

June 21, 1966

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3,256,836

HOPPER DOORS OPERATING ASSEMBLY

Filed Jan. 7, 1963

3 Sheets-Sheet 1

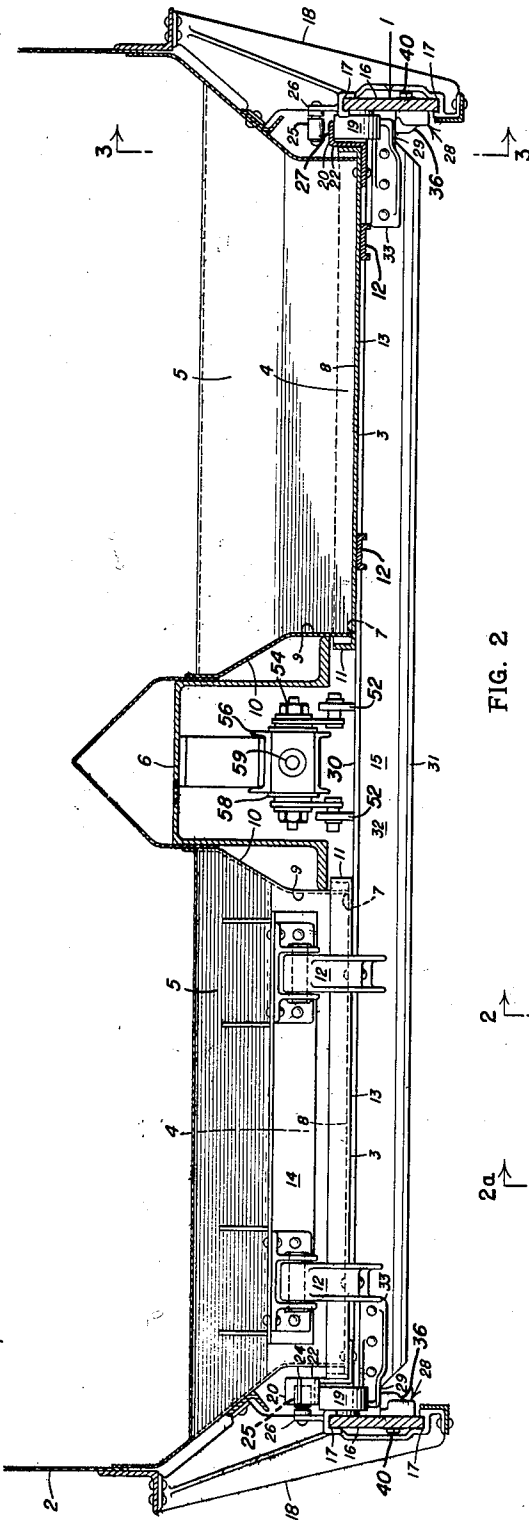


FIG. 2

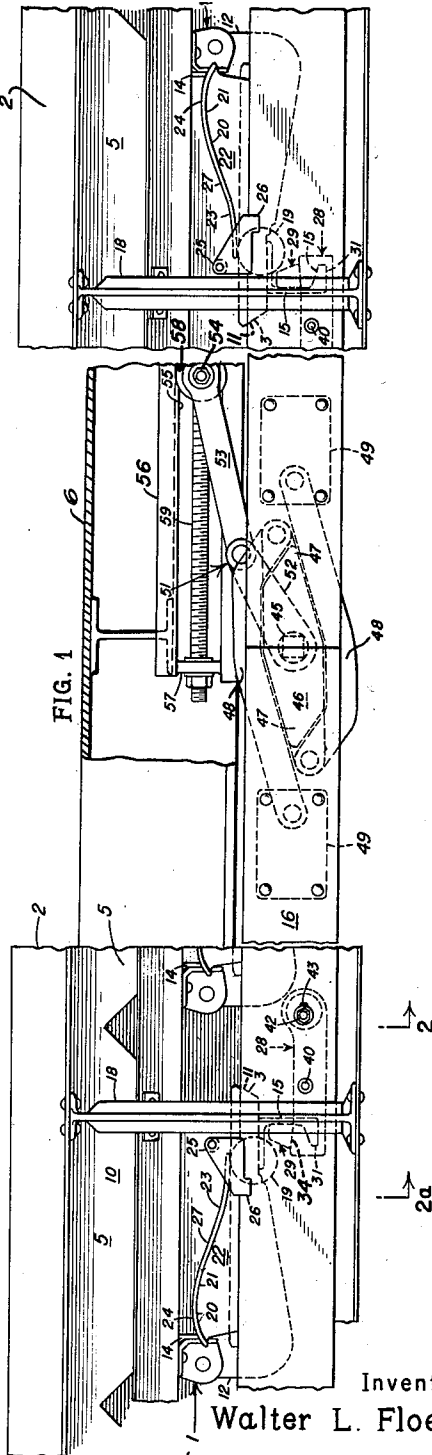


FIG. 1

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3 Sheets-Sheet 2

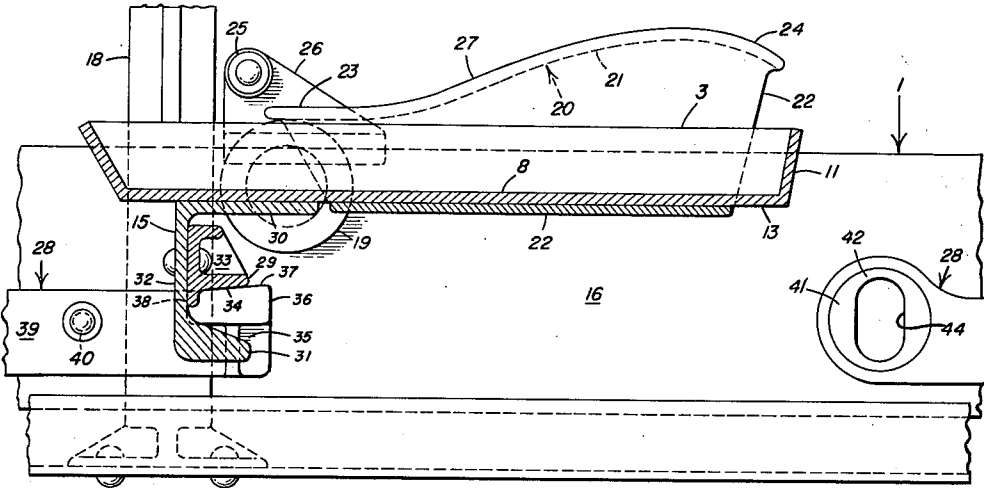


FIG. 3

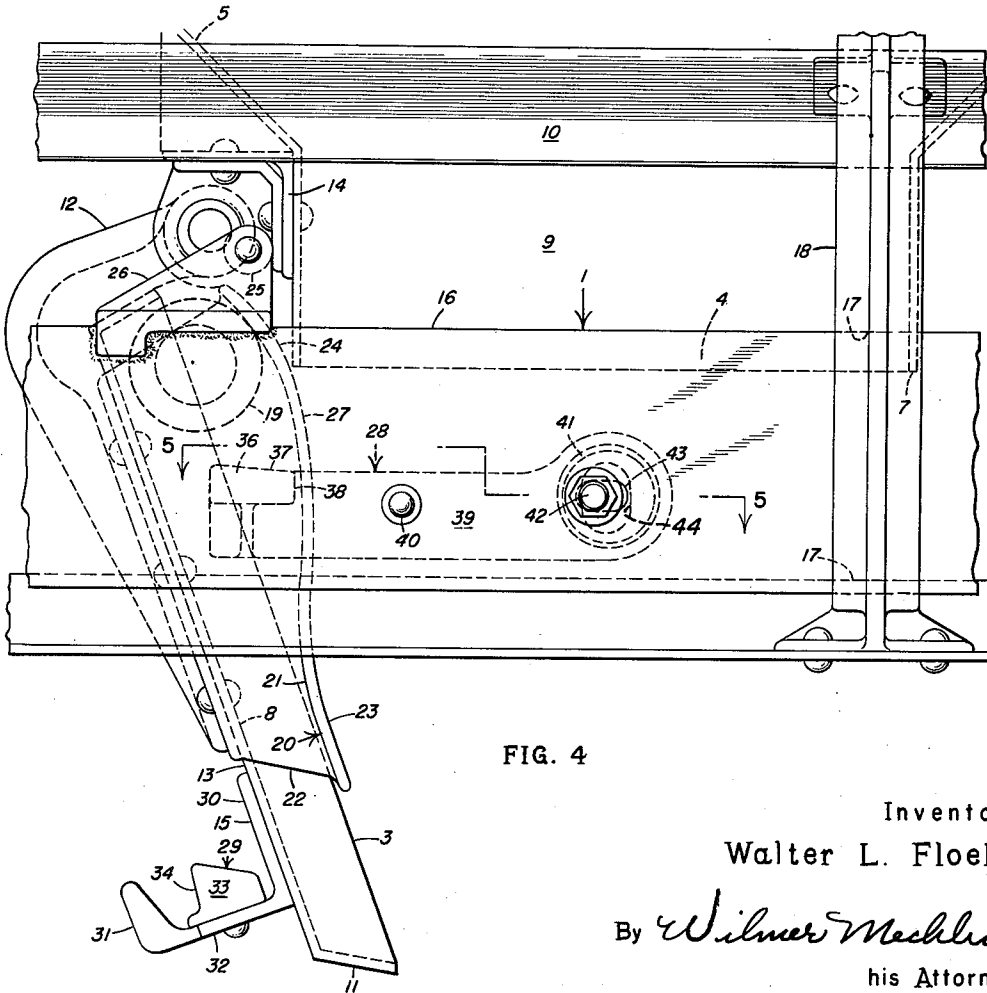


FIG. 4

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3 Sheets-Sheet 3

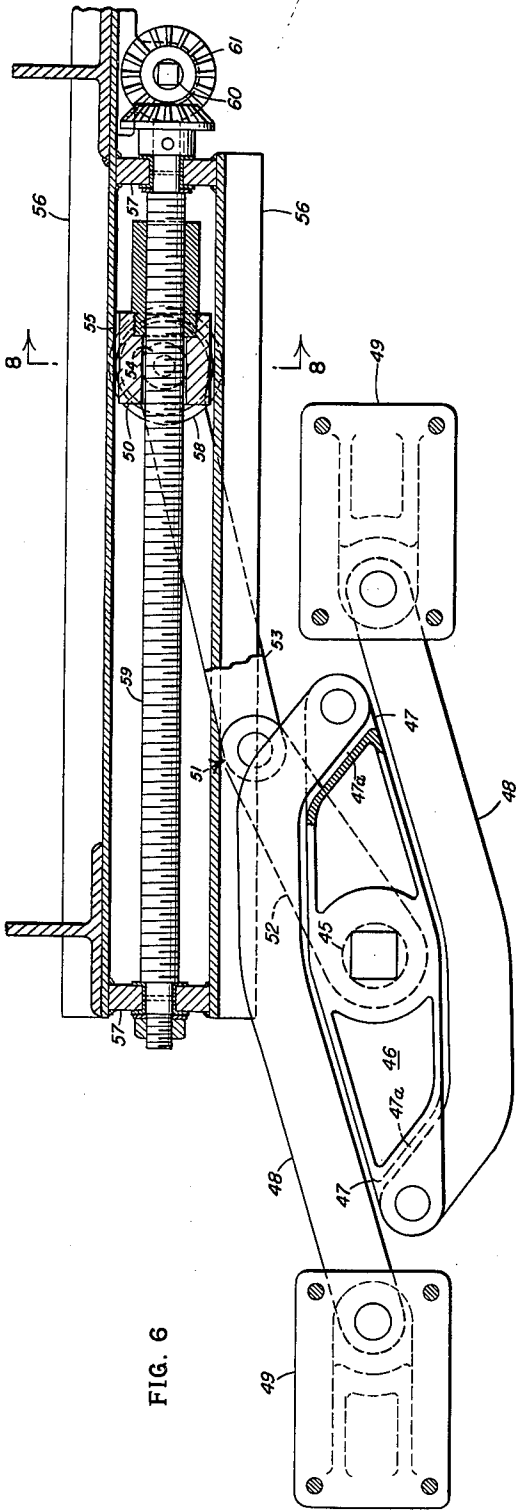


FIG. 6

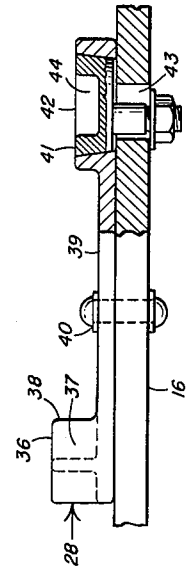


FIG. 5

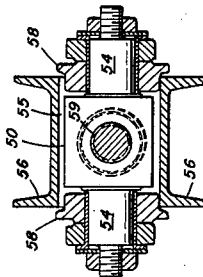


FIG. 8

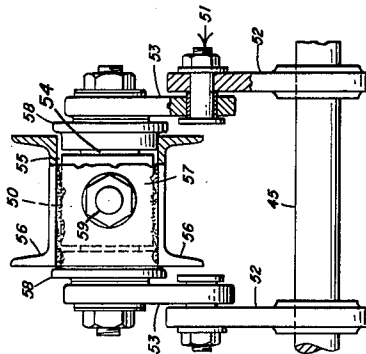


FIG. 7

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3,256,836

HOPPER DOORS OPERATING ASSEMBLY
 Walter L. Floehr, Toledo, Ohio, assignor to Unitcast Corporation, Toledo, Ohio, a corporation of Ohio
 Filed Jan. 7, 1963, Ser. No. 249,690
 17 Claims. (Cl. 105-248)

This invention relates to door operating assemblies of railway hopper cars and has for an object the provision of an improved assembly for operating simultaneously a plurality of longitudinally spaced hopper doors.

Another object of the invention is to provide a mechanism for operating one or more hopper doors whereby each door is positively controllable in its movements between open and closed positions without a positive connection between the door and the mechanism.

An additional object of the invention is to provide a mechanism for operating one or more hopper doors which not only controls the opening and closing movements of each door but in its opening operation is capable of freeing any door stuck to its frame.

A further object of the invention is to provide a mechanism for simultaneously operating a plurality of hopper doors which, in addition to positively controlling the movements of the doors, positively locks the doors in closed position and enables the fits of the doors with their frames in that position to be individually adjusted.

Another object of the invention is to provide a mechanism for operating one or more hopper doors whereby a door can be opened either fully or partly to suit different unloading conditions.

Other objects and advantages of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims and be illustrated in the accompanying drawings, in which:

FIGURE 1 is a fragmentary side elevational view of a hopper car incorporating a preferred embodiment of the improved operating mechanism of the present invention;

FIGURE 2 is a transverse vertical sectional view of the structure of FIGURE 1, taken at the left along lines 2-2 of FIGURE 1 and at the right along lines 2a-2a of the same figure;

FIGURE 3 is a fragmentary vertical sectional view on an enlarged scale taken along lines 3-3 of FIGURE 2;

FIGURE 4 is a fragmentary side elevational view on the scale of FIGURE 3 showing the door of that figure in open position.

FIGURE 5 is a fragmentary sectional view taken along lines 5-5 of FIGURE 4;

FIGURE 6 is a side elevational view on an enlarged scale of the drive for the mechanism, with portions broken away and shown in section to more clearly illustrate certain of the details of construction;

FIGURE 7 is a fragmentary end elevational view of the structure of FIGURE 6, with portions broken away and shown in section to more clearly illustrate certain of the details of the construction; and

FIGURE 8 is a vertical sectional view taken along lines 8-8 of FIGURE 6.

Referring now in detail to the drawings in which like reference characters designate like parts, the improved hopper door operating assembly of the present invention embraces an improved operating mechanism for operating one or more doors and a door construction and arrangement by which the improved mechanism can operate simultaneously the several doors of a railway hopper car.

As exemplary of the invention, the improved operating mechanism, designated generally as 1, has been illus-

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trated applied to a hopper car 2 for simultaneously operating the hinged hopper doors 3 normally closing the discharge openings or outlets 4 of the car's several hoppers 5. In the illustrated arrangement, each door 3 is adapted to close one of the discharge openings 4 and the doors are arranged in longitudinally spaced pairs with the doors of each pair disposed in lateral alignment at opposite sides of a center sill 6. Of the so-called drop bottom type, the hopper doors 3 of the disclosed embodiment are conventional in being swingable vertically, longitudinally of the car, between open and closed positions, about horizontal axes disposed transversely of the car, but are unconventional in having a horizontal rather than the usual incline position when closed.

As befits the horizontal closed disposition of the doors, each of the discharge openings 4 is surrounded or encircled by a horizontally disposed seat 7 adapted to be engaged or abutted by the inner or upper face or surface 8 of the related door 3 when the latter is closed, each seat either being formed on a frame fixed to or rigid with the related hopper or, as here, forming the lower end of a side wall or chute 9 bounding the opening and rigid with and formed as a downward extension of the side sheets 10 of the hopper. Engaging the related seat 7 with its upper face 8, each door 3 preferably has about that face an up-sloping or upturned peripheral flange 11, which, when the door is closed, surrounds or encircles the seat. Each of the doors is swingably or hingedly mounted beyond one end of its discharge opening 4 by a pair of hinges 12 fixed or secured to the door's outer or underface or surface 13 and anchored or based on a cross-member 14 fixed or secured to the car and extending transversely thereof between longitudinally adjoining discharge openings.

The laterally aligned doors 3 of each pair may be swingable independently or, as illustrated, required to swing in unison by connecting them by a channel or other suitable connecting member 15 fixed or secured to and extending transversely of their outer faces 13 below the center sill 6. In the first case, it is necessary and in the second it is preferred that the doors be operated from both sides of the car, such operation with the laterally aligned doors connected being particularly advantageous in preventing twisting of the doors. Designed to operate the doors by slide bars or plates 16 slidable or reciprocable linearly longitudinally of the car, the illustrated operating mechanism 1, accordingly, has a plurality of such bars and at least one at each side of the car.

With its slide bars 16 guided in their substantially horizontal reciprocable movement longitudinally of the car, conveniently by slidably mounting them in guide slots or tracks 17 formed in side braces 18 at the sides of the car, the operating mechanism 1 is capable of translating the rectilinear movement of its slide bars into the swinging movement of the doors 3 between open and closed positions and of controlling the several doors in such movement without a positive connection to any of the doors and with only the laterally aligned doors of each pair directly connected. These capabilities are obtained by mounting on the door-confronting sides of the slide bars 16 for rotation about axes disposed parallel to the hinging axes of the adjoining doors, a plurality of guide or drive rollers 19, one for and preferably positioned at a side of each door 3 for controlling the movements of that door between open and closed positions over the range of reciprocable movement of the slide bar on which the particular roller is mounted.

For transmitting movement of the slide bars to the doors through the rollers 19, there is attached or fixed to or formed on each door 3 at the side thereof confronting the adjoining slide bar a camming or guide flange or lip

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20 projecting substantially horizontally, transversely or laterally of the car, and adapted to overlie and be engaged on its underside 21 by the correspondingly extending, adjoining or related roller. Formed in the illustrated embodiment as the laterally outstanding upper end portion of an angle bracket 22 fixed to the underface 13 of the related door, each of the guide flanges 20 extends longitudinally or along a side of the door and preferably is or ogee or reverse curvature with its leading portion 23 toward the distal or free end of the door substantially flat and parallel to the door's plane or faces 8 and 13 and merging rearwardly with a trailing portion 24 which is arcuately concave, downwardly, and extends or projects upwardly above the leading portion relative to the plane of the door. Of such extent, longitudinally of the car, as to have its leading portion 23 engaged by and its trailing portion 24 receive or pocket the related roller 19, respectively, in the closed and open positions of the door, and so curved that the line of force between it and the roller at any time is substantially tangential to the arc of movement of the door, the preferred longitudinally curved guide flange 20 on each door both enables the door to open progressively or gradually while it is supported on its guide roller on movement of the related slide bar 16 in a door-opening direction and to be driven correspondingly by the roller from open to closed position as the slide bar moves in the opposite or closing direction.

By controlling the movement of the associated slide bar, it therefore is possible to control the movement of each of the doors engaged by its rollers at all times, except under one condition, and to hold the doors in either closed, open or any partly open position. The excepted condition is the sticking of a door to its seat 7 on the associated hopper, as may happen if the car is loaded with cement or other material having adhesive properties especially when exposed to moisture. Ordinarily, a door in such a condition is loosened by prying or hammering to break the seal between it and its seat. However, along with its other capabilities, the operating mechanism 1 of the present invention is able to loosen or release a stuck door without resort to extraneous means. This it accomplishes by having mounted on the associated slide bar 16 not only a guide roller 19 but also a release or seal-breaking roller 25 for each door, the latter roller mounted for rotation about an axis parallel to that of the guide roller either directly on the slide bar or, as illustrated, on a mounting bracket 26 upstanding therefrom and in either case being disposed to engage the upper side 27 of the guide flange 20.

The vertical spacing of the release roller 25 from the adjoining or related guide roller 19 preferably is such that the release roller normally will be disposed above the guide flange 20 but can engage the upper side 27 of the flange over the upsloping part of the trailing portion 24 thereof when the door is stuck to its frame. With the guide and release rollers 19 and 25 vertically straddling the guide flange 20, if, on sliding of the associated slide bar 16 in a door-opening or opening direction, any door does not drop of its own weight as the related guide roller moves toward the trailing portion 24 of the guide flange, the cooperating release roller, by projecting below the upper extremity of the flange, will engage the latter's upper side 27 and by exerting a downward force on the door due to the camming or wedging action consequent upon the upward slope of the engaged part of the flange, break the bond or seal between the door and its seat 7, whereupon that door will drop by gravity to the point of engagement of its flange with the underlying guide roller and be supported and guided by that roller in the balance of its swing to open position.

While the guide rollers 19 are effective to close the doors 3, it is preferred to depend on means other than these rollers and the cooperating guide flanges 20 for holding or locking the doors in closed position. To this

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end, the operating mechanism 1 includes for each door a latch 28 and a catch or keeper 29, one of which is mounted on the adjoining or associated slide bar 16 and the other on the door. In the illustrated embodiment, the latch 28 is mounted on the adjoining slide bar 16 and the catch 29 on the door and the latch and catch are adapted not only to hold or lock the particular door in closed position but to enable the fit of the door in that position with its seat 7 to be adjusted as necessary to compensate for manufacturing tolerances or wear.

In the preferred form, the catch 29 for each door is fixed to or rigid with and immovable relative to the door and carried and partly formed by the channel member 15 fixed to the outer face 13 of each door by which the latter is connected for movement in unison to the laterally aligned door at the other side of the center sill 6. The preferred channel member has an upper leg 30 fixed directly to the underface 13 of the door, a lower leg 31 extending in the same direction as and substantially parallel to the upper leg and an intermediate or connecting web 32 connecting the legs and disposed substantially normal to the door's underface. The lower leg 31 on its door-confronting side is tapered or slopes toward its outer or free end away from the underface of the door and, with the adjoining part of the web 32, forms part of the catch 29. The balance of the catch for each door is formed by a bracket 33 fixed to the web 32 and having a latch-engaging surface 34 confronting the lower leg 31 and sloping in the opposite direction therefrom relative to the underface 13 of the door. The confronting surfaces on the lower leg 31 and the bracket 33 because of their slope, thus together bound or define the vertical extremities of a notch or slot 35 opening outwardly substantially in the general direction of the hinged end of the door and tapered or progressively narrowing inwardly toward the web 32.

In its turn, the bar-mounted latch 28 has a lug or latch element 36 fittable or receivable in the notch 35 in the catch 29 and preferably of wedge shape with an upper face 37 sloping downwardly toward its nose or leading edge 38, in general in correspondence with the slope of the lower or leg-confronting surface 34 on the bracket 33 of the catch. The main part of the latch is formed by a plate, bar or body member 39 pivotally mounted intermediate its ends on a door-confronting side of the adjoining slide plate 16 for limited turning relative to the latter about a substantially horizontal axis. Carrying on one end portion the lug 36, preferably as an integral part outstanding toward the related door 3, the main part or body member 39 of the latch is apertured at its other or opposite end portion at the opposite side of its pivot 40 to receive the preferably frusto-conical head 41 of an eccentric bolt 42, which extends through a slot 43 in the slide bar 16. The eccentric bolt 42 has in its head 41 an oval or other out-of-round socket 44 for receiving a turning tool (not shown) by which, by turning the bolt, the latch 28 and, specifically, its body member 39 can be turned about its pivot 40, in process shifting the vertical or transverse position of the lug 36 on the related slide bar 16. Designed in the final closing movement to lift the flange 20 off the guide roller 19 by the wedging action it exerts on the upper surface 34 of the notch 35, the lug 36 actually supports the distal end of the door in the latter's closed position. Consequently, it is the vertical position of the lug that determines the fit of the related door 3 with its seat 7 and by adjusting that position the fit in turn can be adjusted. With the fits between the doors 3 and their seats 7 thus individually adjustable by vertical movement of their latches, any variation in the fits of the several doors, either initially or due to wear, can readily be eliminated and all doors made to fit with the same tightness.

Although the operating mechanism 1 may have but one slide bar 16 at each side of the car, it ordinarily will be preferred that it have two or a pair of bars at each

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side between which the operation of the doors at the same side is substantially equally divided. With this arrangement, the two or plurality of slide bars 16 at each side of the car ordinarily will be moved, driven, or reciprocated in opposite directions as they open and close their doors and the latter, correspondingly, will open or close toward opposite ends of the car so that all doors open or close at the same time.

In this preferred arrangement, the slide bars may be driven by a single or common drive or operating shaft 45 extending transversely of the car substantially midway, longitudinally, of the latter and the bars 16 may be drivably connected to the shaft by a pair of axially spaced, double-armed cranks 46 fixed or keyed to the shaft, one adjacent and inwardly of the slide bars at each side of the car. With its arms 47 preferably oppositely extending, each crank 46 is connected to each of the adjoining slide bars 16 by a link 48 pivotally connected at opposite ends to an end of one of the arms and to a connecting plate 49 fixed to the inner or confronting side of the bar. The pair of slide bars at each side may be of a length substantially to contact when the doors 3 operated by each are in closed position and, to conserve space in that position of the doors, the links 48 preferably are bent and have their arm-connected end portions received or fitting in recesses 47a in the sides of the arms, with the relative contours of the crank and links such that, when the doors are closed, the crank will be disposed substantially horizontally or longitudinally of the car and the links will be folded along opposite sides of and nest with the crank.

Since considerable force is required to operate the several doors 3 simultaneously, it ordinarily will be inconvenient to actuate the operating shaft 45 by a lever applied directly thereto and necessary that some means for providing sufficient mechanical advantage be interposed between the operating shaft and the point at which the actuating force is manually applied. A means particularly suited for the purpose is that illustrated in which a slide block or cross head 50 is screw-driven linearly longitudinally of the car and its linear motion is converted into rotary motion of the operating shaft by one or, to prevent canting and possible binding of the slide block, preferably a pair of jointed bell cranks 51 each having as one arm a lever or crank arm 52 keyed or otherwise fixed against rotation to the operating shaft and, as the other, a floating link 53 pivotally connected at opposite ends to the crank arm and to one of a pair of trunnions 54 outstanding or projecting from opposite sides of the block.

The slide block 50 is slidable in a guide way 55 extending longitudinally of the car and normal or right angles to the operating shaft 45, here formed by a pair of vertically spaced, oppositely facing channel members 56, each suitably welded or otherwise fixed to the underframe of the car, conveniently inside of the center sill 6 in the space in the mid-portion of the car between the middle hoppers 5 and connected and spaced by a pair of longitudinally spaced bearing blocks 57 welded or otherwise fixed thereto. Suitably guided in its guideway 55 by guide and thrust rollers 58, one rotatable on each trunnion 54 inwardly of one of the floating or drive links 53 and with the actuating screw 59 threaded through it suitably journaled in the bearing blocks 57, the slide block will be driven by turning of the screw and in turn will drive the operating shaft 45 through bell cranks 51 and cause the slide bars 16 to be driven through the cranks 46. It being desirable that the screw 59 be actuable from either side of the car and its preferred location in the central portion of the car mitigating against direct actuation, the illustrated operating mechanism includes a cross-shaft 60 which is mounted on and extends transversely of the car to opposite sides thereof and is drivably connected to an end of the drive screw by bevel or like suitable gearing 61, while itself being turnable by handles

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(not shown) either permanently or removably attachable to its opposite ends.

From the above-detailed description, it will be apparent there has been provided an improved mechanism for operating hinged doors of a railway hopper car which is capable of operating all or any lesser number of the doors simultaneously and of positively controlling the movements of the doors it operates. It should be understood that the described and disclosed embodiment is merely exemplary of the invention and that all modifications are intended to be included that do not depart from the spirit of the invention or the scope of the appended claims.

Having described my invention, I claim:

1. Operating mechanism for a hinged hopper door comprising means reciprocable normal to a hinging axis of said door, means fixed to said door, and means on said reciprocable means and normally disengaged from said fixed means only on said door and engageable therewith on movement of said reciprocable means in an opening direction with the door stuck to a seat for releasing said door therefrom.

2. Operating mechanism for a hinged hopper door comprising means reciprocable normal to a hinging axis of said door, cam means fixed to said door, and means on said reciprocable means and normally disengaged from said cam means only on said door and engageable therewith on movement of said reciprocable means in an opening direction with the door stuck to a seat for releasing said door therefrom.

3. Operating mechanism for a hinged hopper door comprising bar means reciprocable normal to a hinging axis of said door, cam means fixed to and extending along a side of said door, roller means mounted on said bar means for rotation about an axis parallel to said hinging axis, said roller means normally engaging said cam means for controlling opening and closing movements of said door on reciprocation of said bar means, and means on said bar means and engageable with means on said door only on movement of said bar means in an opening direction with the door stuck to a seat for releasing said door therefrom.

4. Operating mechanism for a hinged hopper door comprising bar means reciprocable normal to a hinging axis of said door, cam means fixed to and extending along a side of said door, roller means mounted on said bar means for rotation about an axis parallel to said hinging axis, said roller means normally engaging said cam means for controlling opening and closing movements of said door on reciprocation of said bar means, and roller means mounted on said bar means and spaced from said first-named roller means in a direction normal to the direction of reciprocation of said bar means, said second-named roller means only on movement of said bar means in an opening direction with said door stuck to a seat being engageable with said cam means for applying a force therethrough to release said door.

5. Operating mechanism for a hinged hopper door member comprising a bar member reciprocable normal to a hinging axis of said door member, cam means fixed to and extending along a side of said door member, roller means mounted on said bar member and normally engaging a surface of said cam means for controlling opening and closing movement of said door member on reciprocation of said bar member, roller means mounted on said bar member and engageable with another surface of said cam means only on movement of said bar member in an opening direction with said door stuck to a seat for releasing said door member, and latch means on one of said members and engageable with catch means on the other member in the closed position of said door member for holding said door in said position.

6. Operating mechanism for a hinged hopper door member comprising a bar member reciprocable normal to a hinging axis of said door member, cam means fixed

to and extending along a side of said door member, roller means mounted on said bar member and normally engaging a surface of said cam means for controlling opening and closing movements of said door member on reciprocation of said bar member, roller means mounted on said bar member and engageable with another surface of said cam means only on movement of said bar member in an opening direction with said door stuck to a seat for releasing said door member, and latch means on one of said members and engageable with catch means on the other member in the closed position of said door member for holding said door in said position, one of said latch and catch means being movable relative to its member for adjusting the fit between said door member and said seat in the closed position of said door member.

7. Operating mechanism for a hinged hopper door member comprising a bar member reciprocable normal to a hinging axis of said door member, cam means fixed to and extending along a side of said door member, roller means mounted on said bar member and normally engaging a surface of said cam means for controlling opening and closing movements of said door member on reciprocation of said bar member, roller means mounted on said bar member and engageable with another surface of said cam means only on movement of said bar member in an opening direction with said door stuck to a seat for releasing said door member, a catch fixed to one of said members, a latch pivotally mounted on the other member and engageable with said catch as said door member approaches closed position for holding said door in said position, and eccentric means for pivoting said latch on its member and thereby adjusting the fit of said door member with said seat in the closed position thereof.

8. Operating mechanism for a hinged hopper door comprising bar means reciprocable normal to a hinging axis of said door means, cam means fixed to and extending along a side of said door means, roller means mounted on said bar means and normally engaging a surface of said cam means for controlling opening and closing movements of said door on reciprocation of said bar means, roller means mounted on said bar means and engageable with another surface of said cam means only on movement of said bar means in an opening direction with said door stuck to a seat for releasing said door means, a catch fixed to an outer face of said door, a latch bar pivotally mounted intermediate its ends on said bar means, wedge means on an end portion of said latch bar and engageable with said catch as said door approaches closed position for wedging and holding said door in said position, and eccentric means connecting an opposite end portion of said latch bar to said bar means for adjustably positioning said wedge means transversely of said bar means and thereby adjusting the fit between said door and said seat in the closed position thereof.

9. In a railway hopper car, the combination of a downwardly facing, substantially horizontally disposed seat about a discharge opening of a hopper of said car, a door hinged to said car adjacent said opening and swingable vertically relative thereto between open and closed positions, said door in closed position having an innerface engageable with said seat for closing said opening, a slide bar reciprocable longitudinally of said car outwardly of a side of said door, a camming flange fixed to and extending along a side of said door and outstanding therefrom toward said bar, a roller mounted on a side of said bar confronting said door and underlying and normally engaging an undersurface of said flange for controlling the movements of said door between open and closed positions, and a roller mounted on said bar above said first roller and therewith vertically embracing said flange, said second roller only on movement of said bar in an opening direction with said door stuck to said seat being engageable with an upper surface of said flange for

applying therethrough a downward force for releasing said door.

10. In a railway hopper car, the combination of a downwardly facing, substantially horizontally disposed seat about a discharge opening of a hopper of said car, a door hinged to said car adjacent said opening and swingable vertically relative thereto between open and closed positions, said door in closed position having an innerface engageable with said seat for closing said opening, a slide bar reciprocable longitudinally of said car outwardly of a side of said door, a camming flange fixed to and extending along a side of said door and outstanding therefrom toward said bar, a roller mounted on a side of said bar confronting said door and underlying and normally engaging an undersurface of said flange for controlling the movements of said door between open and closed positions, a roller mounted on said bar above said first roller and therewith vertically embracing said flange, said second roller only on movement of said bar in an opening direction with said door stuck to said seat being engageable with an upper surface of said flange for applying therethrough a downward force for releasing said door, a catch fixed to and extending transversely of an outer face of said door and facing toward a free end thereof, a latch bar pivotally mounted intermediate its ends on a side of said slide bar confronting said door, a latch element on an end portion of said latch bar and receivable in said catch for holding said door in closed position, and eccentric means connecting said latch and slide bars for adjustably positioning said element vertically relative to said slide bar and thereby adjusting the fit between said door and said seat in the closed position thereof.

11. In a railway hopper car having a plurality of hinged doors swingable toward the same end of said car between open and closed positions and each in closed position engaging a seat bounding a downwardly opening discharge opening of a hopper of said car, the combination of a slide bar reciprocable longitudinally of said car adjacent a side of said doors, a camming flange fixed to and extending along said side of each of said doors, and a plurality of rollers mounted on said bar and spaced longitudinally from each other, each of said second rollers being spaced above one of said first rollers and therewith straddling the flange on the adjoining door, and any of said second rollers only on movement of said slide bar in an opening direction with the adjoining door stuck being engageable with an upper surface of the flange on said door for applying therethrough a force to release said door.

12. In a railway hopper car having a plurality of hinged doors swingable in closing toward the same end of said car and each in closed position engaging a seat bounding a downwardly opening discharge opening of a hopper of said car, the combination of a slide bar reciprocable longitudinally of said car adjacent a side of said doors, a camming flange fixed to and extending along said side of each of said doors, a plurality of rollers mounted on said bar and spaced longitudinally from each other, each of said second rollers being spaced above one of said first rollers and therewith straddling the flange on the adjoining doors, any of said second rollers only on movement of said slide bar in an opening direction with the adjoining door stuck being engageable with an upper surface of the flange on said door for applying therethrough a force to release said door, a catch fixed to an outer face of each of said doors and facing away from said end of said car, and a plurality of longitudinally spaced latches mounted on a side of said bar confronting said doors and each receivable in one of said catches for holding said door in closed position, said latches being individually adjustable in position relative to said bar for adjusting the fit between the related door and its seat in the closed position thereof.

13. In a railway hopper car having on either side of a center sill thereof a plurality of hinged doors longitu-

dinally spaced from each other and each laterally aligned with a corresponding door at the other side of said center sill, said doors all being swingable vertically between open and closed positions and closing toward the same end of said car each against a downwardly facing seat bounding a discharge opening of said car, the combination of rigid means fixed to an outer face of and connecting each door to a corresponding door at the other side of said center sill, a pair of slide bars mounted on opposite sides of said center sill outwardly of said doors and reciprocable longitudinally of said car, a camming flange fixed to and extending along an outer side of each door, a plurality of longitudinally spaced guide rollers on each of said slide bars each underlying and normally engaging an undersurface of one of said flanges for controlling the movements of the related door between open and closed positions, a plurality of longitudinally spaced release rollers on each of said bars and each spaced above one of said guide rollers, any of said release rollers only on movement of said bars away from said end of said car with the related door stuck being engageable with the upper surface of the flange of said door for applying therethrough a force to release said door, catch means for each door on said rigid means, a plurality of longitudinally spaced latch means mounted on each bar and each receivable in one of said catches for holding said doors in closed position, said latches being individually adjustable vertically relative to said bars for adjusting the fit of the related door with its seat in the closed position thereof, and means for driving said bars in unison in the same directions.

14. In a railway hopper car having on each side a center sill thereof a plurality of longitudinally spaced doors each laterally aligned with and rigidly connected to a corresponding door on the other side, the doors on each side being arranged in a pair of sets with each door of each set closing toward the same end of the car and oppositely from each door of the other set, mechanism for simultaneously operating said doors comprising cam means fixed to each door, a plurality of slide bars each reciprocable longitudinally of said car adjacent and outwardly of one of said sets of doors, a plurality of longitudinally spaced guide rollers on each bar and each underlying and normally engaging the cam means on one of said doors for controlling the movements thereof between open and closed positions, a plurality of longitudinally spaced release rollers on each bar each above one of said guide rollers and normally spaced above the adjoining cam means, any of said release rollers only on movement of its bar in an opening direction with the related door stuck shut being engageable with an upper face of the flange thereon for applying therethrough a force to release said door, a plurality of latch means on each bar and each engageable with catch means fixed to one of said doors for holding said door in closed position, said latch means being adjustably positioned on said bars for individually adjusting the fits of the doors with their seats, and drive means mounted intermediate the ends of said car for driving said bars simultaneously and the bars at each side in opposite directions and thereby simultaneously opening and closing said doors.

15. In a railway hopper car, a hopper door operating assembly comprising a plurality of hinged hopper doors arranged in sets, a plurality of bars mounted on and extending longitudinally of said car for linear reciprocation longitudinally thereof each adjacent one of said sets, cam means on each of said doors, roller means on each of

said bars and each normally engaging said cam means on adjoining doors for controlling movements of said doors between open and closed positions on reciprocation of said bars, an operating shaft rotatably mounted on and extending transversely of said car, means connecting each of said bars to said shaft for simultaneous movement thereof on rotation of said shaft, and screw-actuated means linearly reciprocable longitudinally of said car and connected to said shaft for imparting rotary movement thereto and thereby moving said bars.

16. A hopper door operating assembly comprising a plurality of slide bars extending and linearly reciprocable longitudinally of a hopper car and each arranged to control opening and closing movements of hopper doors of an adjoining set, an operating shaft rotatably mounted on and extending transversely of said car, lever means fixed against rotation of said shaft, link means connecting each of said bars to said lever means, a screw-actuated means linearly reciprocable longitudinally of said car, and link and lever means drivably connecting said screw-actuated means to said shaft for rotation thereof and simultaneous movement of said bars on actuation on said screw-actuated means.

17. A hopper door operating assembly comprising a pair of slide bars slidably mounted on and extending and linearly reciprocable longitudinally of a hopper car at each side of a center sill thereof, said bars of each pair on movement in opposite directions controlling opening and closing movements of a plurality of oppositely closing hopper doors hinged to said car on the same side of said center sill, an operating shaft rotatably mounted on and extending transversely of said car intermediate said sets of oppositely closing doors, lever means on said shaft at each side of said center sill, link means connecting each of said bars to said lever means at the same side of said center sill, screw-actuating means linearly slidable longitudinally of said car, jointed bell crank means connecting said screw-actuating means to said shaft for imparting rotary movement thereto and thereby simultaneously moving said several slide bars, and actuating means at each side of said car and drivably connected to said screw-actuated means for actuation thereof.

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