March 20, 1956 G. B. DOREY 2,738,739

RAILWAY CAR HOPPER OUTLET ASSEMBLY

Filed Oct. 23, 1952 3 Sheets-Sheet 1

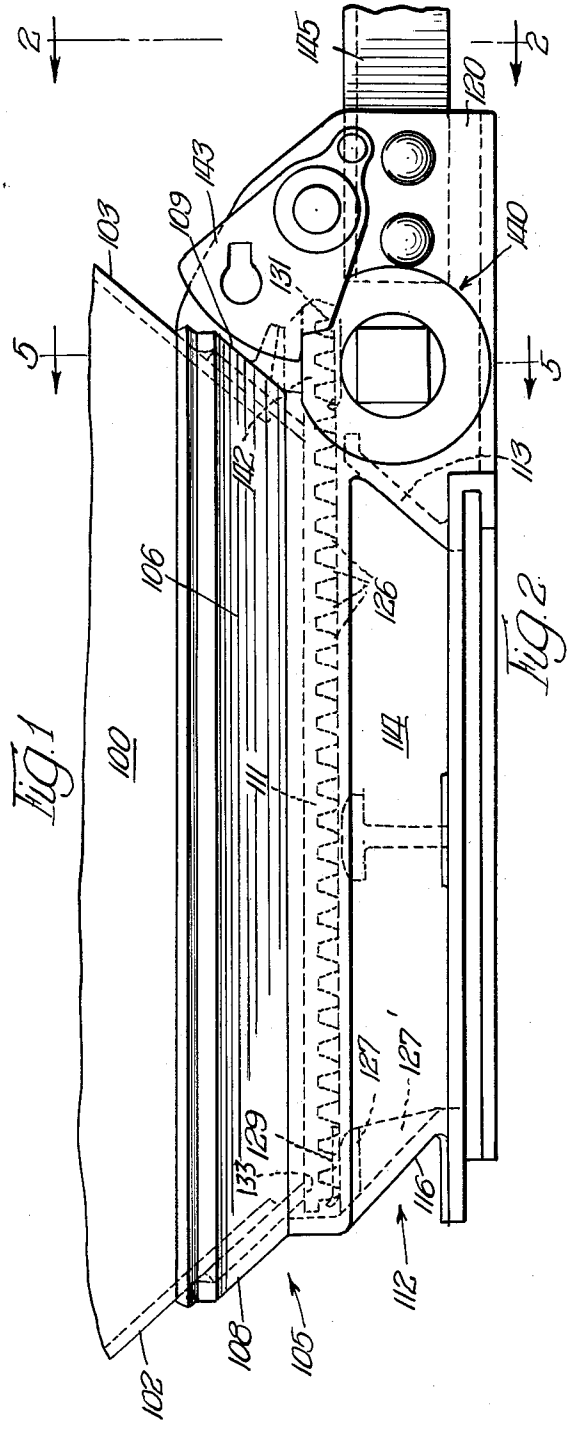


Fig. 1

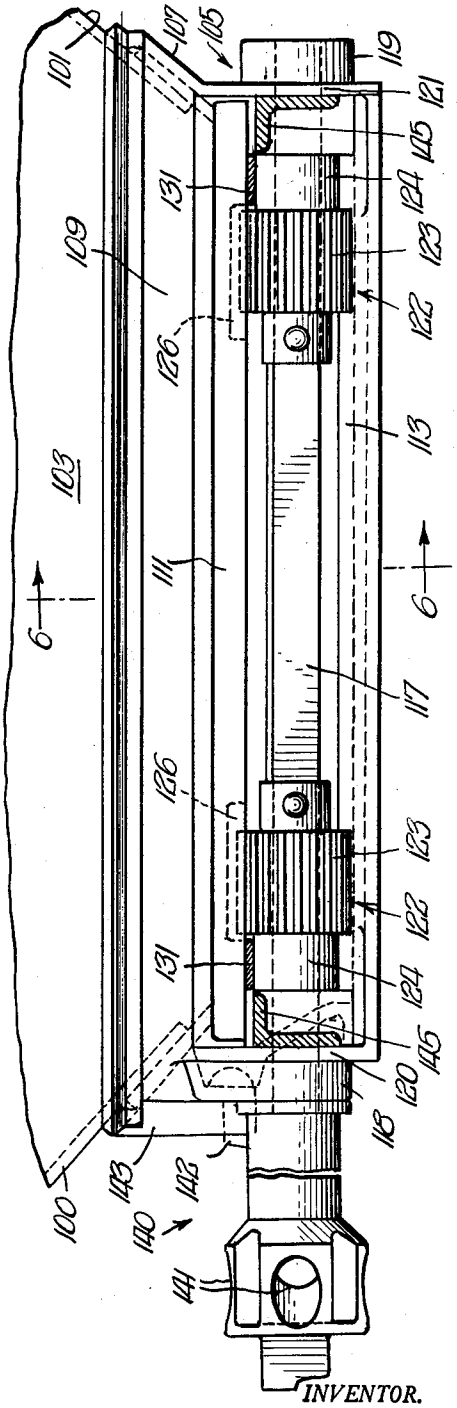


Fig. 2

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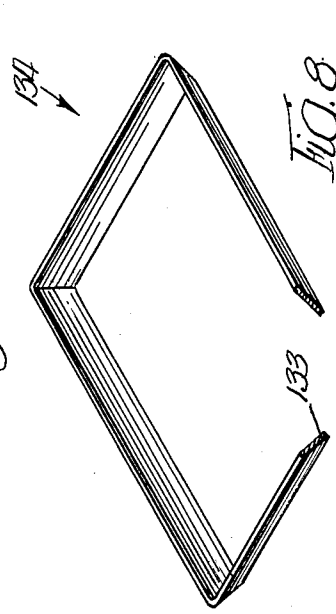


Fig. 4



Fig. 8

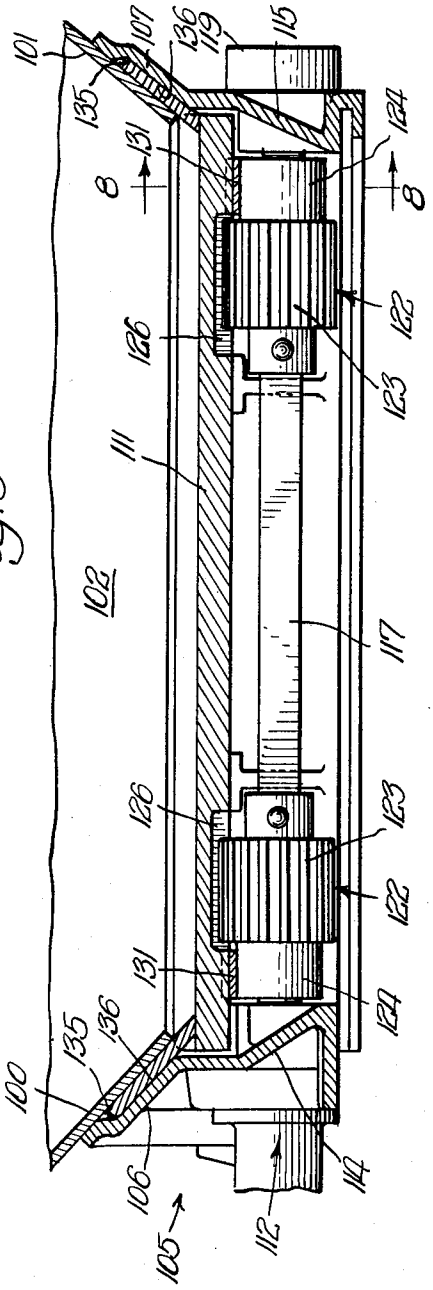


Fig. 5

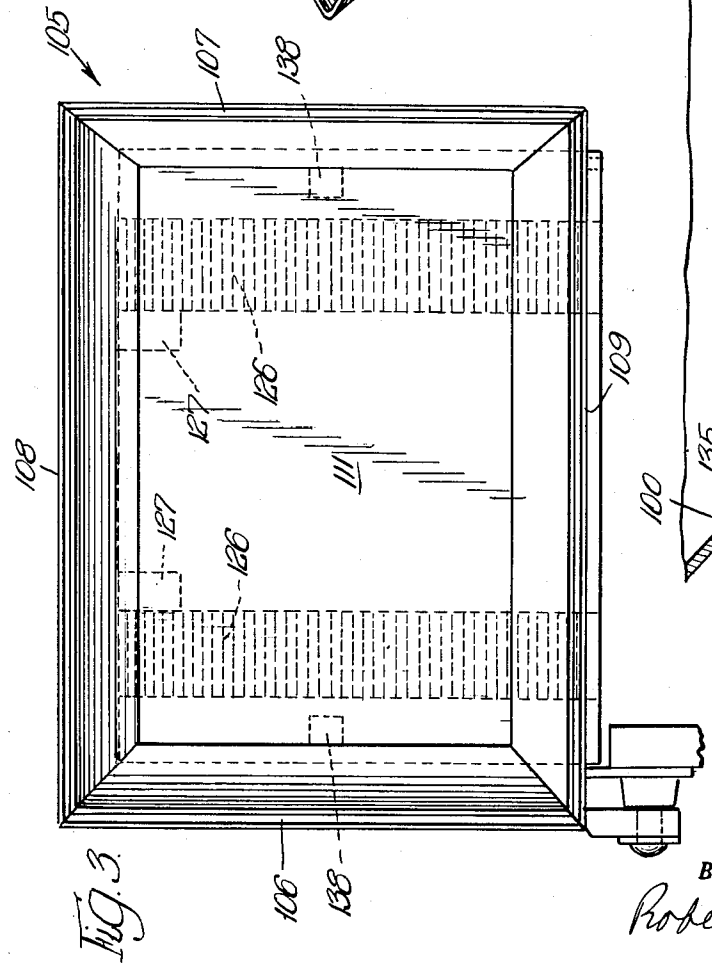


Fig. 3

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RAILWAY CAR HOPPER OUTLET ASSEMBLY

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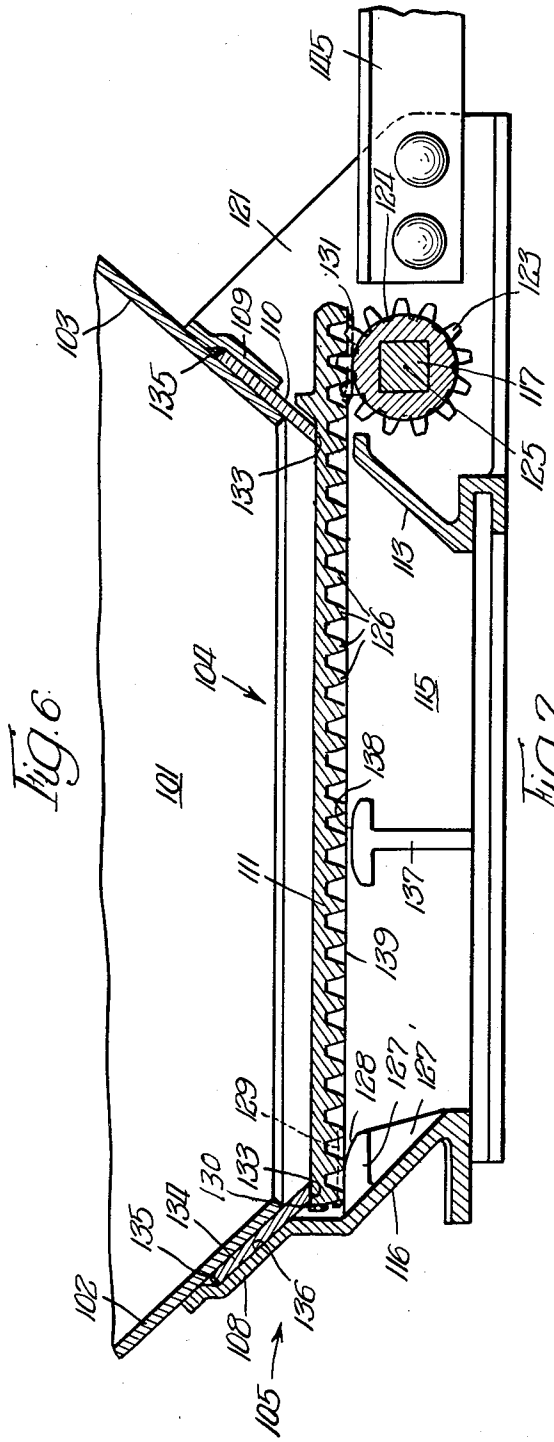


Fig. 6

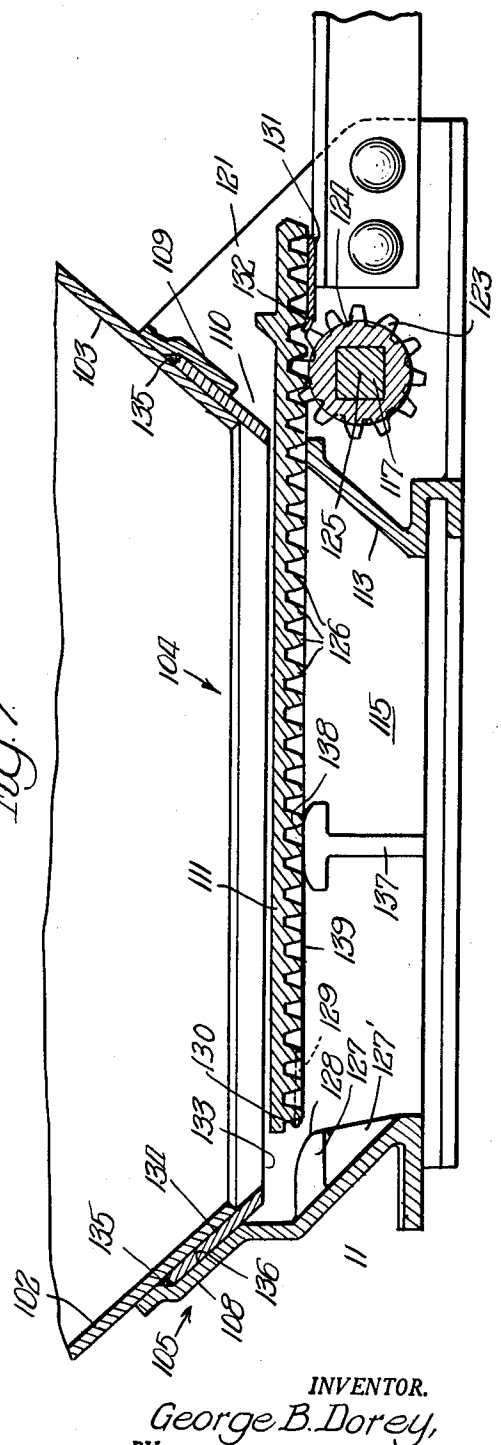


Fig. 7

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2,738,739

RAILWAY CAR HOPPER OUTLET ASSEMBLY

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Application October 23, 1952, Serial No. 316,389

7 Claims. (Cl. 105—282)

This invention relates to an improved hopper outlet assembly such as is employed in connection with railway cars and the like for the handling of finely comminuted lading and constitutes an improvement over the invention disclosed in copending Zimmer application Serial No. 241,761, filed August 14, 1951.

The objects of the invention, among others, are: To provide a structure for tightly closing a discharge opening and to this end the invention contemplates an improved construction wherein a sliding gate is forced upwardly against abutting walls carried by the discharge hopper as the gate approaches the final closed position in a new and improved manner; to provide for supporting the gate at one end by means of a rotatable operating shaft and at the opposite end by brackets on the frame; to provide coordinating lifting means between the supporting means and the gate; to provide for lifting a sliding gate from one level to another in a smooth and gradual motion; and to provide a liner in the discharge gate. Further the invention resides in the details of construction identified with the frame and supporting brackets for the gate.

For further comprehension of the invention reference may be had to the accompanying drawings wherein:

Figure 1 is a side elevational view of the lower portion of a hopper having the improved outlet assembly applied thereto;

Figure 2 is a vertical end elevational view of the structure shown in Figure 1 as seen on a line 2—2 of said Figure 1;

Figure 3 is a plan view of the outlet structure shown in Figures 1 and 2 with the hopper plates omitted and the liner in place;

Figure 4 is a perspective view of the liner;

Figure 5 is a vertical cross sectional view taken on a line 5—5 of Figure 1;

Figure 6 is a vertical longitudinal sectional view taken on a line 6—6 of Figure 2, with the gate in elevated position;

Figure 7 is a vertical longitudinal view similar to Figure 6 except that the gate is shown in lowered and partly open position;

Figure 8 is a vertical sectional view taken through the outer end of the gate and showing the shaft and support.

In Figures 1, 2, and 3 of the drawings the hopper proper is shown as including longitudinally extending side walls 100 and 101 which meet with longitudinally sloping end walls 102 and 103 to form a foursided hopper having a discharge opening 104. Surrounding the lower portion of the hopper is a foursided frame 105 having an upper section formed of walls 106, 107, 108 and 109 which respectively overlie the walls 100, 101, 102 and 103 of the hopper. The wall 107 is formed with a slot 110 through which a slidably mounted gate 111 extends to close the discharge opening 104. The frame 105 below the gate 111 is formed with a foursided chute-like depending extension 112 which includes a transversely extending wall 113 below the slot 110 and the other walls

comprise side walls 114 and 115 which meet with an end wall 116 and thus complete the foursided chute.

The gate 111, in closed position, projects outwardly beyond the slot 110 and below the projecting portion thereof there is disposed a rotatable operating shaft 117 which is journalled at each side of the frame 105 in bearings 118 and 119 which are formed on forwardly projecting extensions 120 and 121 of the frame 105.

The shaft 117 is preferably of a rectangular cross section and non-rotatably mounted thereon are geared pinion members 122 each having a toothed portion 123 and an arcuately shaped bearing seat in the form of a hub 124 for supporting the gate 111 as will be hereinafter pointed out.

The bearing seat or hub 124 is preferably concentrically disposed with respect to the axis 125 of rotation of the shaft 117. Cooperating in meshing relation with the teeth 123 are rack teeth 126 formed on the underside of the gate 111 for movement thereof by rotation of the shaft 117.

The gate 111 in closed position at its outer end is carried by the shaft 117 and at its inner end rests on seats 127 of brackets 127' which are formed integrally with the sloping end wall 116. Each seat 127 is formed with a flared approach 128 on which the gate 111 is adapted to ride upwardly as it moves to closed position. The gate 111 is provided with wear plates 129 on its underside which are curved at 130 to present flared nose pieces. Similarly there are provided at the projecting end of the gate wear plates 131 which seat on the arcuate shaped seats or hubs 124 of the shaft 117 when the gate 111 is in closed position. The wear plates 131 are formed with upwardly curved noses 132 at their inner ends.

The upper surface of the gate 111 in closed position abuts the lower face 133 of the foursided liner 134, Figures 1 and 4, which is interposed between the overlying walls 106, 107, 108, and 109 of the frame 105 and the walls 100, 101, 102, 103 of the hopper proper and is welded to the walls of the frame as indicated at 135. It will be noted that the walls 106, 107, 108 and 109 are formed with a depressed portion 136 to receive the liner 134.

At a location midway of the discharge opening 104 there is provided on each of the side walls 114 and 115 a bracket 137 having a seat 138 disposed at a level slightly below the end seats 127 of the brackets 127' and substantially in alignment with the arcuately shaped seating surfaces of the hubs 124 and in alignment therewith the gate 111 is provided with runway surfaces 139 which rest on the hubs 124 and seats 138 as shown in Figure 7 during the major extent of the gate movement.

As will be understood, the gate 111 is carried partly by the operating shaft 117 and partly by the hopper frame 105 and is adapted to have limited upward movement to the extent provided by the differences in the level between the seats of the wear plates 131 and the main runway surfaces 139 of the gate. The gate 111 is therefore adapted to move on a lower level throughout its major extent of sliding movement and the raising thereof to abut the lower face 133 of the liner is accomplished only as it approaches its fully closed position. The circular surfaces of the hubs 124 lie adjacent the pitch circle of the geared pinion members 122 and consequently the contacting engagement between the undersurfaces of the wear plates 131 and the surfaces of the hubs 124 is generally of a rolling character thus mitigating the disadvantages of sliding frictional contact incidental to the usual wedging action.

The curved nose end portions 132 assure a smooth and gradual movement between the undersurfaces of the wear plates 131 and the hubs 124 in the transition of the gate

111 from one level to the other. Similarly, upwardly curved nose portions 130 on the inner ends of the wear plates 129, and the cooperating flared approaches 128 to the seats 127 provide a smooth transition for the leading edge of the gate 111.

Any suitable operating means for rotating the shaft 117 may be employed. In this particular embodiment of the invention there is shown an operating head 140 on the outer end of the shaft 117. The head 140 is provided with a plurality of socket openings 141 for receiving an operating handle (not shown). The head adjacent the frame 105 is provided with an abutment 142 with which a pivoted latching dog 143 cooperates to lock the shaft 117 against reverse movement. The dog 143 is maintained in latching position by a suitable sealing pin (not shown) which extends through the extension 120 and the dog 143.

For supporting the gate 111 in fully opened position there are provided extension rails 145 which are preferably secured to the respective forwardly projecting extensions 120 and 121 of the frame 105.

Since the lower face 133 of the liner 134 can be easily and accurately machined to engage the upper surface of the gate 111 along its periphery, it is unnecessary to machine any of the surfaces of the frame 105 to insure close fitting engagement with the gate 111. This materially reduces the cost of the assembly.

What is claimed as new is:

1. In a load containing multisided hopper having a discharge opening and a gate for closing the opening, said gate being movable along a path parallel to and spaced from said opening and across the opening for closing it, means for moving said gate along said path including a shaft rotatably mounted with respect to said hopper and interengaging rack and pinion means carried by said gate and shaft respectively for moving said gate by rotation of said shaft, seats on the underside of the ends of said gate with their lower surfaces below the level of said path, an arcuate seat on said shaft for engaging and supporting the seat at one end of said gate only when the latter is in closed position and holding the same in elevated position with respect to said path, and a seat on said hopper for engaging and supporting the seat at the other end of said gate only when it is in closed position for holding the same in elevated position with respect to said path.

2. In a load containing hopper having a discharge opening, a frame bordering the discharge opening, and a gate slidably mounted in the frame for closing the opening; a liner carried by said frame and extending around said discharge opening above said gate, said liner presenting an undersurface against which said gate is adapted to bear when in closed position, said gate being movable upwardly to engage said liner; and means for moving the gate longitudinally across said opening and upwardly against said liner including an operating shaft journalled on said frame, interengaging rack and pinion means carried by said gate and shaft respectively, said gate at one end of the frame being supported by said shaft, auxiliary support means on said frame remote from said shaft, and wedging means between said gate and said support means on said frame and said shaft for moving said gate upwardly against said liner upon longitudinal movement of said gate by said rack and pinion means.

3. In a load containing hopper having a discharge opening, a frame bordering the discharge opening, and a gate slidably mounted in the frame for closing the opening; a liner carried by said frame and extending around said discharge opening above said gate; said liner presenting an undersurface against which said gate is adapted to bear when in closed position, said gate being movable upwardly to engage said liner; and means for moving the gate longitudinally across said opening and upwardly against said liner including an operating shaft journalled on said frame, interengaging rack and pinion means carried by said gate and shaft respectively, hub means on said shaft for supporting one end of said gate in closed position, support means on said frame for the other end of said gate, and wedging means between said ends of said gate and said hub means at one end and said support means at the other end for causing said gate to move upwardly against said liner upon longitudinal movement of said gate by said rack and pinion means.

4. The invention as set forth in claim 3 wherein the hub means has a cylindrical surface coaxial with the axis of rotation of the shaft and its diameter is substantially the same as the pitch diameter of the pinion means.

5. In a foursided load containing hopper having a discharge opening and a gate for closing the opening, a frame surrounding the opening including a chute-like extension below said gate including sloping side and end walls on three sides and a slot on the fourth side for the passage of the gate therethrough, a shaft carried by said frame outside of the slotted end thereof having an arcuate shaped abutment forming a support for said gate, additional supports for said gate including brackets carried by said sloping side and end walls of said frame having seats for engaging the underside of said gate, the seats carried by said end wall being disposed at a higher level than the seats carried by said side walls, and means providing inclined surfaces between said seats carried by said end wall and gate for lifting the gate from said seats carried by said side walls upon final closing movement of said gate.

6. In a foursided load containing hopper having a discharge opening and a gate for closing the opening, a frame surrounding the opening including a chute-like extension below said gate including sloping side and end walls on three sides and a slot on the fourth side for the passage of the gate therethrough, a shaft carried by said frame outside of the slotted end thereof having an arcuate shaped abutment forming a support for said gate, additional supports for said gate including brackets carried by said sloping side and end walls of said frame having seats for engaging the underside of said gate, the seats carried by said end wall being disposed at a higher level than the seats carried by said side walls, and means for lifting the gate from said seats carried by said side walls upon final closing movement of said gate.

7. In a foursided load containing hopper having a discharge opening and a gate for closing the opening, a frame surrounding the opening including a chute-like extension below said gate including sloping side and end walls on three sides and a slot on the fourth side for the passage of the gate therethrough, a liner carried by said frame and extending around said discharge opening above said gate and presenting an under-surface against which said gate is adapted to bear in closed position, a shaft carried by said frame outside of the slotted end thereof having an arcuate shaped abutment forming a support for said gate, additional supports for said gate including brackets by said sloping side and end walls of said frame having seats for engaging the underside of said gate, the seats carried by said end wall being disposed at a higher level than the seats carried by said side walls, and means for lifting the gate from said seats carried by said side walls upon final closing movement of said gate into engagement with said undersurface of said liner.

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