Jan. 20, 1959 W. F. BATHO 2,869,480

OPERATING MECHANISM FOR CLOSURE MEMBER OF A DISCHARGE CUTLET ASSEMBLY

Original Filed March 20, 1950 3 Sheets-Sheet 1

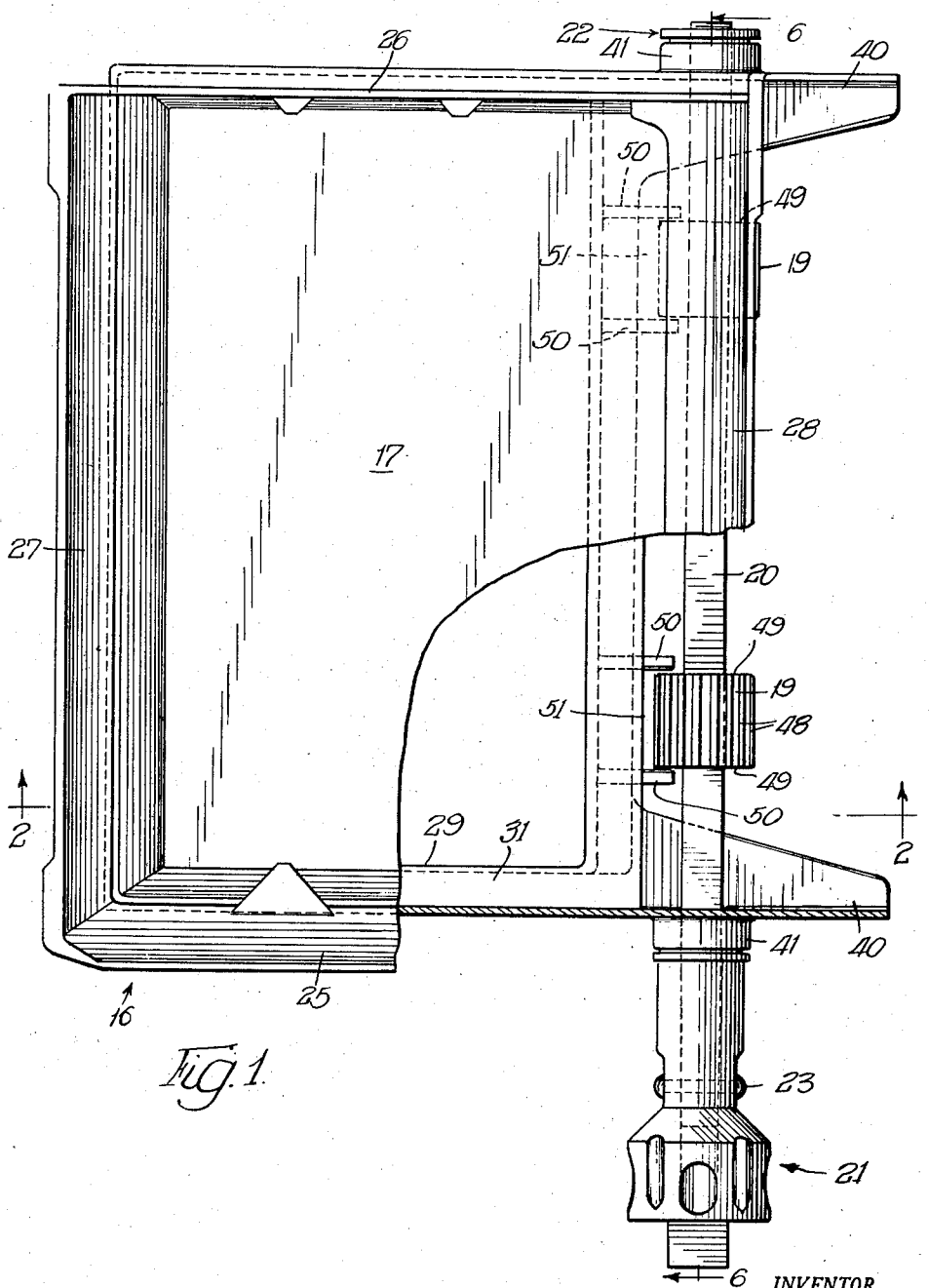


Fig. 1.

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Fig. 2

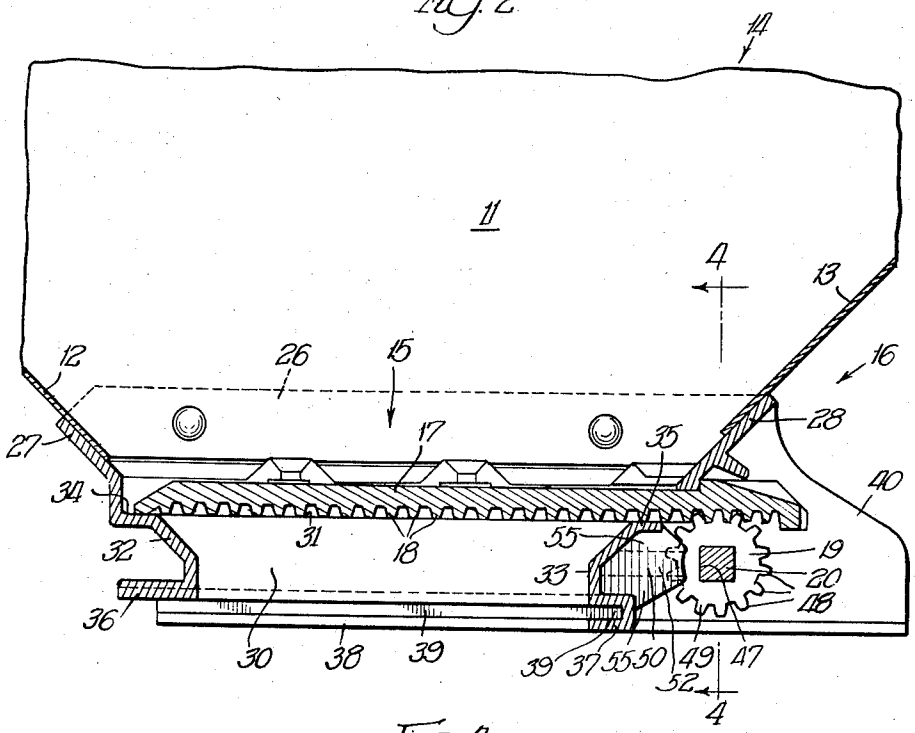
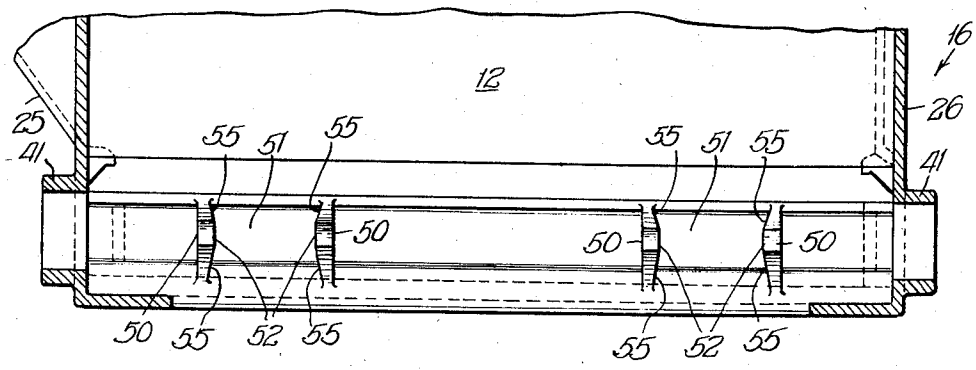


Fig. 4



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Original Filed March 20, 1950 3 Sheets-Sheet 3

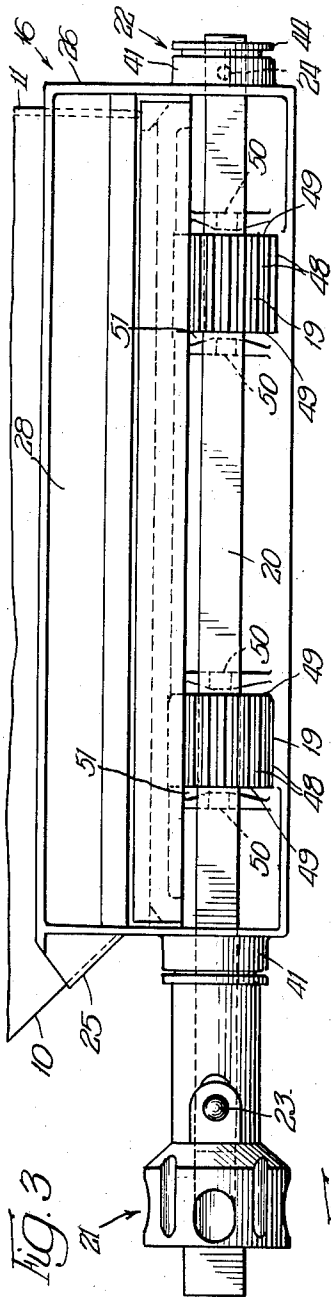


Fig. 3

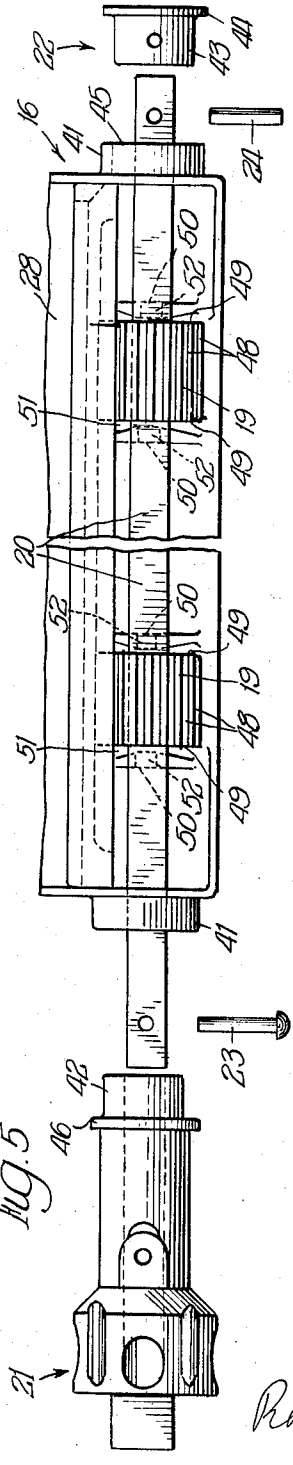


Fig. 5

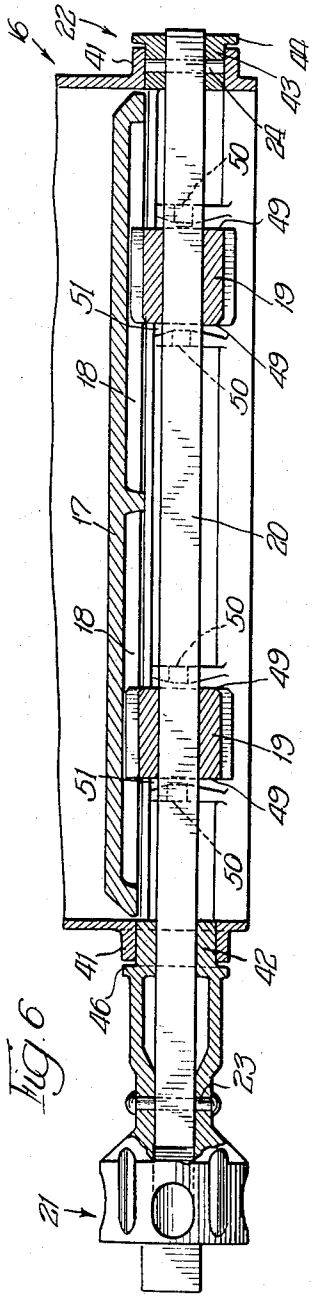


Fig. 6

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United States Patent Office 2,869,480
Patented Jan. 20, 1959

2,869,480

OPERATING MECHANISM FOR CLOSURE MEMBER OF A DISCHARGE OUTLET ASSEMBLY

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Original application March 20, 1950, Serial No. 150,662, now Patent No. 2,690,137, dated September 28, 1954. Divided and this application January 4, 1954, Serial No. 402,087

7 Claims. (Cl. 105—253)

This invention relates to an improved operating means for a closure member, such as employed for varying the size of a discharge outlet for the discharge opening of a load containing hopper and methods of assembling the same. This application is a division of application Serial No. 150,662, filed March 20, 1950, now Patent No. 2,690,137, issued September 28, 1954.

The objects of the invention among others are: To provide an improved means for mounting an operating shaft on an outlet frame; and to provide for assembling the shaft on the frame and disassembling it therefrom requiring the forceable application or removal of only a single rivet.

For a more complete comprehension of this invention reference may be had to the accompanying drawings wherein:

Figure 1 is a plan view of a frame and gate assembly, with the pinion gears and associated shaft indicated thereon, a portion of the gate being broken away to show more clearly certain of the parts;

Figure 2 is a vertical sectional elevational view of the structure shown in Figure 1 and taken on line 2—2 thereof;

Figure 3 is a vertical end elevational view of the assembly shown in Figure 1 as viewed from right to left;

Figure 4 is a vertical sectional view taken through the outlet frame on line 4—4 of Figure 2 showing the frame construction with the shaft, pinion gears and associated parts omitted;

Figure 5 is a vertical end view, similar to Figure 3, showing the shaft and pinions in position with the end bearing members and retaining pins in disassembled relation; and

Figure 6 is a vertical sectional view on an enlarged scale taken through the assembly on a line 6—6 of Figure 1.

In the drawings, the invention is illustrated as embodied in an outlet assembly of a load containing hopper such as employed for the discharge opening of a railway car hopper. A load containing hopper is indicated in Figures 2 and 3, generally, by side walls 10 and 11 which meet with end sloping walls 12 and 13 to form a four-sided hopper 14 having a rectangularly shaped discharge opening 15.

Enclosing the lower portion of the four sides of the hopper 14 is a unitary frame 16 having a sliding gate 17 carried thereby which is provided on its underside with rack teeth 18. Cooperating with the rack teeth 18 of the gate 17 are pinions 19 which are non-rotatably mounted on an operating shaft 20. The shaft 20 is journalled in the frame 16 and is provided at one end with an operating head 21. At the opposite end, the shaft 20 is fitted with a combined bearing and stop member 22. The head 21 is maintained against lengthwise movement by a rivet 23 and the bearing and stop member 22 is likewise maintained against lengthwise movement relative to the shaft 20 by a headless pin 24. The manner

in which these parts are assembled will be set forth presently.

The frame 16 in its preferred form includes an upper wall portion lying above the gate 17 and formed with walls 25, 26, 27 and 28 which overlie the respective walls 10, 11, 12 and 13 of the hopper 14. The frame 16, below the gate 17, is formed with a foursided chute-like portion having walls of appreciable depth including side walls 29 and 30 which are spaced inwardly from the adjacent upper walls 25 and 26 a sufficient distance to provide flat runway surfaces 31 at each side of the frame 16 on which the gate 17 is adapted to have lengthwise sliding movement.

The four walls of the chute are completed by transverse walls 32 and 33 which extend between the respective side walls 29 and 30. The end wall 32 is spaced from the upper wall 27 to provide an end ledge 34 disposed on a level corresponding to the level of the side runway surfaces 31—31 and forms therewith a three sided supporting surface for the gate 17.

The end wall 33 extends transversely below the gate 17 and is provided at its upper margin with a flat horizontal wall 35. At the lower portion of the frame 16 there is a laterally outwardly extending structure which projects from the lower margin of the chute walls 29, 30, 32 and 33. This structure on two adajcent sides is in the form of a flange indicated at 36 and on the other two adjacent sides, as indicated at 37 and 38 in Figure 2, is in the form of channel section presenting an inwardly facing groove 39. The flange 36 and the groove 39 are for the purpose of accommodating a removable extension chute (not shown). The flange 36 and channel sections 37 and 38 operate to strengthen the four sides of the frame 16.

The outstanding grooved section 37 extends in parallelism with the upper transversely disposed wall 35 and in combination with this wall and the wall 33 forms a substantially channel shaped beam member. Projecting forwardly beyond the beam member as formed by walls 33, 35 and 38 and disposed at each side of the frame are vertical side wall extensions 40 which are each provided with a bearing portion 41 presenting an annular bearing for rotatably supporting the operating shaft 20.

The operating shaft 20 is preferably of rectangular cross-section throughout and circular hub bearing end portions to form journals are provided on members 21 and 22 at each end of the shaft 20 to seat in the annular portion of bearings 41 carried by the side wall extensions 40. The circular bearing portion at the outer end of the shaft 20 is preferably formed integrally with the head 21 as indicated at 42 in Figure 5 and at the opposite end of the shaft 20 the circular bearing portion is incorporated with the bearing and stop member 22 as indicated at 43. The bearing member 22 is maintained in position on the shaft 20 by the headless pin 24 which is just long enough to extend through the bearing portion 43. It is held in place on assembly by the inner surface of the bearing portion 41. The member 22 is provided with a stop collar 44 which cooperates with the outer face 45 of the bearing portion 41 formed integrally with the frame 16 to limit the outward movement of the shaft 20. Similarly at the opposite end of the shaft 20 there is provided a stop collar 46 on the head 21 which, in cooperation with the adjacent bearing portion 41, limits inward movement of the shaft 20. The shaft 20 is, therefore, maintained in position and restrained against axial movement in either direction and the entire structure is locked in place in operative position by the rivet 23.

The pinion gears 19, which are preferably two in number, are slidably mounted on the shaft 20 and non-

rotatably related thereto since each is formed with a central rectangularly shaped opening 47, as shown in Figure 2, corresponding substantially in shape and size to the shaft 20. The pinions 19 are formed with gear teeth 48 which mesh with the rack teeth 18 of the gate 17 and adjacent each side wall 49, Figure 3, of the pinions 19 there is disposed a segmental shaped guiding wall 50, which extends forwardly from the frame 16 and is preferably formed integrally with the end wall structure thereof as provided by walls 33, 35 and 37. Each pair of walls 50—50 thus combines to form a pocket 51 within the confines of which each pinion gear 19 is held against axial movement relative to the shaft 20 and independently of any connection therewith. The walls 50 are each formed with a comparatively heavy pad portion 52, Figure 5, lying in the plane of the shaft 20 and extending substantially normal thereto to embrace as much of the side walls 49 of the pinions 19 as to straddle two teeth of each. The outer edge of segmental shaped wall 50 is of arcuate shape and is formed on a radius centering from the axis of rotation of the shaft 20 to clear it in its rotating movement. The inner face of each wall 50 on each side of the pad portion 52 flares outwardly as indicated at 55 to present an outwardly flaring pocket structure for guiding the pinions 19 in their rotary movement in either direction. They prevent the pinions 19 from impinging on the side walls 50.

It will be observed that the pinions 19 are held in operative position on the shaft 20 relative to the rack teeth 18 by the pockets 51 formed by the segmental guiding walls 50. They cannot shift axially along the shaft 20. No openings need be provided in the shaft 20 to receive rivets to hold the pinions 19 in place. Thus the shaft 20 is not weakened by the provision of such openings.

The advantages of the construction disclosed herein may be best realized by following the sequence of assembly operations in the mounting of the shaft 20 and pinions 19. Assuming the pinions 19 centralized in the pockets 51, the shaft 20 with the end bearing and stop member 22 held in position by means of the headless pin 24 is threaded from right to left, as viewed in Figure 5, through the bearing portion 41 and through the openings 47 of the pinions 19. It is moved axially until the stop collar 44 contacts the face 45 of the adjacent bearing portion 41, the headless pin 24 being then held in place by the inner surface of the annular bearing 41, as shown in Figure 6. The operating head 21 is then telescoped over the left hand end of the shaft 20 and secured thereon by the rivet 23. It will thus be appreciated that the rivet 23 is the key member holding the entire assembly in place and consequently the assembly or dismantling of the shaft 20 and pinions 19 may be conveniently and quickly effected from an accessible location.

If desired, the shaft 20 may be threaded through the pinions 19 from either direction through one or the other of the bearing portions 41. Then the combined bearing and stop member 22 can be applied and the headless pin 24 inserted. The shaft 20 is shifted to the left as viewed in Figure 5 to place the bearing 43 in the bearing portion 41. Finally, the operating head 21 is assembled on the left hand end of the shaft 20 and the rivet 23 is inserted and headed over.

What is claimed as new is:

1. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, one of the end walls being slotted and having a part extending below the slot, runways on and extending inwardly of said side walls, a gate slidable on said runways and extending through said slot; means for moving said gate including interengaging rack and pinion means on said gate and frame respectively, and a shaft disposed outwardly of said part of said one end wall below the slot and non-rotatably mounting said pinion means; an annular bearing on each side wall in which said shaft is journaled, a bearing and stop member at each end of said shaft each including a hub bearing portion rotatable within the associated annular bearing and a stop collar integral with said bearing portion and outwardly of and adjacent to the associated annular bearing, and securing means between said bearing and stop members and said shaft, one of said bearing and stop members having an operating head secured to said shaft and the other of said bearing and stop members being secured to said shaft by a headless pin extending through the hub of said other bearing and stop member and said shaft within the associated annular bearing and the movement of said headless pin being limited by the inner surface of the associated annular bearing.

2. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, one of the end walls being slotted and having a part extending below the slot, runways on and extending inwardly of said side walls, a gate slidable on said runways and extending through said slot; means for moving said gate including interengaging rack and pinion means on said gate and frame respectively, and a non-circular shaft disposed outwardly of said part of said one end wall below the slot and non-rotatably mounting said pinion means; an annular bearing on each side wall in which said shaft is journaled, a bearing and stop member at each end of said shaft each including a hub bearing portion rotatable within the associated annular bearing and a stop collar integral with said bearing portion and outwardly of and adjacent to the associated annular bearing, and securing means between said bearing and stop members and said shaft, one of said bearing and stop members having an operating head secured to said shaft at a location intermediate said head and the associated annular bearing and the other of said bearing and stop members being secured to said shaft by a headless pin extending through the hub of said other bearing and stop member and said shaft within the associated annular bearing and the movement of said headless pin being limited by the inner surface of the associated annular bearing.

3. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, runways on and extending inwardly of said side walls, a gate slidable on said runways underneath one of said end walls and having rack teeth on the underside, an annular bearing on each side wall underneath said gate, a shaft journaled at the ends in said bearings and having non-rotatably mounted pinion means engaging said rack teeth; and means retaining said shaft against axial movement relative to said frame including stop members having hubs non-rotatably mounted on the ends of said shaft and extending within said annular bearings, a stop collar integral with each hub and lying outwardly of and adjacent each annular bearing, one of said stop members having an operating head, and securing means extending through each stop member and said shaft, the securing means for the other stop member being a headless pin extending through the hub of said other stop member and within the associated annular bearing.

4. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, runways on and extending inwardly of said side walls, a gate slidable on

said runways underneath one of said end walls and having rack teeth on the underside, an annular bearing on each side wall underneath said gate, a shaft having a square cross-section journaled at the ends in said bearings and having non-rotatably mounted pinion means engaging said rack teeth; and means retaining said shaft against axial movement relative to said frame including stop members having hubs non-rotatably mounted on the ends of said shaft and extending within said annular bearings, a stop collar integral with each hub and lying outwardly of and adjacent each annular bearing, one of said stop members having an operating head, and securing means extending through each stop member and said shaft, the securing means for the one stop member being a headed rivet located between the stop collar of said one stop member and said operating head, the securing means for the other stop member being a headless pin extending through the hub of said other stop member and within the associated annular bearing.

5. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, one of said end walls having an opening and said side walls having extensions beyond the one end wall, runways on and extending inwardly of said side walls, a gate slidable on said runways and extending through said opening in said one end wall and having rack means on the underside, cylindrical bearings projecting outwardly from said extensions below said gate, an operating shaft extending through said bearings and non-rotatably mounting pinion means engaging said rack means to move said gate across said discharge opening; and means for rotatably and non-slidably endwise mounting said shaft in said bearings including a stop member at one end of said shaft having a stop collar overlying the outer end of the bearing at said one end of said shaft and having an annular bearing portion journaled in the last mentioned bearing, pin means extending transversely of said bearing portion and of said shaft between the ends of said last mentioned bearing, and an operating head secured to the other end of said shaft.

6. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, one of said end walls having an opening and said side walls having extensions beyond the one end wall, runways on and extending inwardly of said side walls, a gate slidable on said runways and

extending through said opening in said one end wall and having rack means on the underside, cylindrical bearings projecting outwardly from said extensions below said gate, an operating shaft extending through said bearings and non-rotatably mounting pinion means engaging said rack means to move said gate across said discharge opening, a stop member on each end of said shaft including a stop collar overlying the outer end of each of said bearings and a bearing portion integral with each stop collar and journaled within the respective bearing and rotatably mounting said shaft in said bearings, an operating head secured to one end of said shaft, and means for securing the stop member to said shaft at the other end of said shaft comprising pin means extending transversly of the bearing portion of the last mentioned stop member and of said other end of said shaft and within the confines of the bearing individual thereto.

7. A hopper discharge opening closure structure for use in a railroad car or the like having an opening providing for the downward discharge of lading and comprising, in combination, a frame having side walls and end walls forming a discharge opening, one of said end walls having an opening and said side walls having extensions beyond the one end wall, runways on and extending inwardly of said side walls, a gate slidable on said runways and extending through said opening in said one end wall and having rack means on the underside, cylindrical bearings projecting outwardly from said extensions below said gate, an operating shaft extending through said bearings and non-rotatably mounting pinion means engaging said rack means to move said gate across said discharge opening; and means for rotatably and non-slidably endwise mounting said shaft in said bearings including a stop member at one end of said shaft having a stop collar overlying the outer end of the bearing at said one end of said shaft and having an annular bearing portion journaled in the last mentioned bearing, and pin means extending transversely of said bearing portion and of said shaft between the ends of said last mentioned bearing.

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