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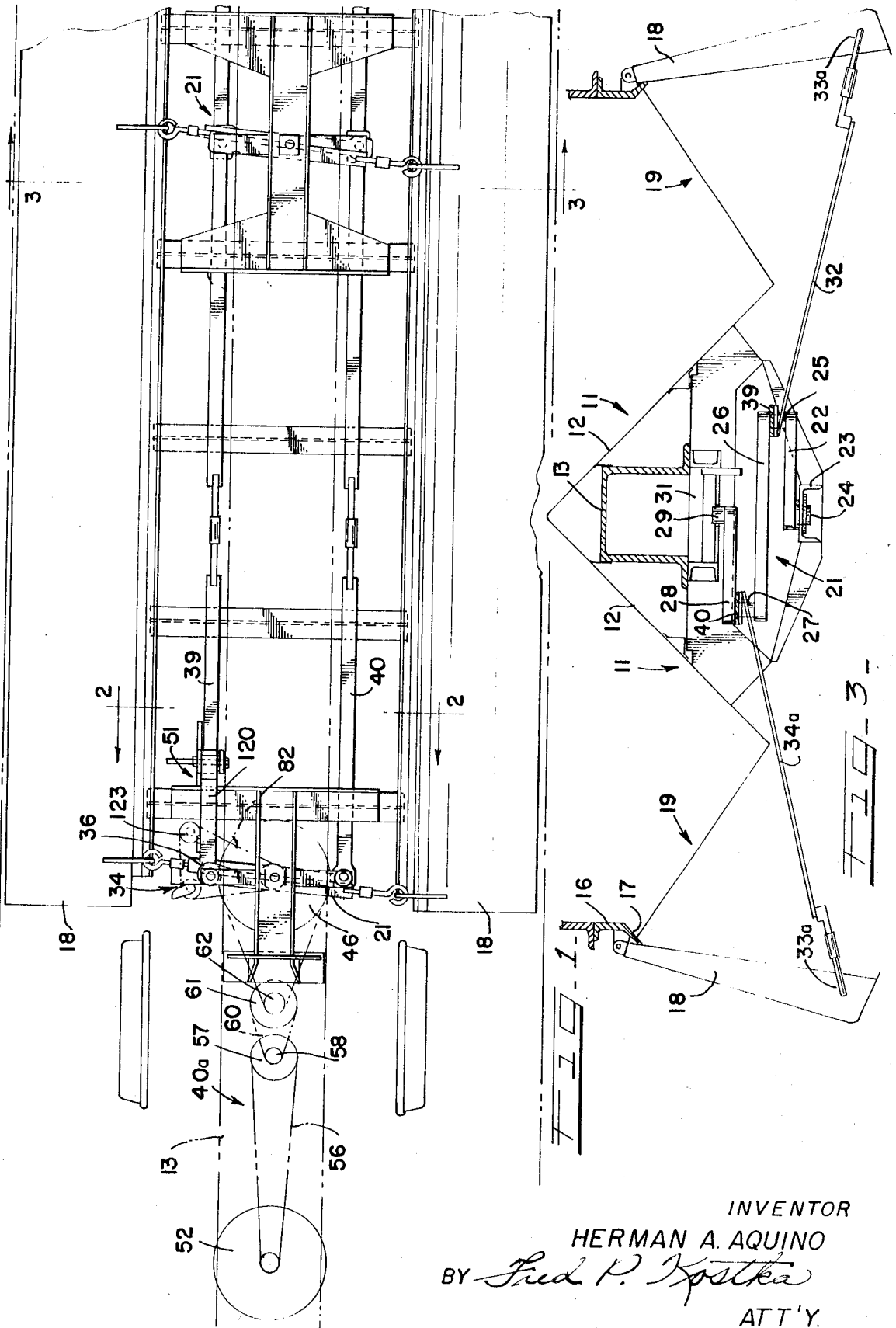
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MANUAL OR TRACKWAY CAM HOPPER CAR DOOR OPERATING MECHANISM

Filed Feb. 23, 1967

7 Sheets-Sheet 1



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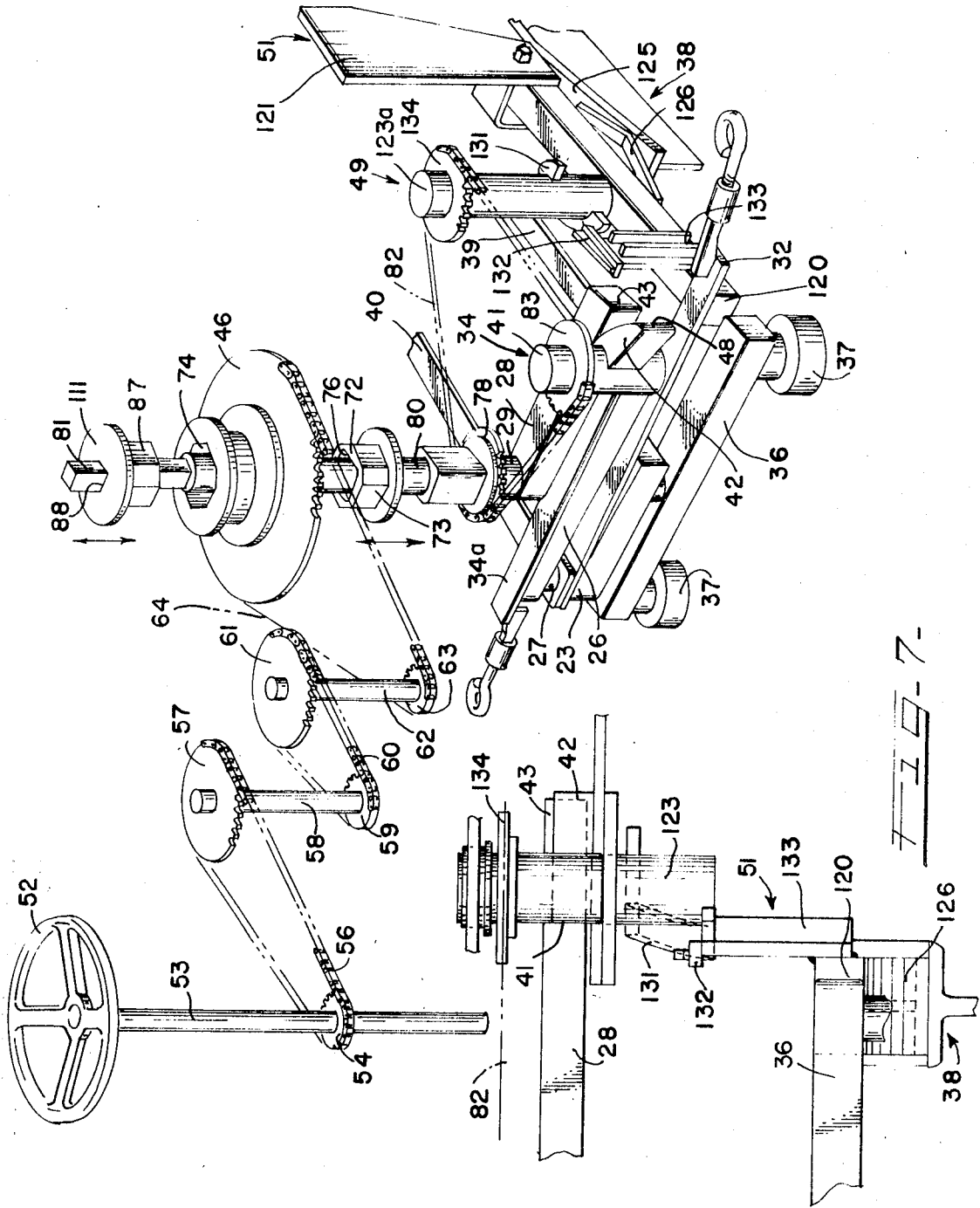
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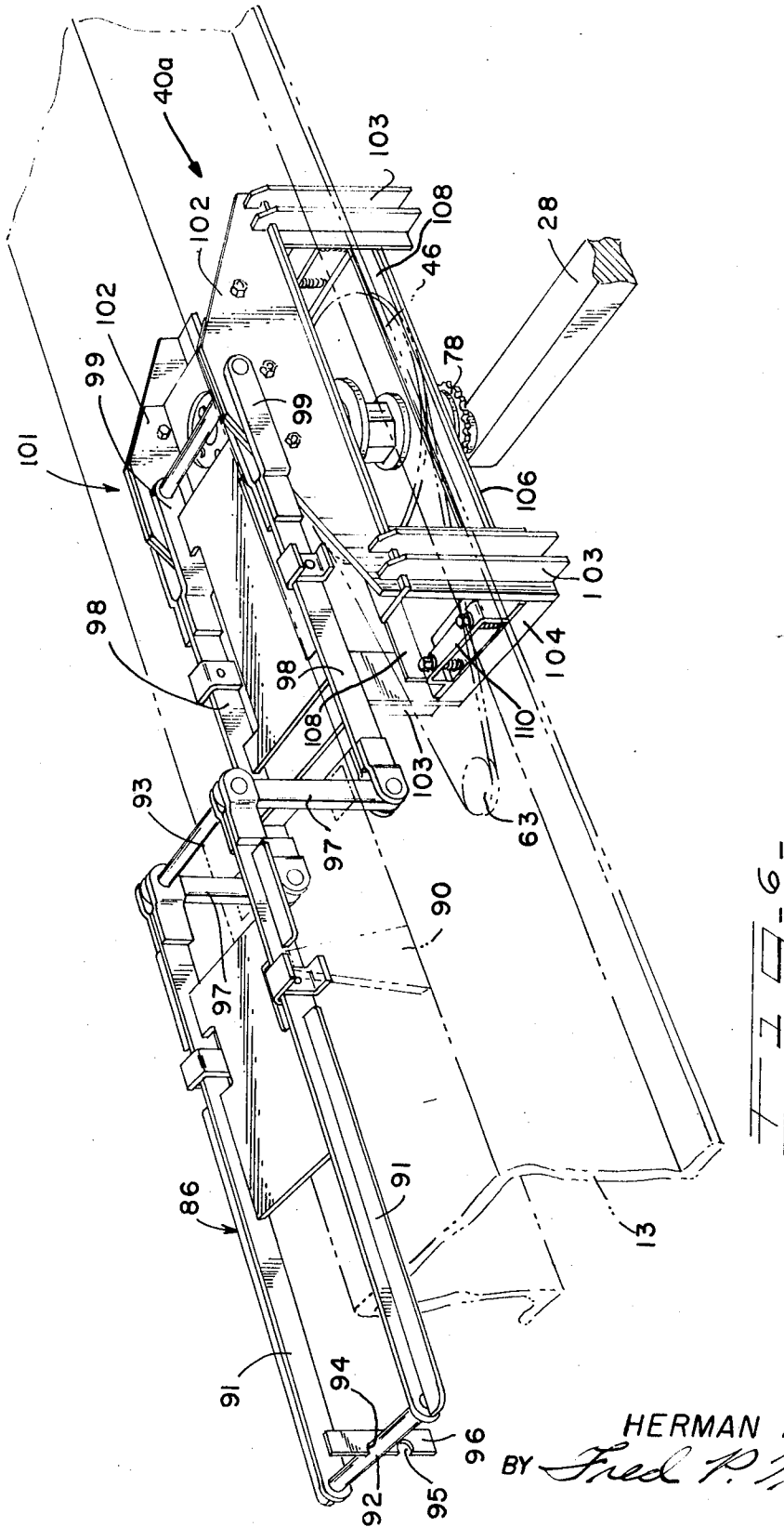
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MANUAL OR TRACKWAY CAM HOPPER CAR DOOR OPERATING MECHANISM

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7 Sheets-Sheet 5



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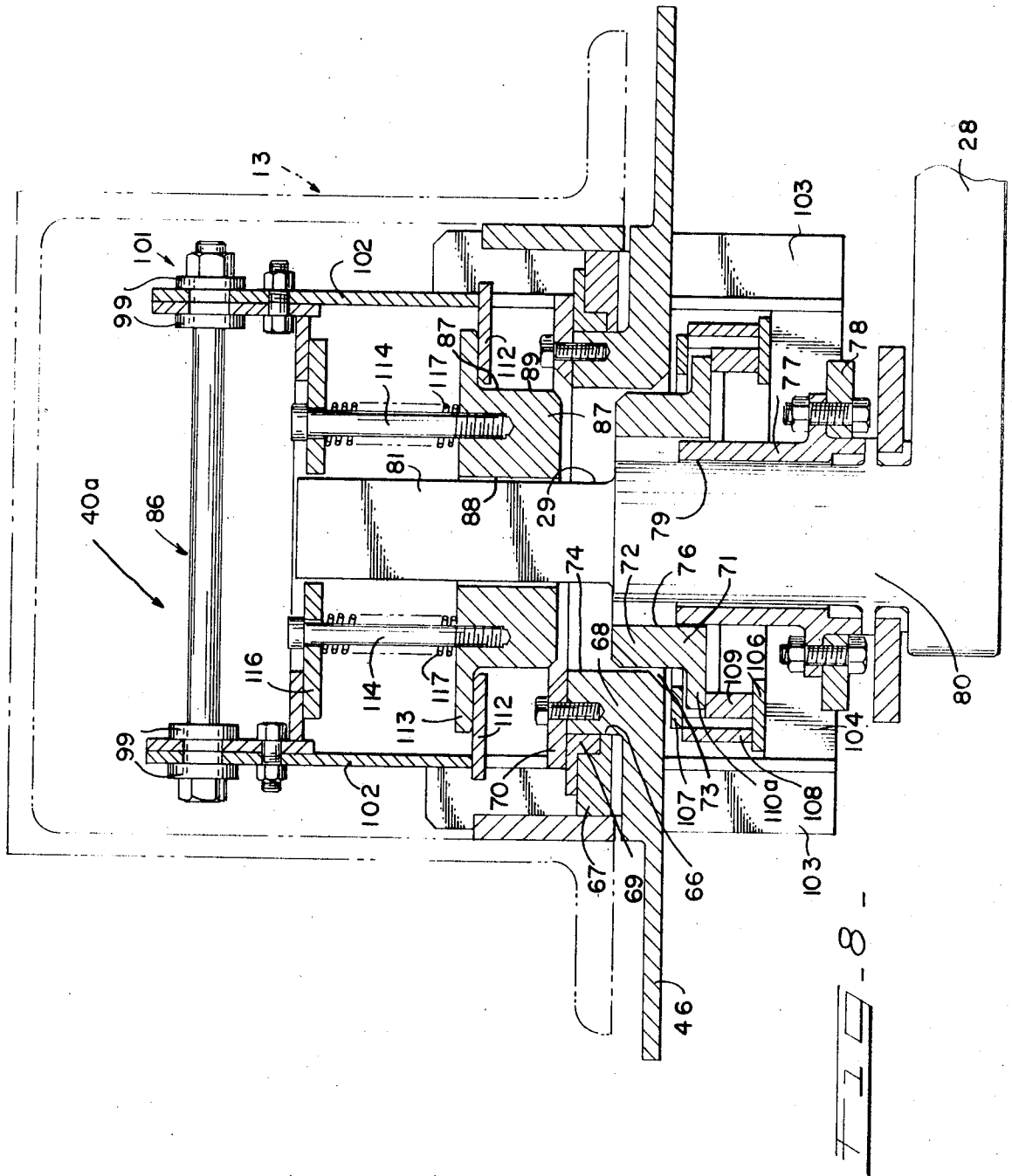
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MANUAL OR TRACKWAY CAM HOPPER CAR DOOR OPERATING MECHANISM

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7 Sheets-Sheet 6



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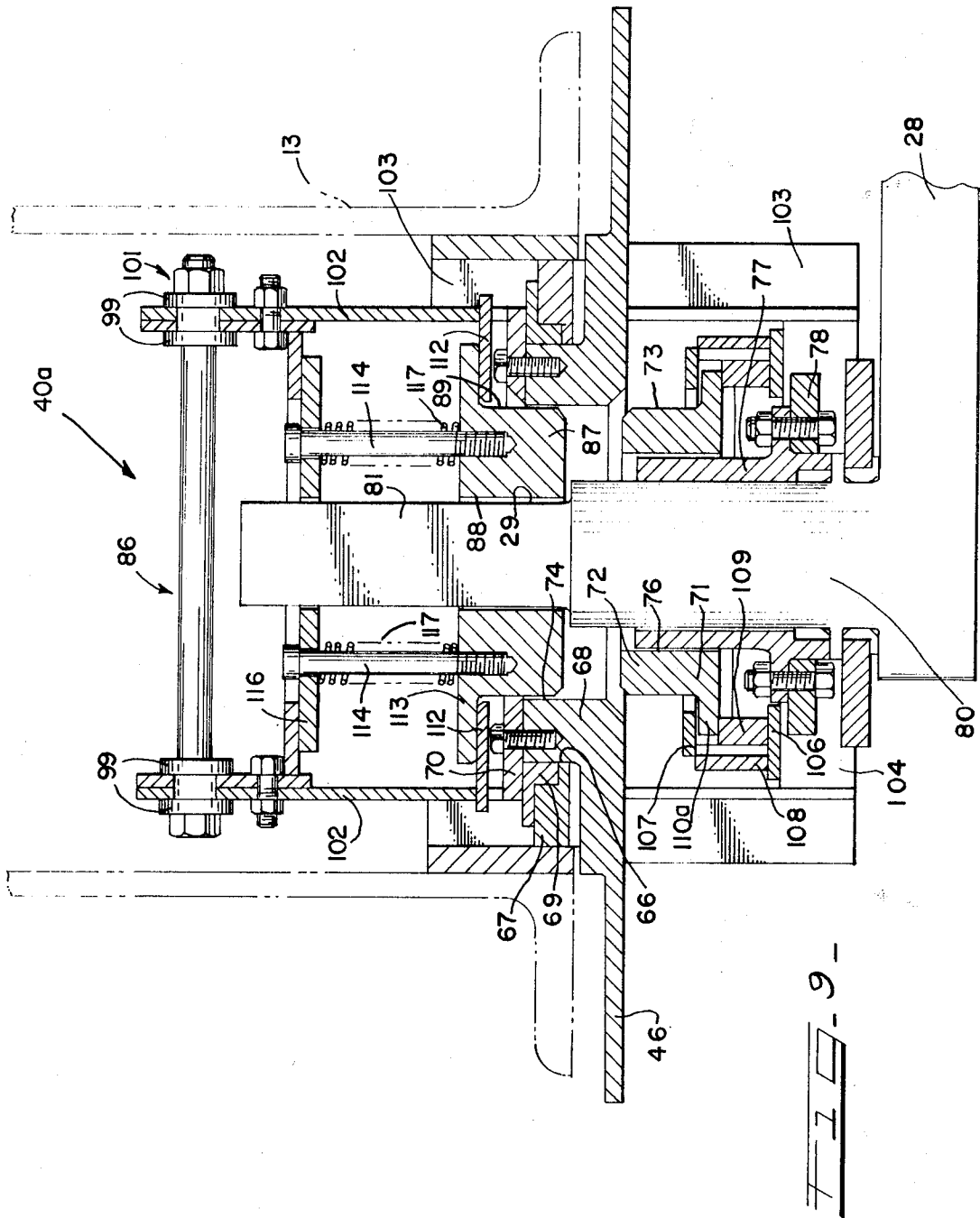
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MANUAL OR TRACKWAY CAM HOPPER CAR DOOR OPERATING MECHANISM

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7 Sheets-Sheet 7



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3,515,076

**MANUAL OR TRACKWAY CAM HOPPER CAR
DOOR OPERATING MECHANISM**

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Filed Feb. 23, 1967, Ser. No. 618,152
Int. Cl. B61d 7/08; E05f 9/00; B65g 67/24
U.S. Cl. 105—251 31 Claims

ABSTRACT OF THE DISCLOSURE

An arrangement for manually opening a pair of doors disposed on opposite sides of a railway vehicle with each door being mounted for swinging movement about a horizontal axis between a closed position underlying respective hopper discharge openings provided on the underside of the vehicle and an open position disposed downwardly away from the openings. A door operating mechanism in the form of a vertically disposed and rotating crank mechanism is associated with the doors and includes a pair of opposed crank throw arms to which there is connected respective links fastened to the doors. The links are arranged, when the doors are in a closed position, to be angularly displaced in an over-center relationship with respect to the crank arms which engage a stop, preventing further rotation of the crank mechanism in one direction. The crank mechanism has connected thereto an actuating cam follower arm which is turned to rotate the crank in a direction away from the stop by a trackway mounted camming mechanism as the railway vehicle moves along the track and thereby to automatically open the doors and to rotate the crank in the opposite direction to close the doors.

The arrangement of the present invention for manually operating the crank mechanism includes a drive sprocket arrangement which turns a rotatable stop camming means engaging a crank arm to displace the crank mechanism out of the over-center relationship with the door connecting levers. When the over-center relationship is overcome by the stop camming means the weight of the lading on the doors and the weight of the doors is operative to rotate the crank mechanism so that the doors are movable to the open position thereof. A clutching mechanism is incorporated into the drive sprocket arrangement so as to selectively operate the stop camming means during opening of the doors and to disconnect the drive from the stop camming means and directly turn the crank mechanism to close the doors.

A further construction includes an auxiliary lock mechanism for positively holding the crank mechanism in the over-center position against the stop when the doors are closed.

BACKGROUND OF THE INVENTION

The manual arrangement of the present invention is adapted to be used in the structure of a door operating mechanism shown and disclosed in U.S. patent application Ser. No. 598,440 to William R. Shaver, filed Dec. 1, 1966, which application is assigned to the assignee of the present invention and incorporated herein by this reference thereto.

SUMMARY OF THE INVENTION

The manual door operating arrangement of the present invention is intended to be used when the railway vehicle is located at destinations other than those having the trackway camming mechanism for automatically opening the door as described in the above mentioned application. The manual door operating arrangement has all of the advantages inherent in the automatic door opening

mechanism and provides for a rapid discharge of the cargo at the destination.

The railway vehicles incorporating the door and operating mechanism therefor are intended to be used for transporting pulverulent cargo such as coal and the like. These railway vehicles are presently used in unit train operations wherein a plurality of the vehicles are connected in a train line. When these cars are located at a destination wherein there is provided the trackway located camming mechanism for automatically opening the doors, there is a rapid discharge of the cargo. Under some circumstances the railway vehicles may be located or delivered at a location where such automatic operating mechanism is either inoperative or not available. Under these conditions the manual operating means may be employed by discharging the cargo of coal from the railway vehicles individually. The present manual operating means is constructed and arranged so as to require the minimum of effort by the operator.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary bottom plan view of a railway vehicle showing the door structure and the door operating mechanism of the present invention with a portion of the underframe structure omitted to show underlying details of structure;

FIG. 2 is an enlarged cross sectional view taken generally along the lines 2—2 of FIG. 1 and showing in particular the door operating mechanism and the hopper construction at the underside of the railway vehicle with the doors shown in the closed position;

FIG. 3 is a cross sectional view taken generally along the lines 3—3 of FIG. 1 and showing the door operating mechanism and the doors in the open position thereof;

FIG. 4 is a side elevational view of the door operating mechanism and auxiliary locking mechanism mounted on the center sill of the railway vehicle and showing in particular the manual arrangement for opening the doors;

FIG. 5 is a perspective view of the manual operating mechanism and showing in particular the sprocket gear train with parts of the clutch shifting structure omitted for purposes of clarity of illustration;

FIG. 6 is a perspective view of the manual door operating mechanism showing in particular the clutching arrangement and the operating means therefor;

FIG. 7 is an end elevational view of the camming mechanism associated with the manual door operating mechanism and auxiliary locking mechanism and showing the relationship with respect to the crank arm of the door opening mechanism;

FIG. 8 is a cross sectional view of the clutch arrangement and showing the relative positions of the clutch members when the manual door operating camming mechanism is actuated to open the doors and;

FIG. 9 is a cross sectional view similar to FIG. 8 but showing the relative positions of the clutch members during the closing of the doors.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, in particular FIGS. 1 to 4, there is shown the underframe of a railway vehicle 10 having a hopper construction 11 formed on the underside thereof. The hopper construction 11 is formed by a pair of opposingly sloped sheets 12 which terminate at an apex above a center sill 13 of the underframe 14. Spaced transversely from the center sill 13 are side sill members 16 having outwardly inclined side flanges 17 to which there is pivotally connected a pair of doors 18 which are movable between a closed position as shown in FIG. 2 to an open position as shown in FIG. 3 relative to lading discharge openings 19 defined between the side sills 16 and the lower terminal ends of the slope sheets 12.

For closing and opening the doors 18 there is provided on the underside of the underframe 14 a plurality of lengthwise spaced crank mechanisms 21, one at either end of the car (of which only one is shown) and one at the center.

The crank mechanisms 21 at the center and at the one end of the railway vehicle each comprise a lower crank arm 22 which is journaled at one end by means of a vertically disposed lower journal shaft 24 in a longitudinally extending framing member 23. At the other end the crank arm 22 has fixed thereto a throw arm 25 which is connected to one end of a connecting arm 26 disposed in the same vertical plane and parallel to the crank arm 22. Fixed to the other end of the connecting arm 26 is a second throw arm 27 which is fixed to an upper end of a crank arm 28. The upper crank arm 28 at the other end thereof is journaled by means of an upper journal shaft 29 in an upper framing structure 31 fixed to the underside of the center sill 13. The journal shafts 24 and 29 of the upper and lower crank arms 28 and 22 are coaxially disposed in a vertical alignment.

Loosely embracing the lower throw arm 25 is one end of a connecting link 32 of which the other end is attached to an attachment plate 33a fixed to one of the doors 18. A similar link 34a is connected from the upper throw arm 27 to an attachment plate 33a on the opposite door 18.

Upon rotation of the crank mechanisms clockwise, as viewed in FIG. 1, reversing the positions of the throw arms 25 and 27, the doors are movable from the closed position shown in FIG. 2 to the open position shown in FIG. 3. In the normal closed position, as shown, the connecting links 26 and 27 are disposed so as to be somewhat angularly displaced relative to the crank arms 22 and 28 and are perpendicular to the longitudinal axis of the railway vehicle 10. Holding the crank mechanism 21 and the connecting links in this relationship is a stop member 34 which limits further rotation of the crank mechanism 21 counterclockwise and prevents opening of doors 18. To open the doors 18 the crank mechanism 21 is required to be turned in a clockwise direction.

The doors 18 may be automatically opened during longitudinal movement of the railway vehicle along the tracks by means of a cam follower arm 36 connected to the lower journal shaft of one of the crank mechanisms 21 at the end of the railway vehicle, as shown. The cam follower arm 36 is provided at each of the ends thereof with follower rollers 37 which engage camming means 38 having vertically disposed camming surfaces 130, which are arranged to turn the cam follower arm 36 as the railway vehicle travels along the track and thereby actuates the crank mechanism 21 in the clockwise direction, as viewed in FIG. 1, for opening the door and counterclockwise direction for closing the door. Connecting each of the crank mechanisms 21 for simultaneous movement are connecting straps 39 and 40 which embrace the respective lower throw arms 25 and 27. A more complete description of the automatic door operating arrangement is contained in co-pending U.S. patent application Ser. No. 598,440 assigned to the assignee of the present invention.

As more fully described in the aforesaid application, the camming means 38 mounted on the trackway is operative by rotation of the crank mechanism 21 in a clockwise direction, as viewed in FIG. 1, to open the doors and in a counterclockwise direction to close the doors after the cargo such as coal has been discharged through the hopper opening 19.

Under some circumstances it may be required to open the doors 18 when the railway vehicle 10 is located at a point which does not have the camming means for automatic actuating of the follower arm 36 and crank mechanism 21. To this end there is provided by the present invention a manual means 40a which is actuated manually by an operator for opening and closing the doors 18. As shown in particular in FIGS. 5 through 7, inclusive, the manual operating mechanism 40a includes a sprocket and

chain drive and the stop 34 which is in the form of a rotatable shaft 41, having a camming stop finger 42 fixed thereon. The camming stop finger 42 is engageable with a projection 43 on the upper crank arm 28. The manual operating mechanism 40a also includes a clutch mechanism, as shown in particular in FIGS. 4, 8 and 9, for disconnecting a sprocket drive gear 46 from the stop arrangement 34 and driving the crank mechanism 21 directly, as to be more fully described hereinafter.

The stop mechanism 34 as shown comprises the vertically disposed stop shaft 41 which is turnably mounted at its upper and lower ends in a support strap fixed to the outer face of one of the slope sheets 12 as shown in FIG. 2. Adjacent the upper end, the stop shaft 41 has fixed thereto the camming stop finger 42 having a camming face 48 which engages the projecting end 43 of the crank arm 28 and is operative to rotate the crank mechanism upon turning of the stop shaft 41.

The sprocket chain drive for turning the stop shaft 41 and thereby the stop finger 42, is arranged to transmit adequate force to turn the crank mechanism 21 toward the door opening position against the force exerted by the weight of the cargo on the doors which tends to hold the crank against the stop shaft 41. To this end there is mounted on the end of the center sill 13 a hand wheel 52 fixed to one end of a rotatable shaft 53 having fixed for rotation therewith a sprocket 54 which drives a chain 56 engaging a gear 57 fixed to a second vertical shaft 58, also journaled for rotation on the center sill 13 inboard of the hand wheel 52. At the lower end of the shaft 58 there is fixed a sprocket gear 59 which upon turning drives a chain 60 engaging a fourth sprocket gear 61 fixed to the upper end of a shaft 62 which is journaled on the center sill 13 with the lower end extending into the hollow thereof. The lower end of the shaft 61 has fixed thereto a sprocket gear 63 which drives the drive sprocket 46 disposed within the clutch mechanism 44.

The drive sprocket 46 is journaled for rotation within opening 66 of a support plate 67 fixed across the underside of the center sill 13. A detachable disc plate 70 is attached to a hub 68 and overlies a bearing insert 69 to hold the drive sprocket 46 on the support plate 67.

For opening the doors 18 there is provided an opening clutch member 71 which is formed with a boss 72 having octagonal side face 73 which is seatable within a complementary formed octagonal opening 74 in the drive sprocket 46. The opening clutch member 71 is formed with a substantially rectangular axial opening 76 which fits over a rectangular boss 77 extending upwardly from a sprocket 78. The sprocket 78 is formed with an axial circular opening 79 which receives circular section 80 extending upwardly from the upper crank shaft 29 as shown in FIG. 5. In this manner the sprocket 78 is turnably journaled on the crank shaft 29 of the crank arm 28. At its upper end the crank arm 29 is formed with a length of rectangular section 81 for reasons which will become more apparent hereinafter.

When the opening clutch member 71 is in the position shown in FIG. 8 with the octagonal hub 72 seated within the octagonal opening 74 of the drive sprocket 46, the sprocket 78 is rotated about the circular section of the shaft 29 upon turning of the hand wheel 52. Upon turning of the sprocket 78 a chain 82 engaging a sprocket 83 fixed to the stop shaft 41 is operative to turn the latter. Upon turning of the stop shaft 41 the camming finger 42 engages the projecting end 43 of the crank arm 28 to rotate the latter counterclockwise as viewed in FIG. 5. This causes the crank arm 28 to rotate out of over center relationship and align with the door connecting levers, whereupon further turning tends to open the doors 18. Thereafter, the weight of the cargo being supported by the doors and the weight of the doors, is operative to exert a turning force through the connecting links 32 and 34a causing the crank mechanisms 21 to also turn

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to the position shown in FIG. 3. When the weight of the cargo and doors is operative to rotate the crank mechanisms 21, it is obvious, of course, that the camming stop finger 42 is no longer in engagement with the crank arm 28.

The chain 82 which turns the stop shaft 41 is also operatively associated with an auxiliary lock releasing means 49 which serves to displace the auxiliary locking arrangement 51 out of locking position as more fully to be explained hereinafter.

For closing the doors, the opening clutch member 71 is disengaged from seating engagement within the octagonal opening 74 of the drive sprocket 46 as shown in FIG. 9 by a clutch shifting mechanism 86, more fully to be explained hereinafter. At the same time, a door closing clutch member 87, which is formed with an axial rectangular opening 88 and which is slidable on the rectangular section 81 of the crank shaft 29, is moved downwardly on the shaft 29 so that a hub 89 of the member 87 formed with octagonal sides is seated within the octagonal gear sprocket opening 74.

With the opening clutch member 71 disengaged and the closing clutch member 87 engaged with the drive sprocket 46, the stop shaft 41 is no longer rotated and crank shaft 29 is driven directly. Hence, upon rotation of the sprocket gear train by means of the hand wheel 52 in an opposite direction from that in which the doors are opening, the crank mechanism 21 is also rotated in the opposite direction so as to close the doors.

The clutch shifting mechanism 86 for shifting the opening and closing clutch members 71 and 87, as shown in particular in FIGS. 4 and 6, includes a pair of transversely spaced levers 91—91 which are pivotally attached intermediate the ends thereof to respective pivot brackets 90 fixed to the center sill 13 for rocking movement about a horizontal pivot. At the outboard and inboard ends thereof the levers 91—91 are connected by bars 92 and 93 of which the outboard bar 92 is engageable within one of two notches 94 and 95 of a retaining plate 96. The upper notch 94 serves to hold the levers 91—91 in the position in which the clutch shifting means 86 is operative to hold the closing clutch member 87 out of engagement with the drive sprocket 46.

At the other end, the levers 91 are pivotally connected to one end of downwardly depending levers 97—97 which are connected to longitudinally extending levers 98—98 pivotally mounted on the side webs of the center sill 13 for rocking movement about a horizontal pivot axis. The inboard ends of the levers 98—98 are formed with clevis arms 99—99 which are pivotally connected to a clutch cradle assembly 101.

The clutch cradle assembly 101 includes transversely spaced side plates 102 having downwardly depending channel legs 103 fixed thereto. End plates 104 are fixed to the lower ends of each of the legs 103. Resiliently biased into engagement with the end plates 104 by means of spring pressed yokes 110 are transversely spaced stripper plates 106 and 107 which are interconnected by means of a vertical plate 108. Fixed to the lower stripper plate 106 is an upstanding bar 109 which is spaced at the upper end thereof from the upper stripper plate 107 so as to embrace therewith a flange 110a on the opening clutch member 71. Upon the vertical movement of the cradle assembly by means of movement of the shifting levers 91, 97, and 98, the open clutch member 68 may be selectively engaged or disengaged with the drive sprocket 46 as heretofore described.

Along the two side plates 102 of the cradle assembly 101, adjacent the upper end thereof, there is affixed a pair of longitudinally extending strip fingers 112 which engage the opposite sides of a collar 113 of the closing clutch member 87. The closing clutch member 87 has threaded therein a plurality of vertically disposed screws 114 which are slidably received adjacent the upper ends thereof in a plate 116 extending across the upper end

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of the cradle side plates 102. Disposed between the upper plate 116 and the closing clutch member 87 and embracing the screws 114 are springs 117 which yieldably hold the collar 113 in engagement with the stripper fingers 112.

Upon movement of the lever 91—91 to seat the bar 92 in the lower notch 95, the cradle assembly 101 supporting the stripper fingers or plates 106—107 and 112 is operative to displace the opening clutch member 68 downwardly out of driving engagement with the drive sprocket 46 and at the same time to seat the closing clutch member 87 into engagement with the former as shown in FIG. 9.

As heretofore described, associated with the stop shaft 41 is the auxiliary lock 51 as shown in particular in FIGS. 4, 5 and 7 comprising essentially an arm 120 which is pivotally attached at one end to a downwardly depending bracket 121 affixed to the center sill 13. The other end of the arm 120 is disposed in the path of movement of the follower arm 36 so as to preclude movement in the opposite direction from that of the stop shaft 41. Thus the doors 18 are held in a locked position by means of both the stop shaft 41 and the arm 120 disposed on the opposite side of the follower arm 36.

To release the auxiliary lock 51 the latter must be elevated about the pivot stud 123 to a point disposed above the follower arm 36 and out of the path of turning movement thereof. To this end the inclined cam helical plate 131 of the auxiliary lock means 51 on the shaft 123a engages a lift structure 124 extending from the arm 120 and lifts the latter upwardly about the pivot stud 123 and out of the path of counterclockwise movements of the follower arm 36 when the latter turns.

The stop arm 120 is also intended to be used with the camming track 38 employed to automatically open the doors. As shown in FIG. 5, the camming tracks mounted on the track side are provided with a vertically inclined cam surface 125 which is operative to engage an inclined camming plate 126 mounted on the underside of the arm 120. Thus as the railway vehicle enters the unload zone containing the camming track, the rising cam surface 125 is operative to lift and hold the arm 120 out of the path of the camming arm 36, as the latter is rotated by the vertical camming surfaces as disclosed in the aforementioned co-pending patent application, causing the crank to turn and open the door 18. The rising cam surface 125 of the camming track 38 is arranged to hold the bar 120 out of the path of movement of the follower arm 36 until the doors 18 are again closed.

Assuming now that the doors 18 are closed over the hopper openings 19, the crank mechanisms 21 are disposed in the position shown in FIGS. 1 and 2. In the closed position the crank arm 28 is held against the stop 34 by the weight of the doors 18 and the lading supported thereon, which force is transmitted to the crank mechanisms 21 through the angularly displaced door connecting links 39 and 40.

At the same time the auxiliary lock 51 is in position in the path of movement of the crank follower arm 36 to prevent inadvertent turning of the crank mechanisms 21 to the door open position.

To open the doors manually, the clutch shifting bar 92 is disposed in the notch 94 of the retainer plate 96. In this position of the clutch shifting means 86, the cradle assembly 101 is located so that the opening clutch member 71 is inserted within the opening 74 of the drive sprocket 46 and seated over the hub 77 of the sprocket 78. Hence, upon turning of the hand wheel 52, the sprocket-chain drive including the sprockets 54, chain 56, sprocket 57, sprocket 59, chain 60, sprocket 61, sprocket 63 and chain 64 are operative to turn drive sprocket 46 which then turns the sprocket 78 about the circular section 80 of shaft 29. Upon turning of the sprocket 78, the stop shaft 41 and the lock release shaft 123a of releasing means 49 are rotated by means of the chain 82 meshing with the sprockets 134 and 83 of releasing means.

Upon turning of the stop shaft 41, the stop camming finger 42 engaging the crank arm projection 43 applies a force thereon causing the crank mechanism 21 to be rotated to a position in alignment with the door connecting levers 39 and 40. Thereafter, the weight of the lading and the doors is operatively acting on the crank mechanisms 21 through the links 39 and 40 causing further turning to the door open position.

As the lock release shaft 123 rotates, the auxiliary lock cam helical plate 131 fixed for rotation therewith and engageable with the lift structure or follower plate 132 fixed by bracket 133 to arm 120 is operative to lift and hold the stop bar 120 out of the path of movement of the follower arm 36 to permit the turning of the crank mechanism 21 as described above. It is also to be noted that during automatic opening of the doors 18 by means of the camming face 130 acting on the camming arm 36 to rotate the crank mechanisms 21 as the railway vehicle moves along the tracks, the upper journal shaft 29 rotates within the circular opening of the sprocket hub 77 so that the drive sprocket 46, the stop shaft sprocket 83 and sprocket 134 directly associated therewith remain stationary. In this manner the manual door opening arrangement remains inoperative during automatic opening.

To close the doors 18 manually after manual opening thereof, the clutch shifting means 86 is positioned so that the bar 92 is seated within the retainer plate notch 95. In this position the clutch cradle 101 as shown in FIG. 9 is located so that the stripper fingers 107 and 106 engaging the opening clutch member 71 are operative to displace the latter from engagement with the drive sprocket 46. The fingers 112 engaging the underside of the flange 111 on the closing clutch member 87 are lowered so that the biasing springs 117 press the hub of the former into driving engagement with the drive sprocket 46.

Hence, upon rotation of the hand wheel 52 the sprocket chain drive is operative to turn the drive sprocket 46 and also turn the closing clutch member 87 seated therein. Upon turning of the clutch member 87 which is formed with a rectangular opening 88 disposed on the rectangular section 81 of the crank shaft journal 29, the crank mechanism is simultaneously turned toward the closed position. Such turning is continued until the door connecting levers 39 and 40 assume the over center position and the crank arm 28 abuts the stop shaft 41, to hold the doors 18 in the closed position.

As the crank arms 28 approach the door closed position, the camming finger 42 is engaged thereby so as to turn the stop shaft 41. During turning of the stop shaft 41 the chain 82 is driven whereby the latter is operative to turn the lock release shaft 123. In this manner the camming plate 131 fixed on the shaft 123 and engaging the auxiliary lock camming plate 132 allows the stop bar 120 to pivot about the stud 123 to a position in the horizontal plane of the follower arm 36 thereby to lock the crank mechanisms 21 against further rotation in either direction.

Thereafter, the clutch shifting mechanism is disposed so that the bar 92 thereof is positioned in the notch 94 to shift the clutch members 71 and 87 into the position for manual or automatic opening, as shown in FIG. 8.

I claim:

1. In a railway vehicle having a pair of doors mounted on opposite sides of said vehicle for lateral swinging movement about a horizontal axis between a closed position underlying respective openings in the underside of said vehicle and supporting lading carried in said car and an open position displaced away from said openings, an arrangement for automatically opening and closing the doors in response to the movement of said railway vehicle along the track including crank means for turning movement in opposing relationship, linkage means connecting said crank means to respective ones of said doors, and said crank means including follower means adapted to be actuated by means mounted on the trackway for rotating

said crank means and thereby opening and closing said doors by displacing said crank means between over center position relative to said linkage means corresponding to said door closed position and said door open position, means for manually opening and closing said doors including camming means engageable with said crank means to open the doors when the crank means is in said over center position, manually operable drive means for actuating said camming means to turn said crank out of said over center position whereby the weight of said doors and the lading supported thereon is operative to further rotate said crank means to open said doors.

2. In a railway vehicle having a pair of doors mounted on opposite sides of said vehicle for lateral swinging movement about a horizontal axis between a closed position underlying respective openings in the underside of said vehicle and supporting lading carried in said car and an open position displaced away from said openings, an arrangement for automatically opening and closing the doors in response to the movement of said railway vehicle along the track including crank means for turning movement in opposing relationship, linkage means connecting said crank means to respective ones of said doors, and said crank means including follower means adapted to be actuated by means mounted on the trackway for rotating said crank means and thereby opening and closing said doors by displacing said crank means between over center position relative to said linkage means corresponding to said door closed position and said door open position, means for manually opening and closing said doors including camming means engageable with said crank means to open the doors when the crank means is in said over center position, manually operable drive means for opening and closing said door means, clutch means for selectively operatively connecting said drive means to said camming means for opening said doors and to said crank means for closing said doors, said camming means when driven by said driving means being operative to turn said crank means out of said over center position whereby the weight of said doors and the lading supported thereon is operative to further rotate said crank means and open said doors.

3. The invention as defined in claim 2 wherein said camming means is a stop against which said crank means abuts in said over center position.

4. The invention as defined in claim 2 wherein said drive means includes a chain and sprocket drive.

5. The invention as defined in claim 4 wherein said chain and sprocket drive includes a drive sprocket mounted on the axis of rotation of said crank means, and said clutch means includes first means for selectively disengaging said drive means from driving engagement with said crank means and connecting said drive means with said crank shaft means and disconnecting said drive means from said camming means.

6. The invention as defined in claim 2 wherein said camming means is a rotary stop against which said crank means abuts in said over center position.

7. The invention as defined in claim 6 wherein an auxiliary stop is mounted on said car for movement between a position opposing movement of said crank means away from said rotary stop and a position clear of said crank means, and wherein said drive means includes means for moving said auxiliary stop to said clear position simultaneously with the turning of said rotary stop to move said crank means from said over center position.

8. In an arrangement for automatically opening and closing the doors on a railway vehicle as said railway vehicle moves along the track, said arrangement including crank means having a pair of oppositely disposed crank arm means mounted for turning movement in opposing relationship, linkage means connecting respective ones of said crank arm means to respective ones of said doors, and said crank means having follower means adapted to be actuated by means mounted on the trackway side for

rotating said crank arm means and thereby opening and closing said doors by displacing said crank arm means between an over center position relative to said linkage means corresponding to a door closed position and to a door open position, an auxiliary lock disposed on one side of said crank means opposing movement of said crank arm means from said over center position, said auxiliary lock being mounted on said railway car for movement between a position lying in the path of movement of said crank means and a position clear thereof so that said crank arm means is free to turn said door to said open position, and auxiliary cam means on said auxiliary lock engageable with trackside mounted means for moving said auxiliary lock to said clear position.

9. The invention as defined in claim 8 wherein said auxiliary cam means includes a follower adapted to be engaged by said trackside located camming means.

10. The invention as defined in claim 8 wherein there is provided manually movable means for moving said auxiliary lock to said clear position, said manually movable means including a drive means, a turnable camming means driven by said drive means, and cam follower means on said auxiliary lock engageable with said driven camming means operative to move said auxiliary lock to said clear position.

11. The invention as set forth in claim 8 wherein said auxiliary lock extends longitudinally of said railway vehicle and is mounted at one end for pivotal movement in a vertical plane so that the remaining end is movable between said position lying in the path of movement of said crank means and said position clear thereof.

12. Door operating mechanism for a vehicle discharge means having doors movable from a closed position to an open position for discharging a load outward of the vehicle, comprising:

a door operating crank mechanism,
linkage connecting said crank mechanism with said doors,

said crank mechanism including follower means adapted to be actuated by means mounted on the trackway for rotating the crank mechanism and thereby opening and closing the doors by displacing the crank mechanism past over center relative to the linkage for the door open and closed positions,

stop means releasibly engaging the crank mechanism and limiting movement of the crank mechanism when placed over center into the closed position, and operating means for moving said stop means in engagement against said crank mechanism for moving the crank mechanism past over center relative to the linkage to open the doors whereby the weight of the doors is operative to further move said crank mechanism.

13. The invention according to claim 12, and said crank mechanism being provided with a crank arm means having a cam engaging portion, and said stop means including a rotatable cam adapted for engagement with said cam engaging portion for swinging said crank arm means over center relative to the linkage attendant to opening said doors.

14. The invention according to claim 12, and said stop means including a rotatable cam adapted for engagement with said crank mechanism for moving the latter past over center relative to the linkage.

15. The invention according to claim 12, and said stop means including a stop member limiting movement of the crank mechanism in the direction of the door closed position when said crank mechanism is over center with respect to said linkage.

16. The invention according to claim 12, and said operating means including a manually operable member,

a drive means operated by the manually operable member and operatively connected with said stop means for operating the same, and

said stop means including a rotatable cam adapted for engagement with said crank mechanism for moving the latter past over center relative to the linkage.

17. The invention according to claim 12, and said operating means including clutch means for driving the stop means or for selectively driving the crank mechanism against the stop means to move the crank mechanism to the closed door position.

18. The invention according to claim 12, and lock means engageable with the crank mechanism and limiting movement of the crank mechanism in a direction opposite to the direction that the stop means is limiting movement of the crank mechanism.

19. The invention according to claim 18, and said operating means including drive means cooperative with the lock means for simultaneously moving the lock means out of the way of the crank mechanism as the stop means is moving the crank mechanism past over center position.

20. The invention according to claim 12, and said operating means including a manually operable member, and

a drive means operated by the manually operable member and operatively connected with said stop means for operating the same.

21. The invention according to claim 20, and a clutch mechanism including a door opening clutch and a door closing clutch,

said drive means including a drive element selectively engageable with said door opening clutch and said door closing clutch, and clutch shifter means for shifting said door opening clutch and door closing clutch in alternate engagement with said drive element for selectively opening or closing said doors.

22. The invention according to claim 20, and an auxiliary lock including a pivotally mounted stop arm swingable from a first position preventing movement of said crank mechanism to a second position permitting movement of said crank mechanism, auxiliary lock releasing means being operatively connected with said drive means and including a lock releasing element operatively connected with said stop arm for moving same in and out of the way of movement of said crank mechanism.

23. The invention according to claim 12, and said operating means comprising a manual drive means including a drive element,

a clutch mechanism including a door opening clutch member and a door closing clutch member and a clutch shifter for selectively and alternately connecting the door opening clutch member and the door closing clutch member with the drive element, said door opening clutch member being operatively connected with said stop means for opening of said doors, and

said door closing clutch member being operatively connected with said crank mechanism for movement thereof for closing of said doors.

24. The invention according to claim 23, and said crank mechanism having a throw arm selectively engageable with said door closing clutch member attendant to closing the doors of the vehicle.

25. The invention according to claim 23, and said crank mechanism having a throw arm and said drive element and said opening clutch member each being freely rotative about the throw arm.

26. The invention according to claim 23, and the door closing clutch member driving the crank mechanism in a rotating path to the door closing position past over center with respect to said linkage.

27. The invention according to claim 23, and the door opening and closing members each being biased with respect to the drive element when moved by the shifter.

28. The invention according to claim 23, and said drive element being a gear means.

29. Door operating mechanism for a vehicle discharge means having doors movable from a closed position to an open position for discharging a load outward of the vehicle, comprising:

- a door operating crank mechanism,
- linkage connecting said crank mechanism with said doors,
- said crank mechanism including follower means adapted to be actuated by means mounted on the trackway for rotating the crank mechanism and thereby opening and closing the doors by displacing the crank mechanism past over center relative to the linkage for the door open and closed positions,
- movable means engaging the crank mechanism and limiting movement of the crank mechanism when placed over center into the closed position, and
- operating means for moving said movable means in engagement against said crank mechanism for moving the crank mechanism past over center relative to the linkage whereby the weight of the doors is operative to further move said crank mechanism to place the doors in the open position,
- and said operating means comprising a manual drive means including a drive element,
- a clutch mechanism including a door opening clutch member and a door closing clutch member and a clutch shifter for selectively and alternatively connecting the door opening clutch member and the door closing clutch member with the drive element,
- said door opening clutch member being operatively connected with said movable means for opening of said doors, and
- said door closing clutch member being operatively connected with said crank mechanism for movement thereof for closing of said doors, and
- an auxiliary lock operatively connected with the movable means, and
- the closing clutch member rotating the crank mechanism to engage and rotate the movable means to move the auxiliary lock into the crank mechanism locking position.

30. Door operating mechanism for a vehicle discharge means having doors movable from a closed position to an open position for discharging a load outward of the vehicle, comprising:

- a door operating crank mechanism,
- linkage connecting said crank mechanism with said doors,
- said crank mechanism including follower means adapted to be actuated by means mounted on the trackway for rotating the crank mechanism and thereby opening and closing the doors by displacing the crank mechanism past over center relative to the linkage for the door open and closed positions,
- movable means engaging the crank mechanism and limiting movement of the crank mechanism when placed over the center into the closed position, and
- operating means for moving said movable means in engagement against said crank mechanism when placed over center into the closed position, and
- operating means for moving said movable means in engagement against said crank mechanism for moving the crank mechanism past over center relative to the linkage whereby the weight of the doors is op-

erative to further move said crank mechanism to place the doors in the open position, and said operating means comprising a manual drive means including a drive element,

- a clutch mechanism including a door opening clutch member and a door closing clutch member and a clutch shifter for selectively and alternately connecting the door opening clutch member and the door closing clutch member with the drive element,
- said door opening clutch member being operatively connected with said movable means for opening of said doors, and
- said door closing clutch member being operatively connected with said crank mechanism for movement thereof for closing of said doors, and
- an auxiliary lock movable in and out of moving obstructing relation with respect to said crank mechanism, and
- an auxiliary lock releasing means operatively connected with said door opening clutch member and operatively engageable with said auxiliary lock and driven by said drive element to move said auxiliary lock out of obstructing relation with said crank mechanism.

31. The invention according to claim 30, and said stop means including an over center stop on one side of the crank mechanism, and said auxiliary lock being a second stop on the other side of the crank mechanism for limiting rotary movement of the crank mechanism in either direction when the doors are in the closed position.

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