Aug. 11, 1931. A. CAMPBELL 1,818,689

LOAD DISCHARGING CAR DOOR MECHANISM

Filed April 19, 1928 3 Sheets-Sheet 1

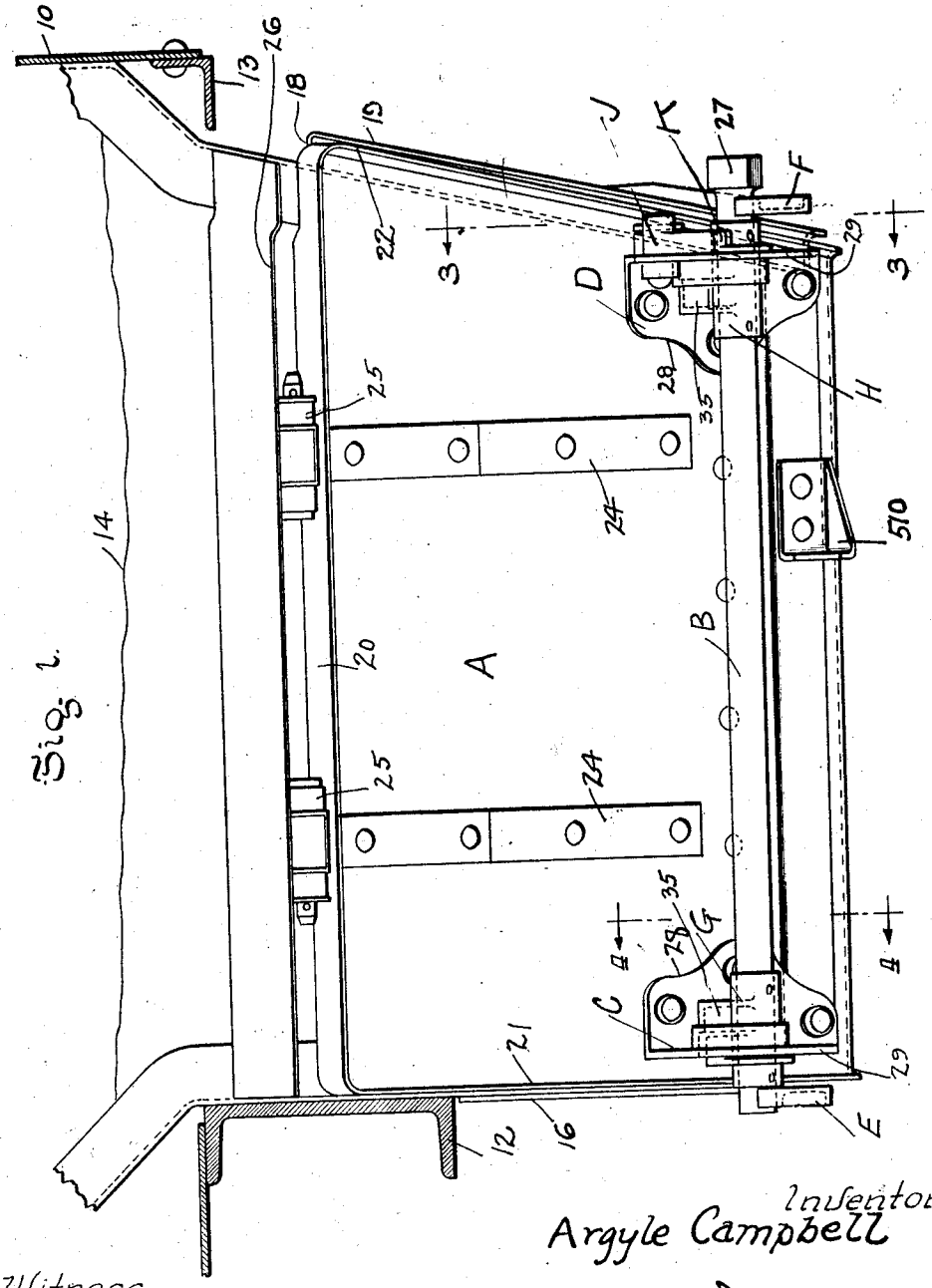


Fig. 1.

Witness
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LOAD DISCHARGING CAR DOOR MECHANISM

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Fig. 2

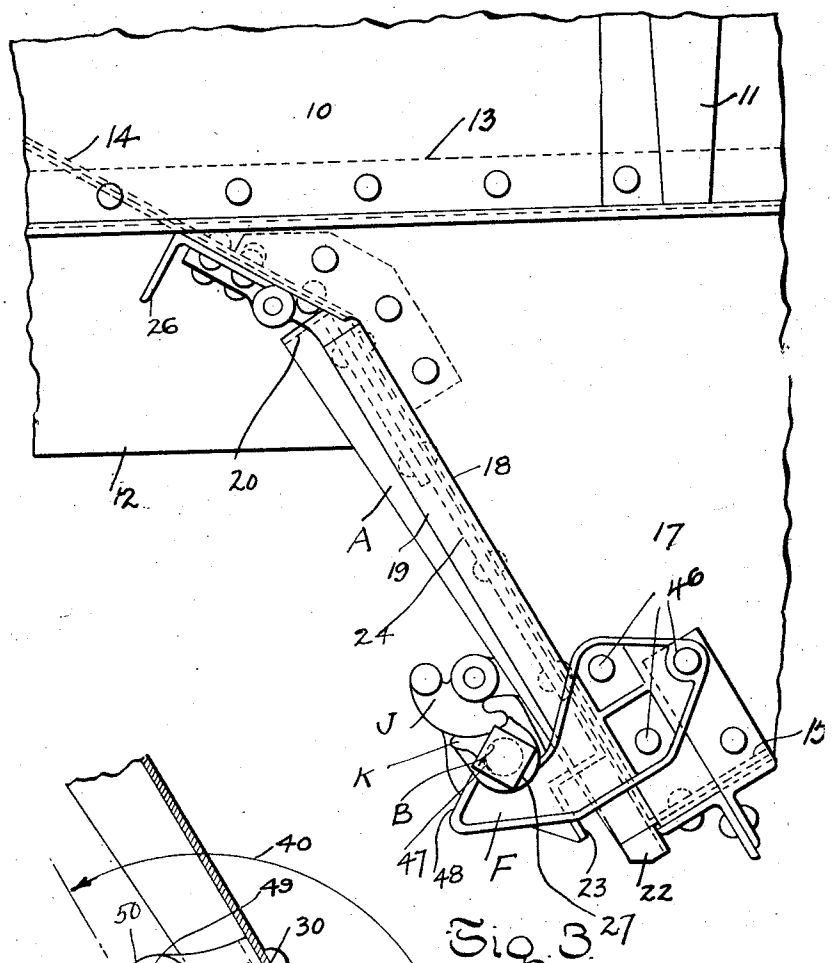
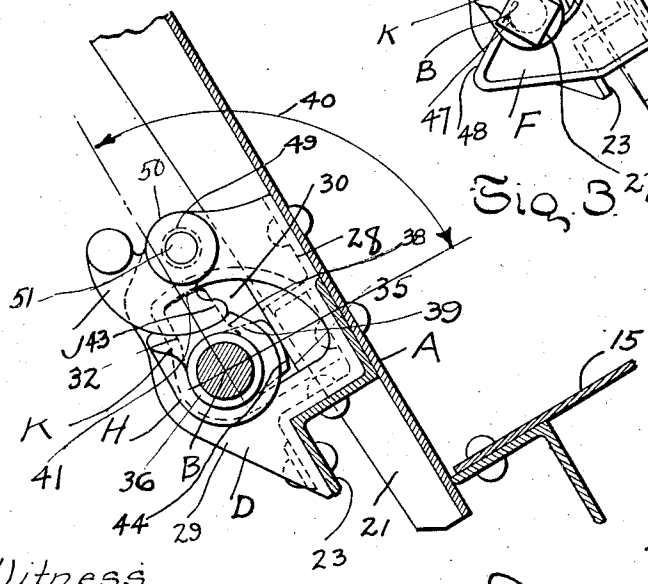


Fig. 3



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Fig. 4.

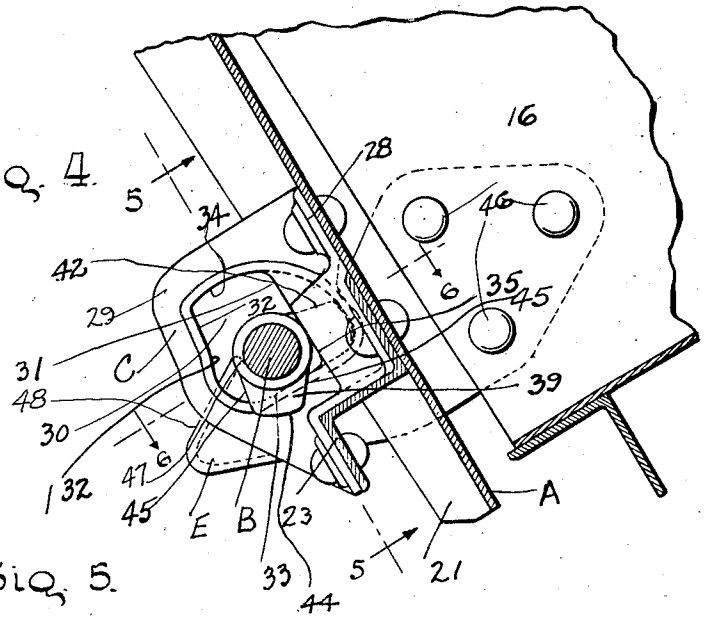


Fig. 5.

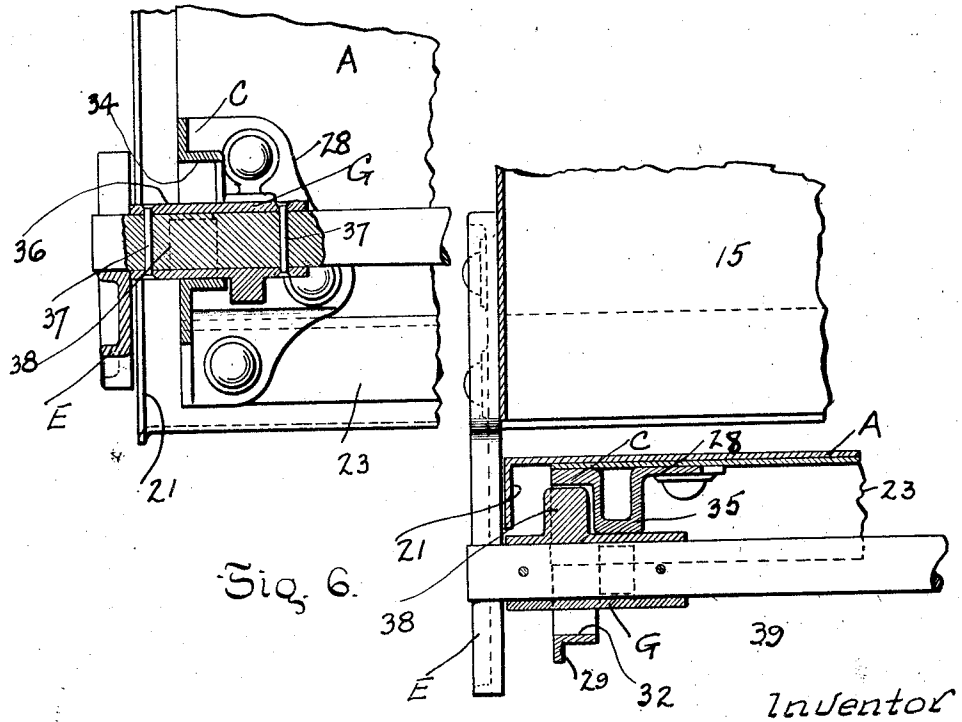


Fig. 6.

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UNITED STATES PATENT OFFICE

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LOAD DISCHARGING CAR DOOR MECHANISM

Application filed April 19, 1928. Serial No. 271,146.

This invention relates to improvements in load discharging car door mechanisms.

One object of the invention is to provide in a dump car efficient and relatively inexpensive means which will operate to lock a discharge door at a plurality of locations from a central location.

A particular object of the invention is the provision of a door locking shaft carried by a dumping door in such a manner that it will automatically engage with shouldered locking members on the car structure when the door is moved to closed position.

Still another object of the invention is to provide means whereby a door locking shaft carried by a discharge door will operate to lock a door in a partially closed or fully closed position.

Further my invention resides in certain other features and details of construction such as will be hereinafter more fully pointed out and claimed.

In the drawings forming a part of this specification, Figure 1 is a transverse sectional view of slightly more than one-half of a dump car of the so-called W-type, showing in elevation my improvements in connection therewith. Figure 2 is a side elevational view of a portion of the car as shown in Figure 1. Figure 3 is a fractional sectional and elevational view taken through the lower portion of the door and on a line corresponding substantially to the line 3—3 of Figure 1. Figure 4 is a fractional sectional and elevational view taken through the door and on a line corresponding substantially to the line 4—4 of Figure 1, said sectional view illustrating the door in a partially open position. Figure 5 is a fractional sectional view taken through the door on a line corresponding substantially to the line 5—5 of Figure 4. And Figure 6 is a fractional sectional view taken through the door on a line corresponding substantially to the line 6—6 of Figure 4.

As shown in the drawings 10 denotes one of the side walls of the car, 11 one of the side stakes, 12 one of the channels employed to make up the girder centersill of well-known form, and 13 a longitudinally extending reinforcing angle member for the side wall 10 of the car.

As customary in the W-type of car a transversely extending ridge is formed by the ridge sheet 14, it being understood that there are a plurality of hoppers in the car, two on each side of the centersill and hinged in pairs transversely of the car. Each of said hoppers is defined by a longitudinal sloping hopper sheet 15, a vertical inner side hopper sheet 16 and an outside hopper sheet 17, the latter sloping inwardly towards the longitudinal center line of the car and having its margin bent outwardly as indicated at 18 and thence substantially in the general direction of the main plate as indicated at 19, said bend 18 providing an abutment for the door.

Each discharge opening in the bottom of the car shown in the drawings is adapted to be closed by a sheet metal door A which is preferably flanged at its margins so as to provide a top horizontally extending flange 20, inner side flanges 21 and outer side flange 22, and adjacent the free edge of the door there is provided a reinforcing beam 23 which is preferably in the form of a Z, and spaced a limited distance from the free edge of the door, said flanges 20, 21 and 22 being pressed outwardly in the same general direction from the main plane of the door. The door A is pivotally attached by suitable hinge braces 24 to hinge brackets 25 carried by the lower edge of the transversely extending ridge sheet 14, the latter being suitably reinforced by means of an angle member 26. The hinge braces 24 may consist of heavy strap members which extend from the hinge end of the door for a considerable distance towards the free edge thereof.

The door operating mechanism broadly includes a bodily movable shaft B loosely mounted in bearings C and D, the latter being rigidly secured to the door, and the shaft B projects beyond the respective ends of the door and cooperates with shouldered brackets E and F. Rigidly mounted on the shaft B on adjacent ends of the door are shaft actuating elements G and H, which co-operate with the respective bearings C and D in a manner to be hereinafter described. The

bearings C and D and shaft actuating elements G and H on the respective ends of the door, as will be noted, face in opposite directions but are otherwise similar in general formation, except that the respective members D and H on the outer end of the door have associated therewith a locking cam J and a lug K for the purpose of holding the shaft against movement when the mechanism is in locked position; similar reference characters will be utilized to designate like parts of the two constructions.

The shaft B, which is preferably of circular section, extends outwardly beyond the side flanges 21 and 22 of the door, and is preferably formed adjacent its outer end with a squared section 27, whereby the shaft may be engaged by a suitable operating tool for the purpose of rotating and actuating the shaft.

The bearings C and D within which the shaft is mounted are each formed with a base portion 28 rigidly secured to the door plate proper and to the door beam 23, and outstanding from said base portion is a main web portion 29 having a perforation or slot 30 formed therein. Each of said perforations 30 is of generally elongated form to permit of movement of the shaft B in a substantially vertical direction and is also of sufficient width to permit of lateral movement. The inner wall 31 of said perforation is disposed substantially parallel with the main plane of the door, and the outer wall 32 of said slot is deflected inwardly as at 132 for the purpose of providing a perforation of restricted size adjacent the upper portion thereof, so that when the shaft is moved upwardly in the slot it will also be moved inwardly towards the door.

The lower and upper walls of the slot 30 which are indicated at 33 and 34 respectively, are extended beyond the inner wall 31 of the slot, and together with the outer wall 32 form a continuous rim which provides a box-shaped bearing, the upper wall 34 being of arcuate shape and subtending the angle formed by the angularly related walls 32 and 33. To one side of the said box bearing and preferably substantially in alignment with the inner wall 31 of the perforation there is disposed a door supporting seat 35, which is adapted to register with the associated door actuating element as will be hereinafter described.

The shaft actuating elements G and H being of the same general construction with the exception of the lug K added to the member H, the description will be confined to one member only. Each element includes a hub portion 36 extending lengthwise of the shaft and fixedly united therewith by means of a plurality of rivets 37. Formed integrally with the said hub portion 36 and spaced from each other lengthwise of the shaft are an operating arm as indicated at 38 and 39 respectively, said respective arms being also disposed in different angular relation from each other, as indicated by the angle 40 which extends through slightly more than 90 degrees. The door operating arm 38 is disposed in alinement with the arcuate rim 34 of the associated bracket and is preferably formed on its outer end with a rim 41 of arcuate shape preferably concentric with the axis of the shaft B.

The opposite sides 42 and 43 of the arm present faces which are respectively adapted to engage with the angularly related walls 32 and 33 for the purpose of limiting the turning movement of the shaft. The door supporting arm 39 is disposed in alignment with the door seat 35 and is formed with a curved rim 44, the latter being disposed at a greater distance from the axis of the shaft than the periphery of the hub and united therewith by substantially straight side portions 45—45 which extend tangentially to said hub.

The shouldered brackets E and F which respectively engage with the projecting ends of the shaft are preferably firmly riveted to their associated hopper sheets as indicated at 46. Each of said brackets includes a locking shoulder 47 and a bevelled approach 48 leading thereto. Said bevelled approach 48 is adapted to engage beneath the shaft B as the door is slammed to closed position, and to lift said shaft in the slotted bearings a sufficient distance to allow the same to drop into engaging position behind the shoulders 47, in the manner of a latch, it being understood that owing to the substantially vertical position of the door, the shaft will normally gravitate to the lower portion of the slots.

Any suitable means may be employed for locking the shaft against rotation and against bodily movement but the preferred manner is to mount a cam J on a bushing 49 formed integrally with the outer of the bearings 28 as shown, said cam being adapted to register with a projection K fixed relatively to the shaft.

The cam is adapted to be retained in operative position by a washer 50 and rivet 51. Endwise movement of the shaft is prevented due to the fact that the respective actuating elements and their associated bearings on the opposite ends of the door face in opposite directions.

The operation of the device is as follows: Assuming the doors to be locked and closed as indicated in Figs. 1, 2 and 3, the operator first disengages the cam J from its engagement with the associated lug K and moves said cam to an overbalanced position into engagement with the web 29. A suitable operating tool or wrench is then applied to the squared end 27 of the shaft B and the shaft rotated in a clockwise direction through an

arc of approximately 90 degrees, until such time as the face 43 comes into contact with the lower wall 33 of the box bearing. During said rotation of the shaft the door supporting arm 39 is moved downwardly and the curved rim 44 moved away from its engagement with the associated seat 35 on the door, which operation results in the door opening to the position in Figure 4, when the door is then supported directly by the periphery of the hub portion 36. Further continued rotation of the shaft B in the indicated direction causes the face 43 of the operating arm 38 to bear on the lower wall or abutment 33 when the said arm 38 acts as a cog about which the shaft B fulcrums, and it is then moved bodily to the upper portion of the slot and free of the shoulders 47 on the respective brackets E and F, and the door will open of its own weight, the shaft meanwhile gravitating to its normal position in the lower portion of the bearings.

The closing operation of the door is as follows: The operator swings the door towards closed position in any suitable manner, but preferably by applying a pole in a push pole pocket, as indicated at 510 in Figure 1. As the door is moved towards closed position the shaft rides on the bevel approach 48 of the respective keepers and is caused to move upwardly in the slots 30, the two ends of the shaft being lifted simultaneously. As the shaft is moved upwardly in the slots it is also caused to move inwardly towards the door due to the inwardly deflected portion 132 of the outer wall 32. The shaft then drops behind the respective shoulders 47 of the brackets to the position indicated in Figure 4, and the door is then supported in a partially closed position on the periphery of the hub 36. The operator then rotates the shaft in a counter-clockwise direction, the shaft rotating in its bearings on the shouldered brackets, and the door is moved from a partially closed to a fully closed position by reason of the fact that the main supporting seat 44 on the arm 39 is disposed at a greater distance from the axis of rotation of the shaft than the preliminary supporting surface 36. During such rotation of the shaft the rim 41 of the door operating arm 38 moves substantially concentrically with the inner surface 34 of the bearing, and thus restrains the shaft against displacement relatively to the keepers. The rotation of the shaft is continued until such time as the surface 42 on the shaft operating arm is in contact with the outer wall 32 of the box bearing. Thereafter the operator throws the locking dog J in engagement with the projection K, and the shaft is securely locked against displacement.

This arrangement of thus fulcruming the bodily movable shaft on a fixed abutment on the car structure, and wedging the door from one position to the other by a rotary movement of the shaft provides for greatly multiplied leverage, is conducive to speed and ease of operation and provides the necessary multiplied power for compensating for irregularities in manufacture or warped doors.

While I have herein shown and described what I now consider the preferred manner of carrying out my invention, the same is merely illustrative and I contemplate all changes and modifications which come within the scope of the claims appended hereto.

I claim:—

1. In a railway car, the combination with the body of a discharge door; a shouldered locking keeper carried by the car structure; a bodily displaceable shaft carried by and rotatable in means on said door providing slots, said shaft being adapted to normally gravitate bodily to a position in the lower portion of said slots when said door is open; means associated with the keeper for displacing said shaft from its normal position in the slots, said means including a bevel runway formed on the keeper and normally disposed in the path of the shaft as the door is moved to closed position, and means actuated by the rotation of said shaft for locking the door in closed position.

2. In a railway car, the combination with a dumping door; of a keeper fixedly mounted upon the car structure, said keeper having a locking shoulder; a locking shaft carried by said door, said shaft being rotatable and having a bodily movement of translation and being automatically engageable with said locking shoulder when said door is closed; and means for locking the shaft against bodily movement.

3. In a railway car, the combination with a body member; of a dumping door member; a keeper carried by one of said members; a shaft carried by the other of said members, said shaft being adapted to have a bodily movement of translation relatively to its associated member, whereby the door may be locked relatively to the keeper in a partially closed or a fully closed position, said shaft being automatically engageable with said keeper to lock the door in partially closed position; and means for moving the door from one position to the other by rotation of said shaft.

4. In a railway car, the combination with a discharge opening; of a door adapted to close said opening; a shouldered keeper mounted on the car structure; a bodily translatable shaft mounted upon the door, said shaft being engageable with the shoulder on the keeper and formed with door engaging seats disposed at varying distances from its axis of rotation whereby the shaft will maintain the door in a partially or fully closed position.

5. In a railway car, the combination with a discharge door; of a shouldered keeper, a

loosely mounted locking element carried by the door and engageable with the keeper, said locking element being adapted to have a movement of translation along the face of the keeper and also in the direction of movement of the door, said locking element being adapted to maintain the door in a partially closed position upon first engaging with the keeper; and a projection fixedly mounted upon the locking element, said projection being adapted to assume a position between the locking element and the door to lock the door in fully closed position.

6. In a railway car, the combination with the body of the car; of a door mounted thereon for swinging movement; a keeper carried by the car body; a bodily movable and displaceable shaft carried by the door, said shaft being displaceable for a limited distance in the direction of movement of the door and also at an angle to the direction of movement of the door and being automatically engageable with said keeper when the door is closed, and means adapted to assume a position between the shaft and the door for the purpose of restricting movement of the shaft in the direction of movement of the door.

7. In a railway car, the combination with the body and a dumping door normally urged to open position under the influence of gravity; of a shouldered keeper carried by the body; slotted brackets carried by the door; a shaft extending within said slotted brackets, said shaft being movable with reference to said door and automatically movable into locking engagement with the shouldered keeper when said door is closed; and means actuated by movement of the shaft for effecting the movement of the shaft in the slotted brackets.

8. In a railway car, the combination with the body thereof; of a discharge door; shouldered keepers disposed at the respective ends of the door; a locking shaft movably carried by the door, said shaft having extensions projecting beyond the ends of the door, said extensions being automatically engageable with the shoulders on the keepers when said door is moved to closed position; and means actuated by movement of the shaft adapted to block the movement of the shaft relatively to the door, said means including a fixed element carried by the shaft and adapted to assume a position intermediate the shaft and an abutment on the door.

9. In a railway car, the combination with a body and a discharging door; of a locking shaft adapted to have a bodily movement of translation in the path of movement of the door and at an angle thereto; a shouldered locking keeper adapted to engage with said shaft to maintain the door in closed position, said shaft being mounted to gravitate into a locking position with reference to said keeper when said door is closed; and means actuated by movement of said shaft adapted to restrain movement of the shaft relatively to the keeper and door, said means including projecting portions fixed relatively to the shaft and adapted to simultaneously assume positions intermediate the shaft and portions of the door thereby providing blocking means in the respective paths of movement of said shaft.

10. In a railway car door, the combination with a locking shaft carried by the door and adapted to have bodily movement with respect thereto; of a keeper carried by the car structure and adapted to cooperate with the said element for locking the door in a partially or fully closed position, said shaft being automatically engageable with said keeper during closing movement of said door, and means for inducing movement between the door and the car body by rotation of the shaft, said means including a projection on the shaft adapted to engage with a seating element on the door, and means for confining the shaft against bodily movement during the rotation of the shaft for effecting movement of the door from a partially to a fully closed position.

11. In a railway car, the combination with a discharge door and a shouldered keeper; of a shaft carried by the door, said shaft having fixedly mounted thereon an operating arm and a door raising arm, said arms being disposed in different angular relations relatively to the axis of the shaft and spaced from each other lengthwise of the shaft; abutments on the door cooperable with the opposite sides of the operating arm, one of said abutments being for the purpose of limiting turning movement of the shaft in one direction and the other of said abutments being for the purpose of engaging with the operating arm for initiating bodily movement of the shaft when rotated in the opposite direction; and means acting upon the outer end of said operating arm for restraining bodily movement of the shaft when rotated in one direction.

12. In a railway car, the combination with the body thereof and a discharge door; of a shouldered keeper carried by one of the parts; a bodily movable and rotatable shaft carried by the other of said parts and automatically engageable with said keeper during closing movement of said door, said locking shaft having an arm fixed relatively thereto adapted to engage with the door for the purpose of initiating relative movement between the keeper and the door.

13. In a railway car, the combination with the body of the car; of a door mounted thereon for swinging movement; a shouldered locking member mounted upon the car structure; a rotatable and bodily movable shaft mounted upon the door; slotted brackets mounted upon the door and forming guides for the shaft, each said bracket including an

elongated slot, said slots being formed to provide for bodily movement of the shaft in a plane substantially normal to the door and also in a substantially parallel plane with respect to said door; a plurality of projections carried by the shaft, one of said projections being adapted to engage behind the door to maintain the same in locked position and another of said projections being adapted to engage with a guiding track on the bracket for the purpose of confining the shaft in fixed relation to the bracket during the rotary movement of the shaft, said last named projection being also adapted to engage with a fixed abutment to displace the shaft from its engagement with the shouldered bracket, said projections on the respective ends of the door being disposed on opposite sides of the slots whereby the shaft is maintained against endwise movement.

14. In a railway car, the combination with the body thereof and a discharge door; of a shouldered keeper carried by one of the parts; a bodily movable and rotatable shaft carried by the other of said parts, said locking shaft having a plurality of projecting arms in fixed relation to said shaft and disposed in different angular relations relatively to the axis of the shaft, said arms being spaced from each other lengthwise of the shaft; one of said arms operating as an actuating element for the locking shaft and the other of said arms acting as a door raising means; slotted brackets within which the said locking shaft is mounted, one of said brackets having a box bearing presenting a continuous rim disposed in the plane of and enclosing the operating arm, the contour of said rim being defined by two angularly related walls and an arcuate shaped wall subtending said angularly related walls, said respective angularly disposed walls presenting abutments to respectively engage on opposite sides of the operating arm for limiting the turning movement of the locking element, and said arcuate shaped wall being adapted to act upon the outer end of the arm for the purpose of restraining the locking shaft against bodily movement relatively to the keeper during engagement of the door raising arm with the door.

15. In a railway car door locking device, the combination with a discharge door; of a shouldered keeper mounted upon the car structure; a door locking shaft mounted on the door adapted to normally assume a locking position with respect to the door; means associated with the keeper for displacing the shaft from its locking position as the door is moved toward closed position, said shaft being also adapted to have a limited degree of bodily movement in the direction of movement of the door, said shaft being adapted to maintain the door in a partially closed position upon first engaging with the keeper; and means associated with the shaft and door for inducing relative movement between the door and shaft for the purpose of forcing the door to a fully closed position by rotation of the shaft..

16. In a railway car, the combination with a body and dumping door; of a shaft mounted upon the door; a shouldered keeper mounted upon the car structure, said shoulder on the keeper being adapted for engagement with said shaft for maintaining the door in closed position; guides upon the door within which said shaft is mounted, said guides having slots formed therein to permit of movement of the shaft in vertical and horizontal directions; means associated with said guide and shaft for confining the movement of the shaft in the slots against lateral movement during a partial revolution of the shaft; and means associated with said door and shaft for displacing the shaft from its locked position, said means including an abutment carried by the door and an arm mounted on the shaft, said arm having one side thereof engageable with the abutment.

17. In a railway car, the combination with a car body member and a dump door member; of keeper means carried by one of said members; a translatable operating shaft carried by the other of said members and automatically engageable in the manner of a latch with said keeper means when said door is closed; and means on said shaft for moving the latter with reference to the member carrying the same when the shaft is rotated.

18. In a railway car, the combination with a car body member and a dump door member; of keeper means carried by one of said members; a translatable shaft carried by the other of said members and automatically engageable in the manner of a latch with said keeper means when said door is closed; and means for locking and shifting said shaft with reference to said keeper means through rotation of said shaft.

19. In a railway car, the combination with a car body; of a swinging door therefor; keeper means on said car body; a bodily shiftable rotatable shaft carried by said door and automatically engageable with said keeper in the manner of a latch when the door is moved to closed position, said shaft being movable to a plurality of operative positions with reference to said keeper means so as to release said door, hold the same partially closed or completely closed; and means cooperating with said shaft and actuated by rotation thereof to effect shifting of said shaft to any of said operative positions.

20. In a railway car door locking device, the combination with a car body member and a dump door member; of keeper means carried by one of said members; a translatable shaft carried by the other of said members and automatically engageable in the manner

of a latch with said keeper means to maintain the door in a preliminary partly closed position; and means for moving the door to final closed position by the rotation of the shaft, about its axis.

21. In a railway car door locking device, the combination with a car body member and a dump door member; of shouldered keeper means carried by the car body; a translatable shaft carried by the door, said shaft being automatically engageable in the manner of a latch with said shouldered keeper means when said door is closed; means for translating the shaft by rotation thereof; and means for maintaining said shaft against rotation and translatory movement.

22. In a car having a discharge opening and a pivoted door flanged along one of its edges, the combination of a shouldered bracket member secured to a fixed part of the car adjacent said discharge opening; of a bodily movable and rotatable latch member located outwardly beyond the door flange and projecting beyond said flange to engage with the shoulder on the bracket to thereby maintain the door in closed position.

23. In car construction having a discharge opening, the combination with a door having a reinforcing beam member secured to the underside of the door; of a slotted bracket secured to the beam member; a bodily movable and rotatable latch member mounted in said slotted bracket; interengaging means between the latch member and the bracket for imparting bodily movement to the latch member by rotation thereof; and shouldered means on a fixed part of the car adapted to cooperate with the latch member to maintain the door in closed position, said latch member being automatically engageable in the manner of a latch with said shouldered means.

24. In a railway car, the combination with a discharge hopper including spaced walls defining the side walls of the hopper and a door disposed intermediate said walls; of a reinforcing beam disposed on the door adjacent the free edge of the door, said beam being of Z-shape with one flange lying against the door and having the other flange spaced from the door, slotted brackets carried by the beam, each said bracket being secured to the respective flanges; a latch member bodily movable in the brackets and having portions projecting beyond the hopper side walls; and shouldered keepers carried by the hopper side walls and adapted to engage the projecting portions of the latch member.

25. In a railway car, the combination with a discharge hopper including spaced walls defining the side walls of the hopper and a door disposed intermediate said walls; a stiffening beam of Z-shape extending along the free edge of the door and terminating adjacent the hopper side walls, said Z-shape having one flange secured to the underside of the door and having the web thereof substantially normal to the plane of the door; slotted brackets secured to the web of the Z-shape member and to the flanges thereof; a bodily movable latch member extending through the slotted brackets; and shouldered keepers carried by the hopper side walls adapted to engage the latch member to maintain the door in closed position.

26. In a railway car door locking device, the combination of a car body, a dumping door mounted on said car body; shouldered means carried by the car body adjacent an edge of the door; a bodily movable and rotatable latch member carried by the door and projecting beyond an edge of the door to automatically engage with the shouldered means, said latch member being spaced appreciably from the main body of the door; a spacer disposed on the door between the latch member and body of the door, said spacer having a runway on which the latch member is adapted to move; and integral abutment means on the spacer adapted to cooperate with the latch member to move the latter by rotation thereof.

27. In a railway car door locking device, the combination of a car body; a dumping door mounted on said car body; shouldered means carried by the car body adjacent an edge of the door; a bodily movable and rotatable latch member carried by the door and projecting beyond an edge of the main body of the door and adapted to automatically engage with the shouldered means on the latch member extending outwardly from its axis of rotation and adapted to seat in the space between the latch member and the body of the door; and abutment means carried by the door and adapted to cooperate with the means on the latch member for the purpose of inducing bodily movement of the latch member when rotated, said abutment means being disposed in the space between the latch member and the body of the door.

In witness that I claim the foregoing I have hereunto subscribed my name this 16th day of April, 1928.

ARGYLE CAMPBELL.