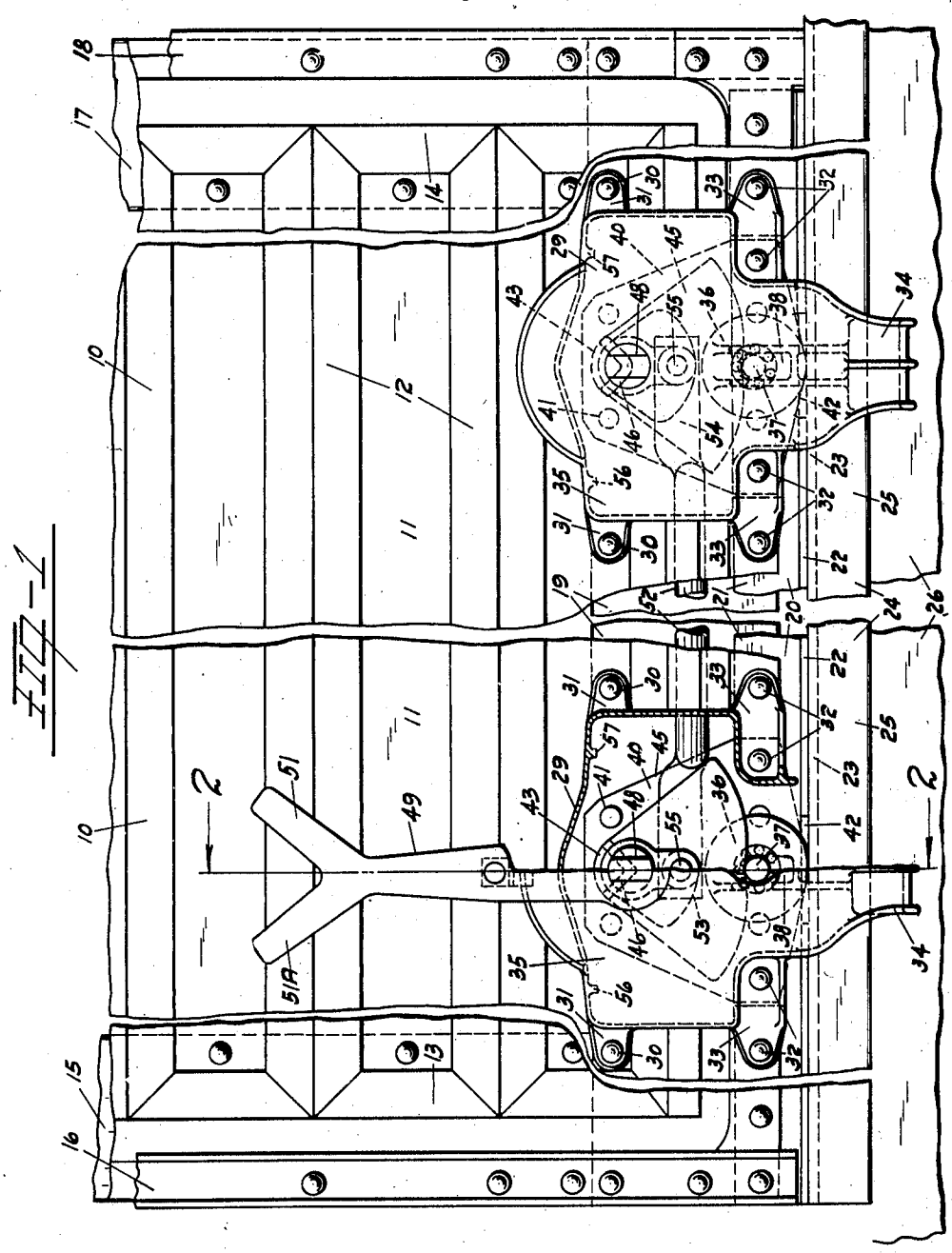


FIG. 1

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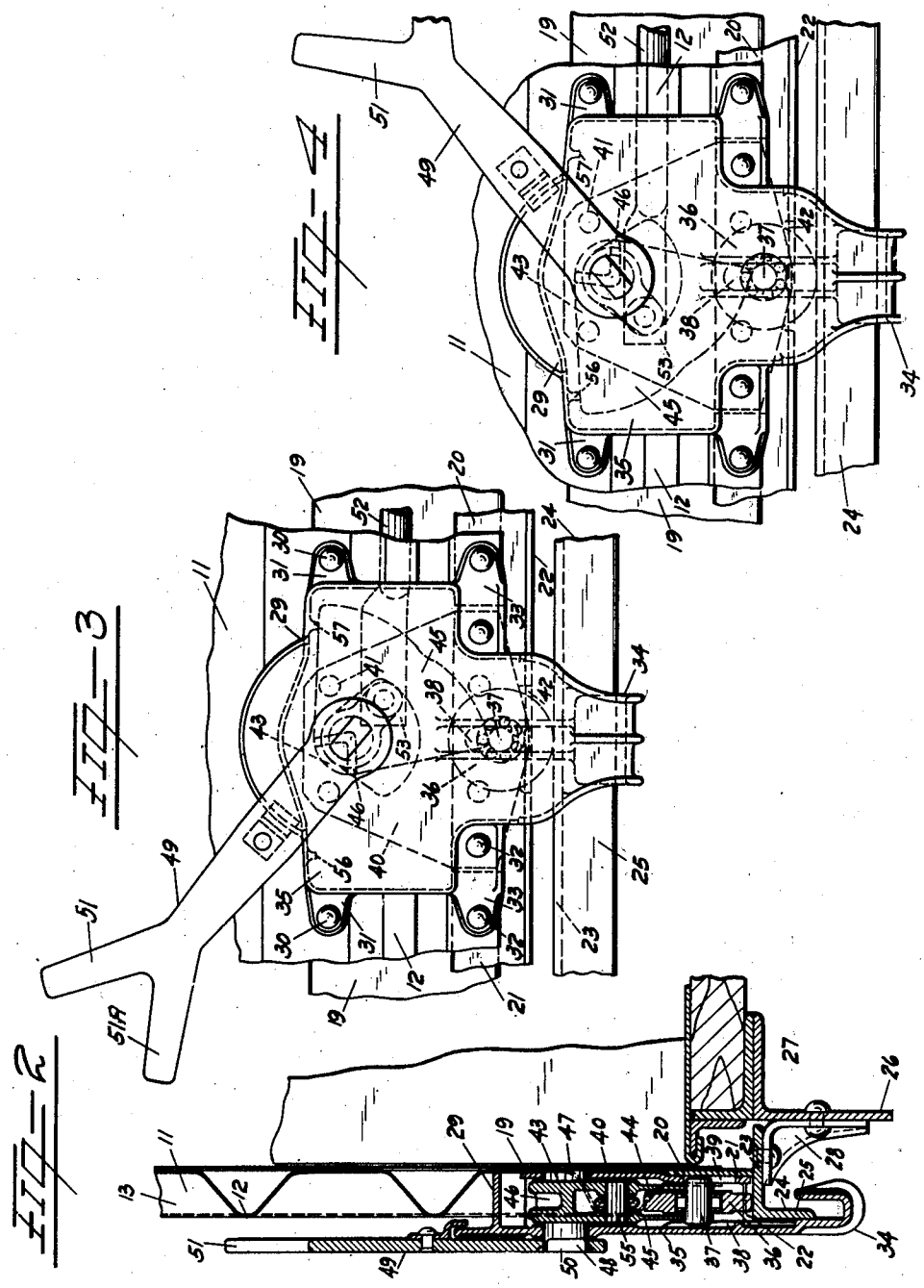


FIG-2

FIG-3

FIG-4

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DOOR LIFT MECHANISM

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Application September 3, 1942, Serial No. 457,136

9 Claims. (Cl. 16—99)

This invention relates to door lift mechanisms and is directed primarily to lift mechanisms for sliding railway house car doors.

It is an object of this invention to provide a single standard lift mechanism for sliding railway house car doors capable of replacing the lift mechanisms now utilized.

A further object is to provide lift mechanisms for sliding doors which shall be capable of operation in either direction in a plane parallel to the doors.

A further object is to provide lift mechanisms for sliding doors which shall obtain a reduction in the leverage arm of the doors.

A further object is to provide lift mechanisms for sliding doors which shall secure reductions in cost, number of parts required and in friction.

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 sliding car door equipped with lift mechanism embodying the invention, parts being broken away to more clearly show the mechanism.

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

Fig. 3 is a fragmentary elevation showing a portion of the door elevated by operation of the lift mechanism in one direction.

Fig. 4 is a view similar to Fig. 3 showing this portion of the door elevated by operation of the lift mechanism in the opposite direction.

The instant invention, which is an improvement upon the invention disclosed in applicant's co-pending application, Serial No. 413,015, filed September 30, 1941, is embodied in a construction applied to a metallic car door 10 which comprises a metallic panel 11 formed with a plurality of horizontal corrugations 12 merging at their ends into vertical corrugations 13 and 14 formed in the panel adjacent to the edges thereof. The front vertical margin of the panel is reinforced by means of a metallic backing plate 15 and a stiffening member 16. The rear vertical margin of the panel is reinforced by means of a metallic backing plate 17 and a stiffening member 18. The lower horizontal margin of the panel is reinforced by means of a metallic backing plate 19 and an angle member 20, the vertical leg 21 of which is disposed between and fastened to the panel 11 and the backing plate 19. The leg 22 of the reinforcing angle 20 extends horizontally outwardly and serves to frictionally support the door upon the horizontal flange 23 of an angle track member 24 the vertical leg 25 of which extends downwardly. The track member 24 is secured to a reinforcing member 26 for the side sill 27 of a railway house car by means of brackets 28 secured, as more clearly shown in Fig. 2 of the drawings, to the horizontal flange 23 of the track member and to the side sill reinforcement by means of rivets. Suitable reinforcement (not shown) is applied to the upper horizontal margin of the door. The door described above is a well known type of door for railway house cars and is shown for the purpose of illustrating the lift mechanism embodying the instant invention. It is to be understood that this mechanism is applicable as well to other types of sliding doors.

In the preferred form illustrated the lift mechanism of the instant invention embodies housing members 29 secured adjacent to the front and rear lower corners of the door as by means of rivets 30 passing through ears 31 and rivets 32 passing through ears 33. The housing members 29 are formed with depending hook shaped portions 34 which embrace the vertical flange 25 of the angle track to prevent disengagement of the lower portion of the door.

The housing members are formed with a hollow body portion 35 within which rollers 36 are disposed. Pins 37 extend through the rollers. The ends of the pins are received within slots 38 and 39, the former being provided in the body portion of the housing, which is preferably a casting, and the latter in a plate member 40 secured as by means of rivets 41 to the panel 11 and backing plate 19 and by means of the rivets 32 to the panel and vertical leg 21 of the angle reinforcing member. The plate members 40 by reason of their securement as set forth above serve to reinforce the lower edge of the door by spanning the slot 42 formed in the horizontal leg 22 of the angle reinforcing member to permit engagement of the rollers 36 with the track. It is to be observed that the roller pins are cylindrical substantially from end to end.

Cams 43 are also disposed within the hollow body portions 35 of the housing members 29. In the form illustrated these cams are castings and comprise cam elements 44 and 45 connected together at their upper portions by means of the substantially V-shaped diaphragms 46 and receiving the rollers 36 between them. Trunnions 47 and 48 extend from the cam elements 44 and 45 above the rollers 36 and are journalled in bearings provided in the plate members 40 and in the housing members 29 as more clearly shown in

Fig. 2 of the drawings. The trunnions 48 project beyond the housing members and an actuating lever 49 is secured upon one of these trunnions, preferably the trunnion adjacent to the lower front corner of the door. For this purpose the trunnions are provided with flat faces 50 and the lever may be fastened to the trunnion by means of welding. The upper portion of the lever 49 is preferably in the form of a Y so as to provide two handles 51 and 51A.

As more clearly shown in Figs. 1 and 2 of the drawings the cam elements 44 and 45 are adapted to directly engage the roller pins 37 and to have rolling bearing upon said pins. To obtain simultaneous movement of the cams 43 a connecting bar 52 is employed. The ends of the connecting bar are flattened as indicated at 53 and 54 and extend between the cam elements 44 and 45 to which they are fastened by means of pins 55. The cams 43, as more clearly appears in Fig. 1 of the drawings, are preferably symmetrical about a vertical plane including the axis of the trunnions 47 and 48.

The lift mechanism hereinabove described is utilized to elevate the door above the track 24 so as to transfer the weight of the door from the track to the rollers 36 when it is desired to open or close the door. Assuming that it is desired to move the door toward the right as viewed in Fig. 1, the operator will grasp the handle 51 and swing the operating lever 49 toward the right. This movement of the lever will impart a corresponding movement to the cam 43 upon which the lever is mounted and through the connecting bar 52 a similar movement will be imparted to the other cam.

During this movement of the lever and the cams the latter will roll directly upon the pins 37 and by reason of the surface of the cam elements which engages the pins will elevate the door above the track. During the elevation of the door relative movement will occur between the roller pins 37 and slots 38 and 39 in which the ends of the pin are received. Movement of the cams and elevation of the door will be limited by the engagement of the cams with stops 56 formed on the housing members. After elevation the door may be moved toward the right upon the rollers 36. When the lever is released the door will automatically be lowered by the action of gravity so that it will again frictionally engage the track.

By reason of the symmetry of the cams 43 the door may be moved toward the left as viewed in Fig. 1 of the drawings by a movement of the operating lever 49 toward the left. For this purpose the handle 51A is used and the lever and cams are actuated to lift the door upon the rollers. The amount of the lift is determined by the stop members 57 formed on the roller housings.

It will be apparent from the foregoing description that the door may be elevated by operation of the lever 49 in either direction in a plane parallel to the door. The cams directly engage the roller pins. In view of this fact the point of engagement of the cams and the roller pins more closely approaches the vertical diameter of the pins so that the leverage of the door resisting elevation is reduced. In other words, the amount of force required to elevate the door is decreased. Flat faces on the ends of roller pins heretofore employed in lift mechanisms of the character described are eliminated, thereby securing an elimination of the cost of machining these faces and a reduction in the amount of friction between the pins and the slots in which they are received while the door is being elevated.

Moreover, the instant invention provides a lift mechanism which serves as a single standard capable of replacing the two standard mechanisms now utilized. These two standards are at present made necessary by the varying widths of cars and lift mechanisms which are capable of application to cars of up to a certain width cannot be used upon wider cars because they extend beyond the permissible tunnel clearance. The mechanism embodying the instant invention, however, satisfies the clearance diagram for all widths of cars and is therefore capable of serving as a single standard.

The invention is illustrated and described in a lift mechanism which is operable in either direction in a plane parallel to the door. It is to be understood, however, that if such operation is not desired it can be operated in one direction only. In this event cam elements of the size shown are not necessary and they may be reduced substantially one-half. Any desired means may then be provided to insure movement of the lever and cams in one direction and prevent movement in the opposite direction.

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. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams on opposite sides of each roller, means adapted to journal said cams in a door, said cams being adapted to have rolling bearing upon said pins, means connecting said cams for simultaneous movement and means for actuating said mechanism.

2. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door, said cams being adapted to have rolling bearing upon said pins, means connecting said cams for simultaneous movement and means for actuating said mechanism.

3. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door, said cams being adapted to have rolling bearing upon said pins, means connecting said cams for simultaneous movement and means for actuating said mechanism, each of said cams extending on opposite sides of a vertical plane including the axis of a pin, said actuating means and said cams being movable in either direction in a plane parallel to said door.

4. Lift mechanism for sliding doors comprising a roller, a rotatable pin extending through said roller, a cam, means adapted to journal said cam in a door, said cam being adapted to have rolling bearing upon said pin and means mounted upon said journal means for actuating said cam.

5. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door above said rollers, said cams being adapted to have rolling bearing upon said pins, a lever mounted upon one of said means and

means connecting said cams for simultaneous movement.

6. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door, said cams being symmetrical about a vertical plane including the axis of said means and being adapted to have rolling bearing upon said pins, means connecting said cams for simultaneous movement and means for actuating said mechanism.

7. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door, said cams being adapted to have rolling bearing upon said pins, one of said journal means projecting outwardly beyond said door, a lever mounted upon said projecting means and means connecting said cams for simultaneous movement.

8. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door, said cams being adapted to have rolling bearing upon said pins, means connecting said cams for simultaneous movement and means for actuating said mechanism, said actuating means being movable in either direction in a plane parallel to said door.

9. Lift mechanism for sliding doors comprising spaced rollers, rotatable pins extending through said rollers, cams, means adapted to journal said cams in a door, said cams being adapted to have rolling bearing upon said pins, means connecting said cams for simultaneous movement and means for actuating said mechanism, said cams bearing upon said pins contiguous to the vertical diameter of said pins throughout the actuating of said mechanism.

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