Sept. 1, 1959 G. B. DOREY 2,901,984

OPERATING MECHANISM FOR SLIDING GATE FOR A DISCHARGE OUTLET MOUNTED ON A LOAD CONTAINING HOPPER OF A RAILWAY CAR

Original Filed Jan. 4, 1952 5 Sheets-Sheet 1

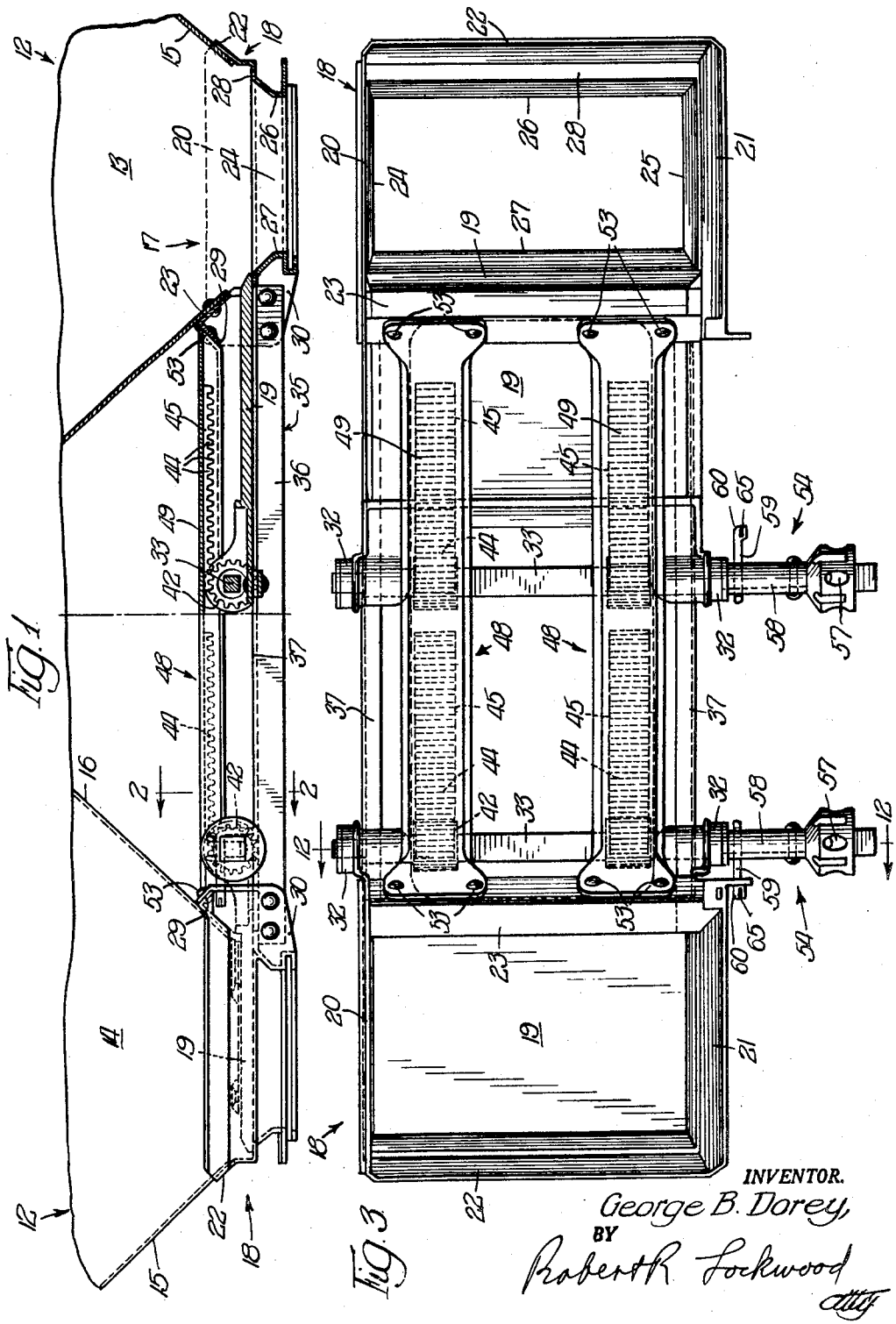


Fig. 1

Fig. 3

INVENTOR.
George B. Dorey,
BY
Robert R Lockwood
Atty

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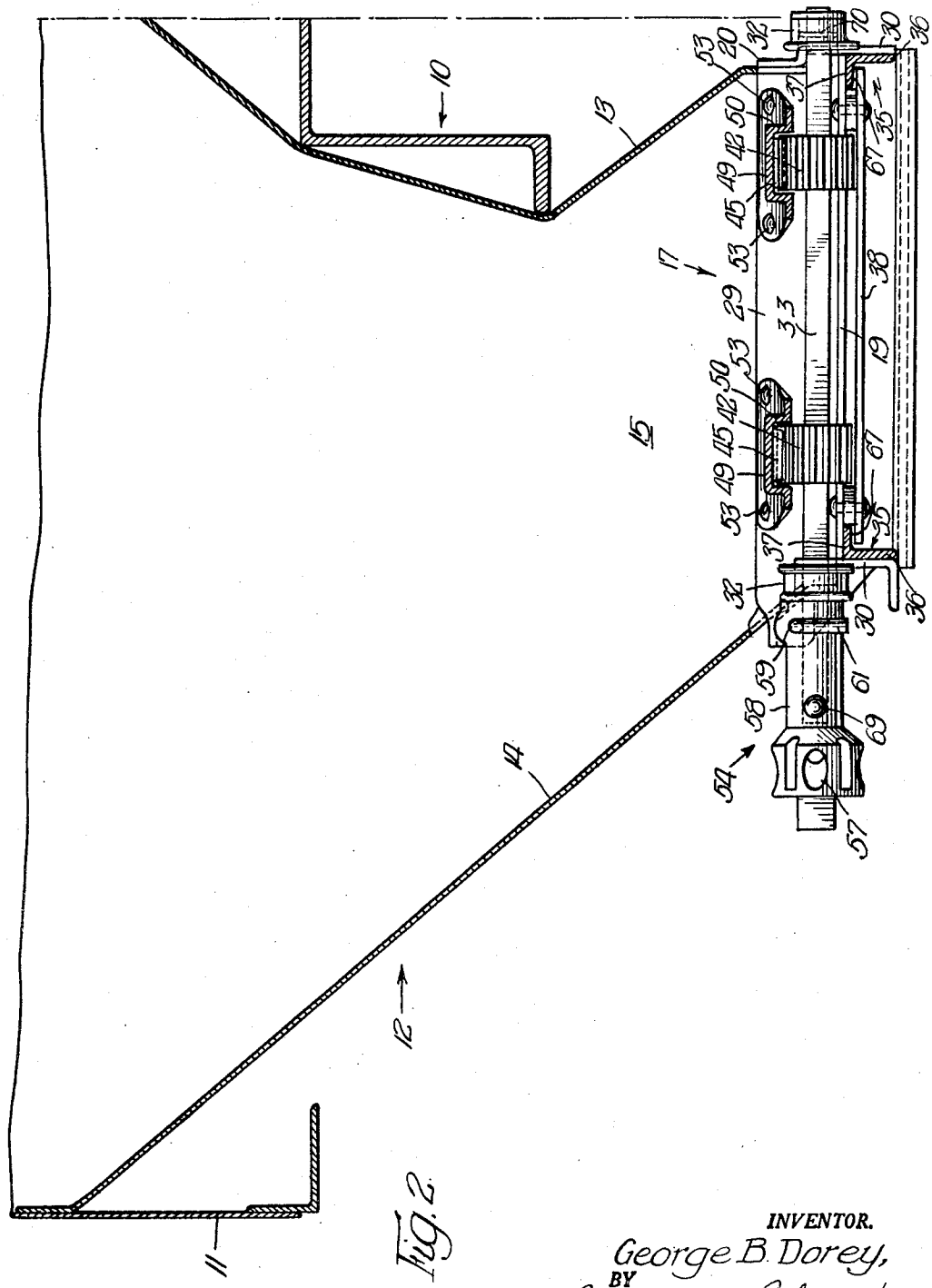


Fig. 2.

INVENTOR.
George B. Dorey,
BY
Robert R. Lockwood
Atty.

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Fig. 4

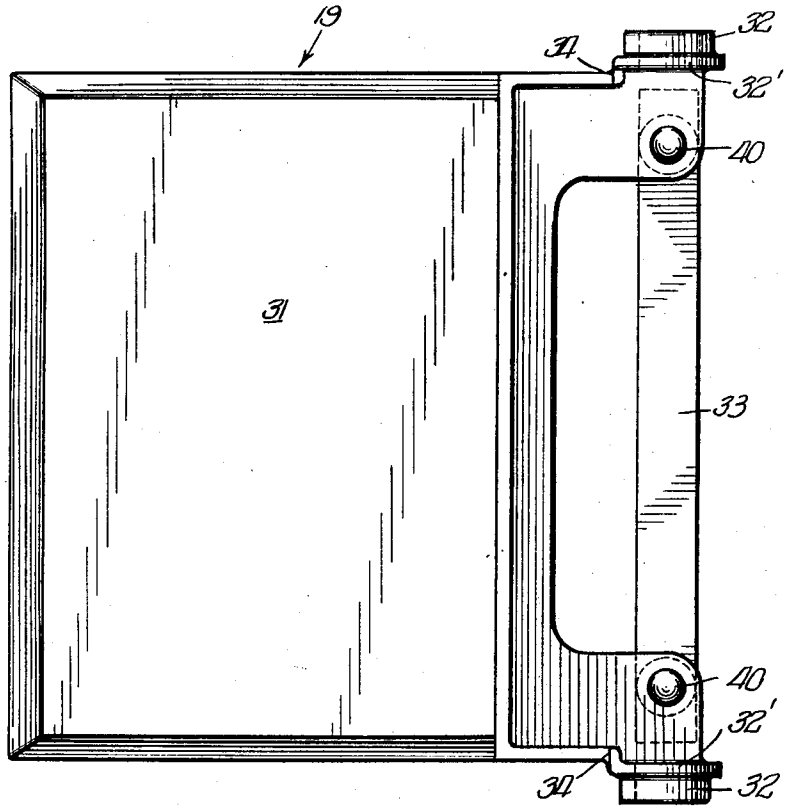


Fig. 5

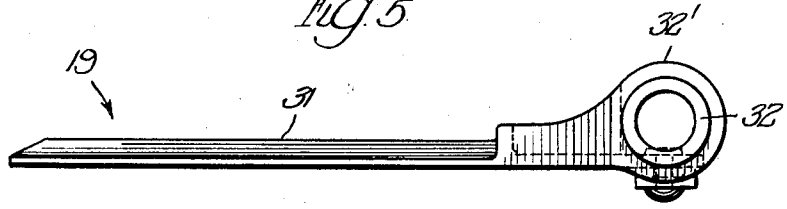
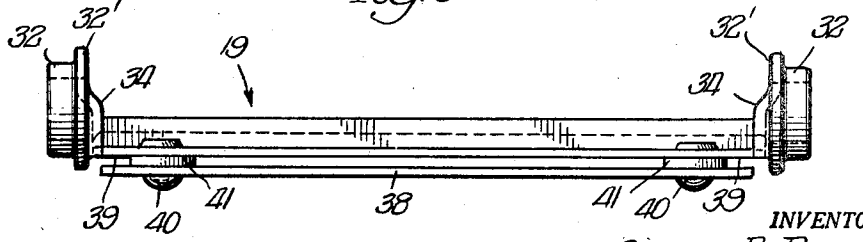


Fig. 6



INVENTOR.
George B. Dorey,
BY
Robert R Lockwood
atty

Sept. 1, 1959 G. B. DOREY 2,901,984

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Fig. 7

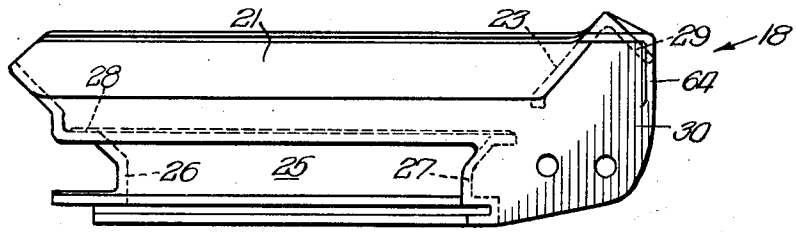


Fig. 8

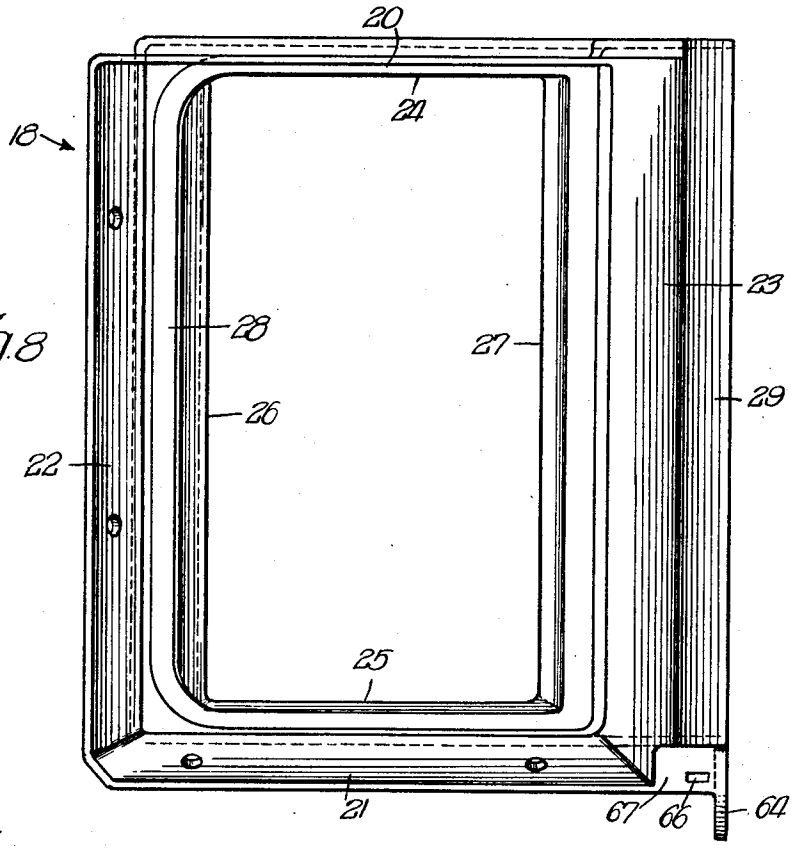
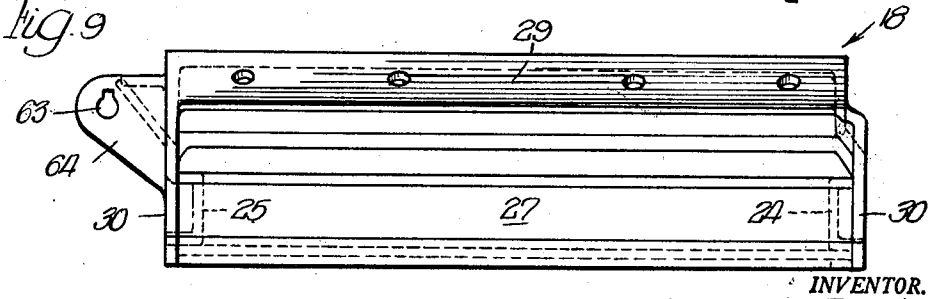


Fig. 9



INVENTOR.
George B. Dorey,
BY
Robert K Lockwood
Atty.

Sept. 1, 1959 G. B. DOREY 2,901,984

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Fig. 11

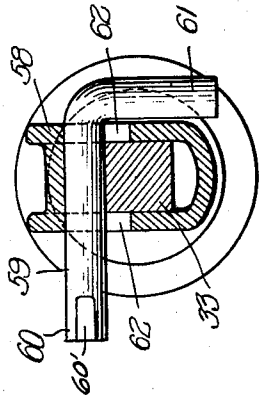


Fig. 10

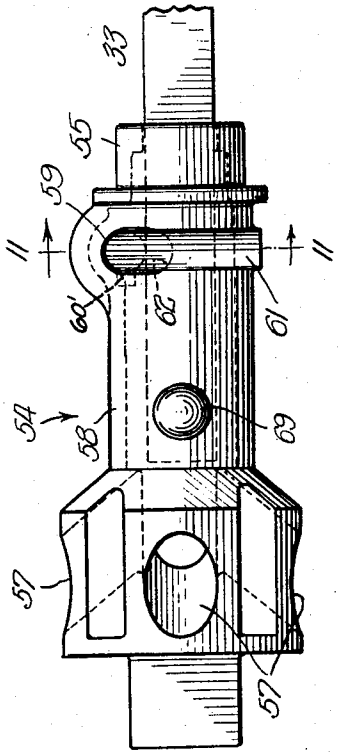
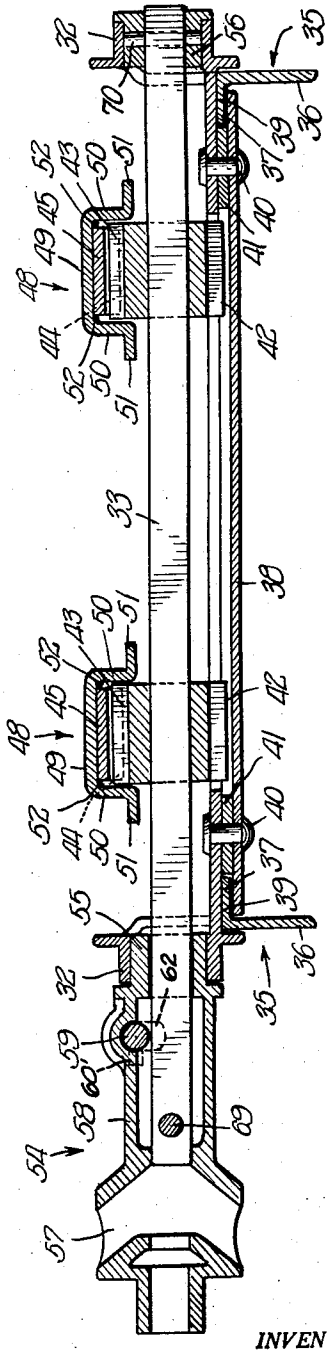


Fig. 12



INVENTOR.
George B. Dorey,
BY
Robert R Lockwood
Atty

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OPERATING MECHANISM FOR SLIDING GATE FOR A DISCHARGE OUTLET MOUNTED ON A LOAD CONTAINING HOPPER OF A RAILWAY CAR

George B. Dorey, Westmount, Quebec, Canada, assignor to Enterprise Railway Equipment Company, Chicago, Ill., a corporation of Illinois

Original application January 4, 1952, Serial No. 264,897, now Patent No. 2,791,973, dated May 14, 1957. Divided and this application March 21, 1957, Serial No. 647,637

3 Claims. (Cl. 105—282)

This invention relates to an improved discharge outlet for a load containing hopper which is especially adapted for use in connection with the discharge outlet of a car such as a railway hopper car. This application is a division of application Serial No. 264,897, filed January 4, 1952, now Patent No. 2,791,973, issued May 14, 1957.

The invention is particularly concerned with that type of structure wherein a discharge opening is closed by a sliding gate and wherein the gate is moved by means of an operating shaft journaled on the gate and supported by the latter. The movement of the gate is effected by rotation of the shaft, there being interengaging rack and pinion teeth carried by the car structure and shaft respectively.

The invention is primarily concerned with that type of sliding gate adapted to be moved through the agency of a rotatable shaft carried by the gate and one of the objects of this invention, among others, is to provide a structure whereby the shaft is journaled on the gate and supported thereby and the gate in turn is underlain throughout its range of movement by supporting rails.

Other objects of the invention include the provision of guiding means for maintaining operating pinions in axial alignment on the shaft; the provision of improved locking and sealing means for the shaft when the gate is in closed position; and the provision of improved means for supporting rack teeth on the car structure.

In the accompanying drawings the improvement is illustrated as applied to a railway hopper car wherein:

Figure 1 shows as much as necessary of the lower portion of a car to illustrate a pair of longitudinally extending and facing hoppers, the hopper on the left hand side having the gate in closed position and the hopper on the right hand side having the gate in opened position.

Figure 2 is a vertical end sectional view of the structure shown in Figure 1 as viewed on a line 2—2 of Figure 1.

Figure 3 is a plan view of the discharge outlets and gates shown in Figure 1.

Figure 4 is a plan view of the gate.

Figure 5 is a vertical longitudinal view of the gate shown in Figure 4.

Figuer 6 is a vertical end view of the gate shown in Figure 4 as viewed from right to left.

Figure 7 is a side longitudinal vertical view of the outlet frame.

Figure 8 is a plan view of the outlet frame shown in Figure 7.

Figure 9 is a vertical end view of the outlet frame shown in Figure 7 as viewed from right to left.

Figure 10 is a vertical longitudinal view of the operating head with the sealing bolt applied thereto.

Figure 11 is a vertical sectional view taken on a line 11—11 of Figure 10.

Figure 12 is a vertical sectional view on an enlarged scale taken generally along line 12—12 of Figure 3.

In said drawings, Figures 1 and 2, the improvement is shown as applied to a railway hopper car and the car structure is shown as including a center sill 10 and an outwardly spaced side wall 11. Positioned between the center sill 10 and the side walls are load containing hoppers 12 which are spaced from each other lengthwise of the car and each includes inner and outer side walls indicated at 13 and 14 respectively and front and rear sloping walls indicated at 15 and 16 respectively. The said walls 13, 14, 15 and 16 cooperate to form a four sided hopper which leads to a discharge opening 17 and the area around the said opening is bordered by a unitary frame member 18 one for each hopper 12.

Inasmuch as the construction of the various hoppers is essentially the same, the description herein will be confined to only one of such hoppers and associated frame structure.

The frame 18 is provided with a sliding gate 19 for closing the opening. The frame includes walls 20, 21, 22 and 23 overlying the walls 13, 14, 15 and 16 of the hopper and below said overlying walls the frame includes a lower chute-like structure formed of walls 24, 25, 26 and 27, said walls being spaced inwardly laterally from the upper overlying walls a sufficient distance to provide a horizontally extending ledge surface 28 on which the gate 19 rests when in closed position.

At the facing ends of the respective hoppers the frame members 18 are each provided with an outwardly downwardly sloping wall 29 which, in cooperation with wall 23, forms an inverted V-shaped section extending transversely from side to side of each frame member above the gate 19 and at each end of the said V-shaped section there are longitudinally extending depending walls 30—30.

The gate 19 includes a body plate section 31 which forms the closure for the opening 17 and at the outer end of the gate 19 there is provided a pair of bearings 32—32 in which an operating shaft 33 having a square cross section is journaled. The bearings 32—32 are disposed outwardly of the body section 31 and are braced relatively thereto by vertically disposed walls 32' which are formed with an offset portion 34 to make connection with the outwardly spaced bearings 32 and the body section 31.

Extending between the respective facing hoppers are rail members 35 each formed of angular section with one flange 36 vertically disposed and secured to the depending end walls 30—30 and having the adjacent flange 37 inwardly directed to underlie and support the gate 19.

Extending transversely of the gate 19 and disposed substantially in alignment with the axis of the shaft 33 is a guide plate or strap 38 which is secured adjacent to the underside bearing surface 39 of the gate by rivets 40 and is spaced downwardly from the said bearing surface by a boss 41 and is extended outwardly beneath the inwardly directed flange 37 of the rail members 35. The undersurface 39 of the gate 19 in combination with the projecting ends of the guide plate 38 thus forms a pair of guide walls which provide a stable supporting structure for the gate 19.

The mechanism for moving the gate 19 by rotation of the square shaft 33 includes pinion gears 42 which are non-rotatably mounted on the said shaft 33 and formed with gear teeth 43 which mesh with teeth 44 of rack members 45, the latter being carried by the hopper structure. There are preferably two sets of rack teeth 44 and pinion gears 42 per outlet. The rack member 45 preferably consists of a length of body plate serrated to provide the teeth 44. The rack member 45 is carried by a housing 48 of inverted channel shape including a web 49 and depending side flanges 50—50, the margins

of the latter being reinforced laterally by outwardly extending flanges indicated at 51.

The rack member 45 is welded at each side to the web 49 of the housing 48 as indicated at 52 and the respective ends of the channel member 48 are riveted or otherwise secured to the downwardly sloping wall 29 of the inverted V-shaped section of the frame as indicated at 53. The side flanges 50—50 of each housing 48 lie at each side of the respective pinions 42 and thereby restrict the latter against axial movement on the shaft 33.

Referring to the shaft 33 it will be recalled that this member is of rectangular cross section and at the outer or operating end there is provided an operating head 54 which is formed with a circular bearing section 55 which is extended in one of the bearings 32 of the gate 19. At the opposite end of the shaft 33 a flanged circularly shaped collar 56 is similarly mounted on the shaft to provide a circularly shaped bearing for the shaft.

The operating head 54 is provided with a series of socket openings 57 for receiving and holding a removable bar, and intermediate said openings and the gate 19 there is an elongated body portion 58 and extending through said body portion is a locking and sealing pin 59 having at one end a key shaped end 60 including a laterally extending flange 60' and at the opposite end a handle 61. Elongated apertures 62—62 are formed in the body portion 58 of the head 54 and said apertures are sufficiently elongated to readily accommodate the key shaped end 60 of the pin 59. The elongated apertures 62 are extended into the plane of the shaft 33 and it is therefore required that the pin 59 be threaded through the apertures 62 of the head 54 prior to assembly of the latter on the shaft 33.

The sealing pin 59 is axially movable in a direction at right angles to the shaft 33 and is of sufficient length to extend through a key shaped aperture 63 formed in a laterally disposed vertical wall 64 of the frame. The key shaped end 60 of the pin 59 is so disposed in relation to the handle 61 and the aperture 63 as to bring the said end 60 of the pin out of registering alignment with the aperture 63 when the handle 61 gravitates to a depending vertical position. The key shaped end 60 is formed with an elongated slot 65 for accommodating a sealing ribbon therethrough. In alignment with said aperture 65 when the pin 59 is in sealing position with the handle 61 in vertical position there is an aperture 66, Figure 8, in a horizontally extending upper wall 67 which also accommodates the sealing ribbon.

The sealing and locking pin 59 when extended through the aperture 63 effectively locks the shaft 33 against reverse rotation.

The provision made for journaling the operating shaft 33 directly on the gate 19 and in turn providing an underlying support by way of the rail members 35 for the gate 19 at the location of the shaft provides a stable construction for the gate. The operating location, as will be noted by reference to Figure 2, is spaced appreciably from the side of the gate 19 and the overhanging portion thus presented tends to impart a sideways canting tendency thereto as pressure is exerted on the operating head 54 during rotation of the shaft 33. However, such canting effect is counteracted by the guide plate 38 making contact with the undersurface 68 of the flanges 37 of the rail members 35 and the bosses 41 contacting the inner edges of the flanges 37.

The entire arrangement involving the shaft 33, pinions 42 and locking means therefor involves only a comparatively small amount of riveting as the entire shaft assembly and its sealing pin 59 is maintained in position by one rivet 69, it being understood that the collar 56 is maintained in axial alignment on the shaft 33 by a loosely mounted headless pin 70 which is maintained in position by the inner surface of the associated journal bearing of the gate 19.

What is claimed as new is:

1. In a hopper constituting a stationary part and having a discharge opening and a sliding gate for the opening constituting a movable part, means for moving the gate relatively to said hopper including a rotatable shaft carried by one of the parts and geared pinion means carried by the shaft and rack teeth carried by the other of the parts to mesh with the geared pinion means, an operating head on the shaft and a key shaped sealing and locking pin extending through the head across the plane of the shaft, said hopper having a key shaped opening arranged and disposed to accommodate the key shaped end of the pin when the gate is in closed position.

2. In a hopper constituting a stationary part having a discharge opening and a sliding gate for closing the opening constituting a movable part, means for moving the gate relatively to said hopper including a rotatable shaft carried by one of the parts and geared pinion means carried by the shaft and rack teeth carried by the other of the parts to mesh with said geared pinion means, an operating head on the shaft having slotted openings on opposite sides with portions of said openings overlying said shaft, and a locking pin having a key shaped head including a laterally extending flange insertable only through those portions of said slotted openings overlying said shaft when the same is absent and, after having been inserted through said slotted openings and said shaft having been placed in operative position in said operating head, being prevented by said shaft from being withdrawn from said slotted openings, said hopper having a key shaped opening arranged and disposed to receive said key shaped head when said gate is in closed position.

3. For combination with a rotatable shaft carrying pinion means for moving a gate to close a hopper opening, said hopper having a key shaped locking pin receiving aperture, an operating head for mounting on one end of said shaft and having slotted openings on opposite sides with portions of said openings overlying said shaft, and a locking pin having a key shaped head for entering said aperture in said hopper to hold said shaft against rotation when the gate is closed, said key shaped head of said locking pin including a laterally extending flange insertable only through those portions of said slotted openings overlying said shaft when the same is absent and, after having been inserted through said slotted openings and said shaft having been placed in operative position in said operating head, being prevented by said shaft from being withdrawn from said slotted openings.

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