March 9, 1937. W. F. DIETRICHSON ET AL 2,073,513

RAILWAY HOPPER CAR

Filed April 21, 1934 4 Sheets-Sheet 1

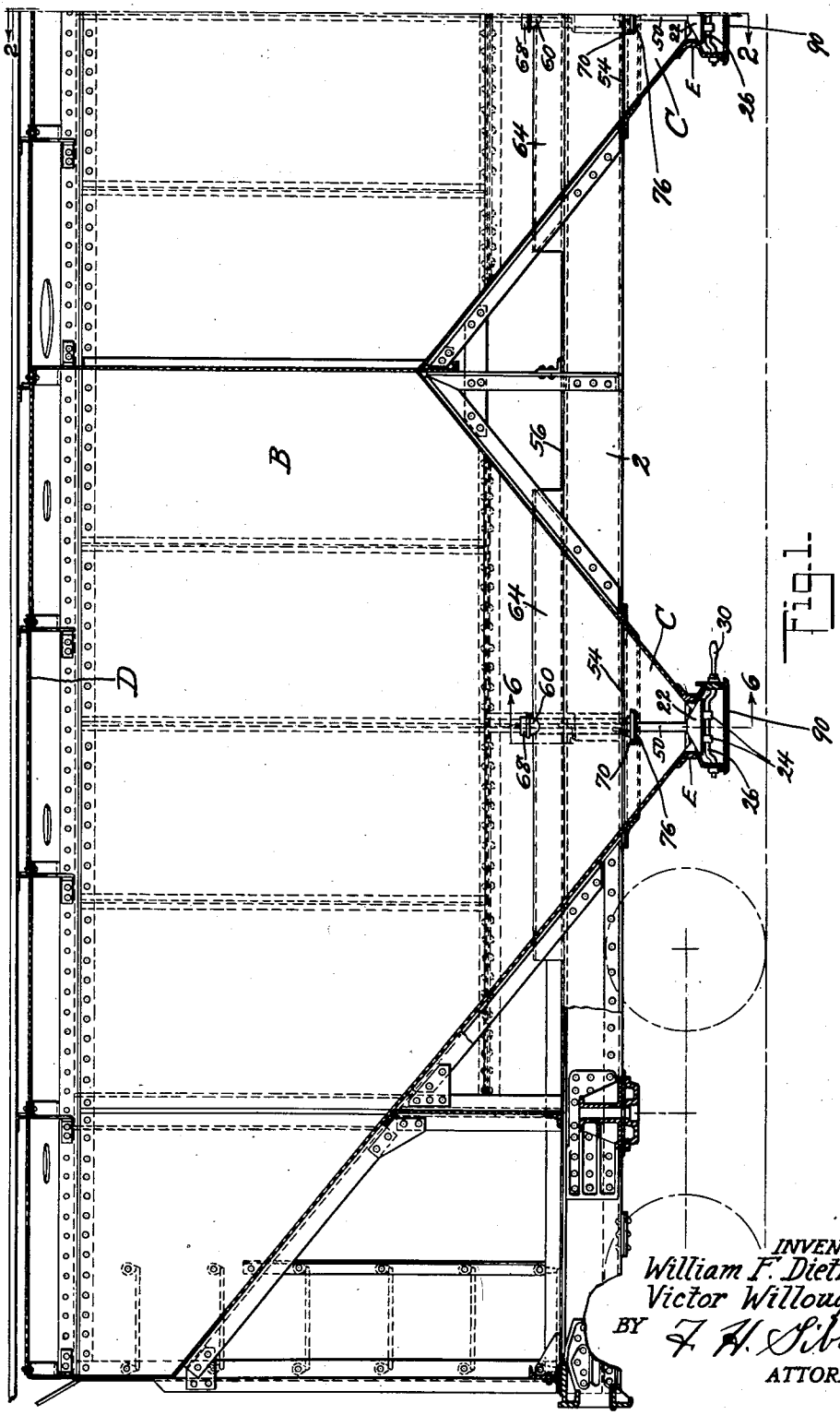


Fig. 1.

INVENTORS
William F. Dietrichson
Victor Willoughby
BY F. H. Sibbs
ATTORNEY

March 9, 1937. W. F. DIETRICHSON ET AL 2,073,513

RAILWAY HOPPER CAR

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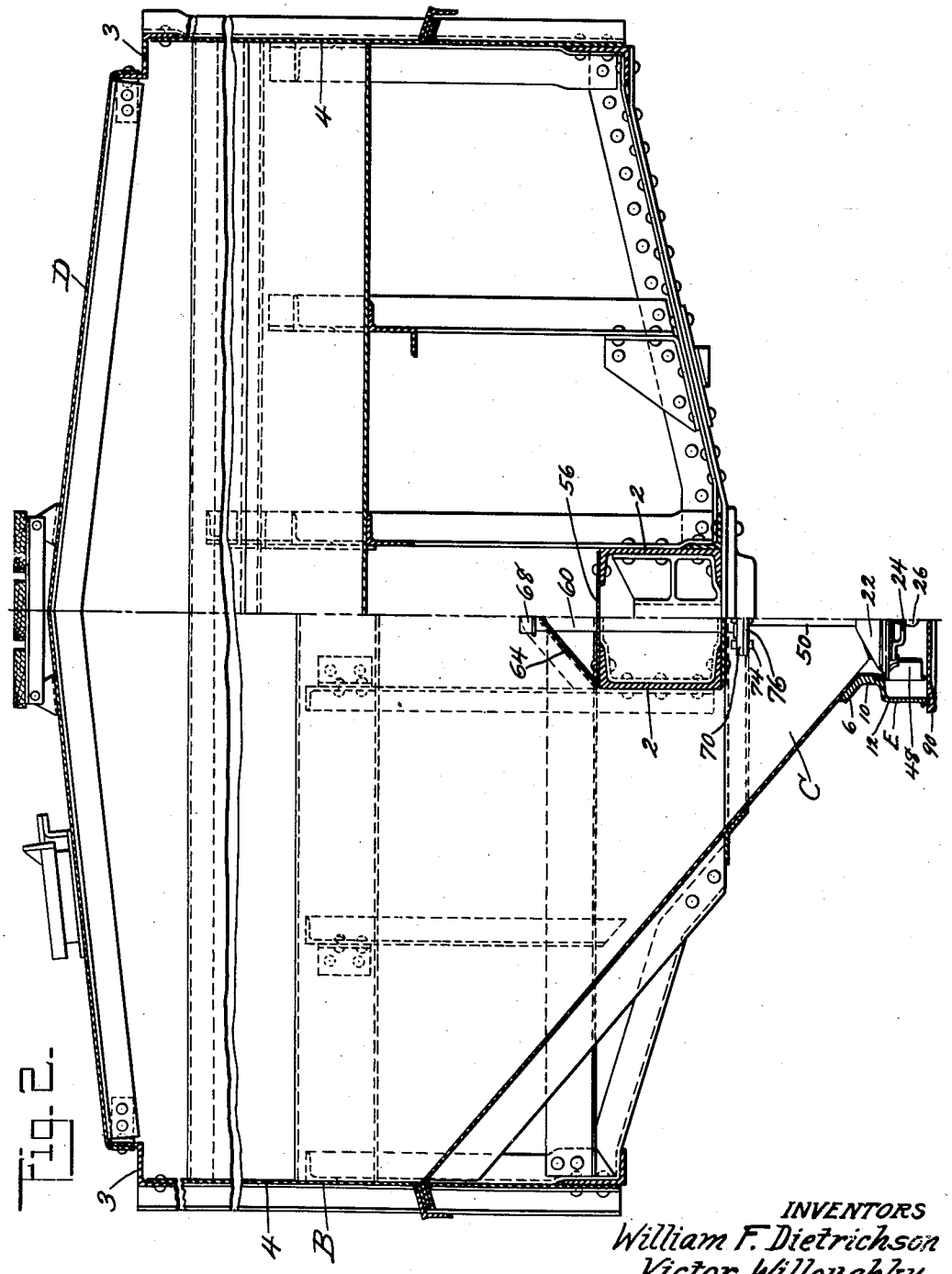


Fig. 2.

INVENTORS
William F. Dietrichson
Victor Willoughby
BY F. A. Gibb
ATTORNEY

March 9, 1937. W. F. DIETRICHSON ET AL 2,073,513

RAILWAY HOPPER CAR

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Fig. 3.

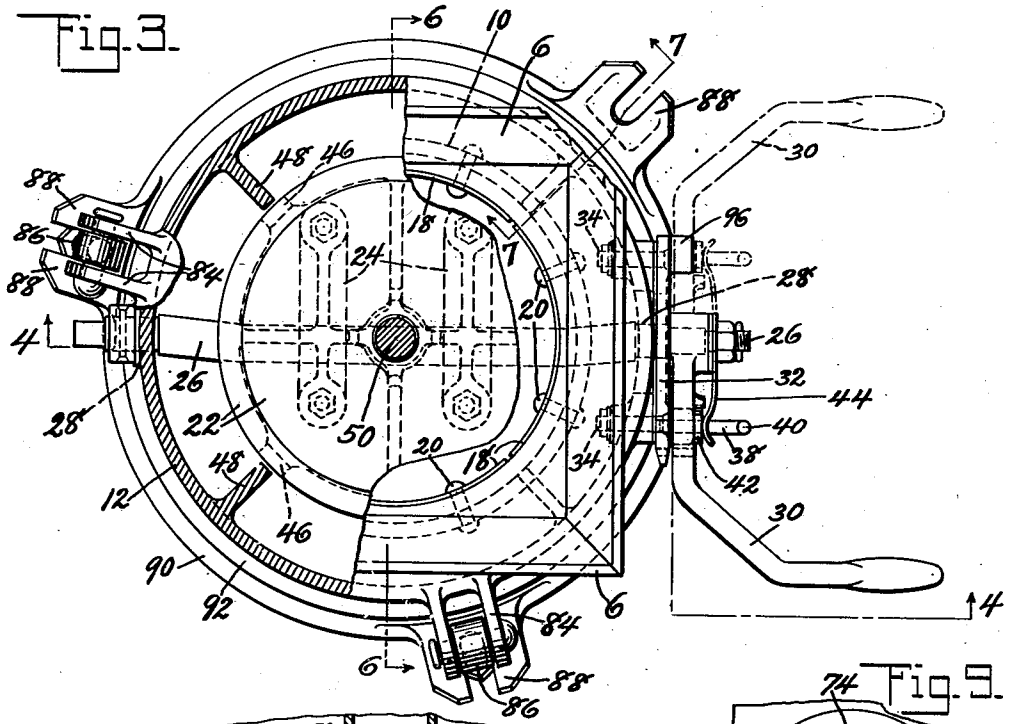


Fig. 4.

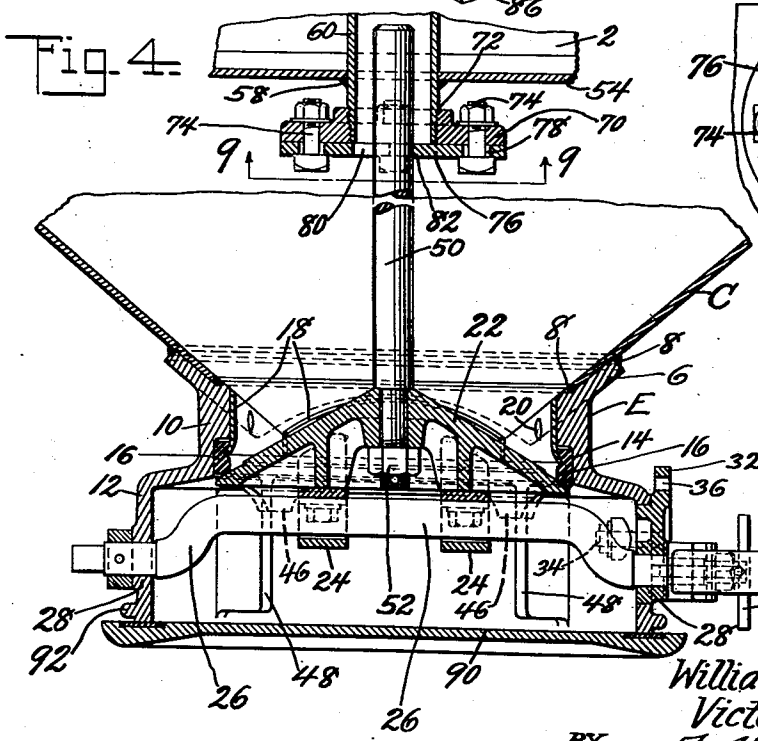
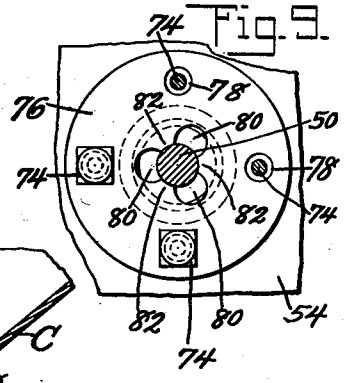


Fig. 9.



INVENTORS
William F. Dietrichson
Victor Willoughby
BY
A. H. Sibley
ATTORNEY

March 9, 1937. W. F. DIETRICHSON ET AL 2,073,513

RAILWAY HOPPER CAR

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Fig. 5

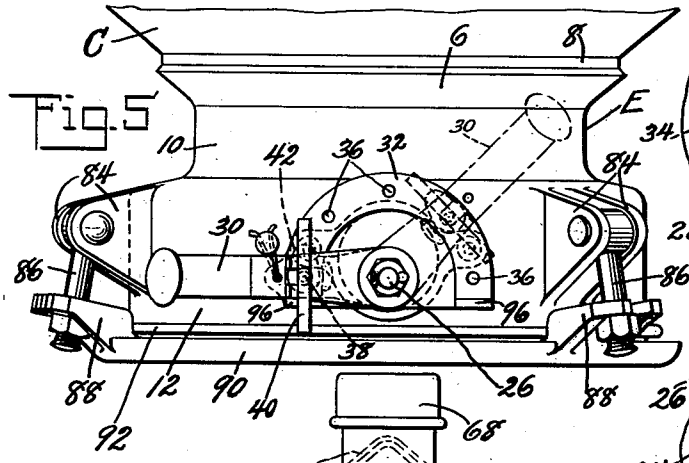


Fig. 8.

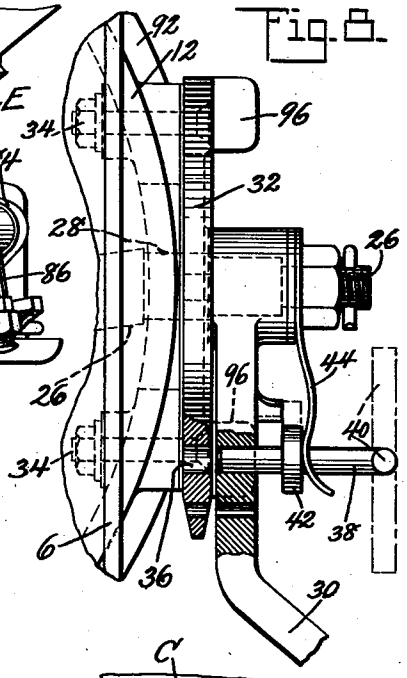


Fig. 6.

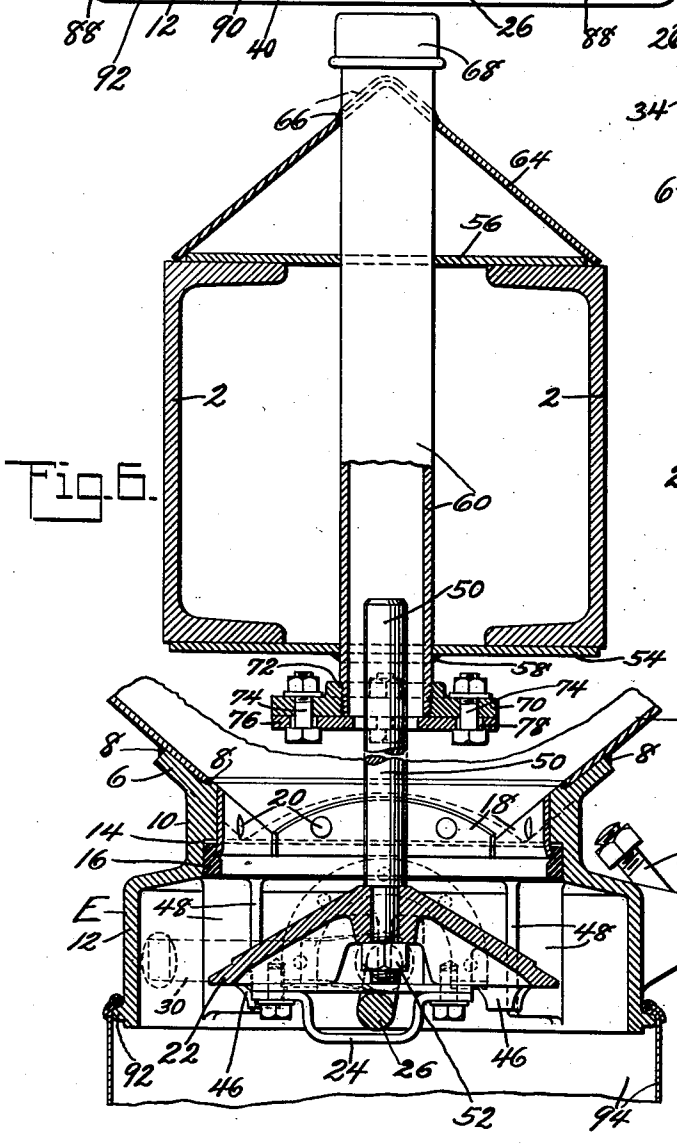
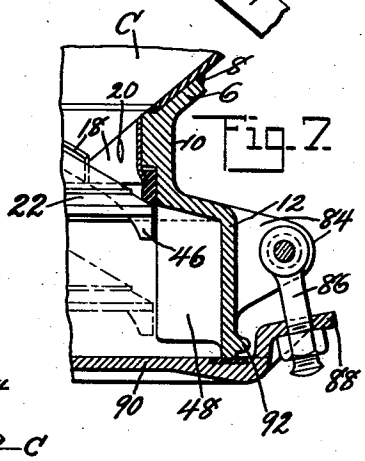


Fig. 7.



INVENTORS
William F. Dietrichson
Victor Willoughby
BY T. H. Gibbs
ATTORNEY

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UNITED STATES PATENT OFFICE

2,073,513

RAILWAY HOPPER CAR

William F. Dietrichson, Berwick, Pa., and Victor Willoughby, Ridgewood, N. J., assignors to American Car and Foundry Company, New York, N. Y., a corporation of New Jersey

Application April 21, 1934, Serial No. 721,674

19 Claims. (Cl. 105—248)

This invention relates generally to railway hopper car constructions and has particular reference to means for controlling discharge of lading therefrom.

One object of the present invention is the provision of a new and improved outlet arrangement for the hoppers of railway cars.

Another object of this invention is the provision of a new and improved valve means for controlling discharge of material from the hoppers of railway cars.

Other objects and advantages of this invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which

Figure 1 is a sectional view through a portion of a railway hopper car showing the present invention applied thereto;

Fig. 2 is a sectional view through the car shown in Fig. 1, a portion of the figure being taken on the line 2—2, Fig. 1, while the other portion of the figure is taken through the car at a point adjacent the bolster;

Fig. 3 is a top plan view of the hopper outlet arrangement, certain parts being broken away to disclose other parts in section;

Fig. 4 is a sectional view on the line 4—4, Fig. 3;

Fig. 5 is a side elevation of the outlet arrangement shown as attached to the discharge end portion of a hopper;

Fig. 6 is a sectional view on the line 6—6, Figs. 1 and 3;

Fig. 7 is a sectional view on the line 7—7, Fig. 3;

Fig. 8 is an enlarged detail view of the valve operating device, showing a portion of the crank handle, a part of the figure being shown in section; and

Fig. 9 is a view on the line 9—9, Fig. 4.

Referring now more particularly to the drawings, the hopper outlet arrangement forming the subject matter of this invention is shown as applied to a railway car having an underframe including center sills 2, a car body B provided with a plurality of hoppers C and a car roof D. In the instance shown in the drawings side plates 3 are shown as secured to the upper edge portions of the side walls 4 of the car and serve as the supporting means for the roof D. The car body may be of any preferred or desired construction, an example of which is shown in the drawings, particularly Figs. 1 and 2, and said body is so formed as to provide the before mentioned hoppers C.

The present invention is concerned primarily with a means for closing the outlet portion of the hopper and for controlling discharge of lading therethrough, said means comprising an outlet arrangement formed as a unitary casting E. The casting E comprises a frame including an upper marginal attaching portion 6 formed to the contour of the discharge portion of the hopper C and hence substantially rectangular in form as indicated clearly in Fig. 3. The attaching portion 6 is connected to the outlet portion of the hopper in any suitable manner as by being welded thereto, both externally and internally, as shown at 8. This rectangular attaching portion 6 merges into a substantially circular neck 10 which depends from the attaching portion 6 as clearly shown in Fig. 4 and, depending from the neck 10 is a skirt portion 12 of greater diameter than the neck, also as clearly shown in Fig. 4 and as illustrated in Figs. 1, 2, 5, 6, and 7. It can thus be seen that the outlet arrangement comprises generally a unitary casting including the rectangular attaching portion 6 with the neck 10 and skirt portion 12 depending therefrom.

As shown clearly in Figs. 4 and 6 the neck portion 10 is rabbeted at 14 to receive a gasket 16 preferably of resilient material such as rubber or rubber compound; said gasket 16 being held in place by spring metal retainer elements 18 secured to the neck portion 10 in any suitable manner as by the fasteners 20 (see Fig. 3).

The neck 10 constitutes a discharge opening for material from the hopper and said opening is adapted to be closed by a valve 22 having depending bearings 24 with which a crank shaft 26 is engaged whereby the valve is supported for reciprocation from closing to open position. The opposite end portions of the crank shaft 26 are journalled in bearings 28 at the skirt portion of the casting E as shown in Figs. 3 and 4.

The crank shaft is adapted to be operated by a handle member 30 secured to one end portion of the crank shaft (see Figs. 3, 4, and 8) and arranged adjacent quadrant 32 secured to the casting E by bolts 34 or other suitable fasteners. The quadrant is provided with a plurality of spaced openings 36 adapted to receive a pin 38 carried by the handle 30 whereby the position of the valve 22 may be regulated to control discharge of lading from the hopper. As shown clearly in Fig. 8 the pin 38 is provided with a handle 40 and with a shoulder 42 with which latter a spring 44 engages to urge the pin towards the quadrant 32 and to retain the pin in any desired opening 36.

At its periphery the valve 22 is provided with contacting members 46 arranged to cooperate with guides 48 formed with the skirt portion of

the casting and projecting radially thereinto as shown more clearly in Fig. 3 whereby the valve 22 is guided vertically during its movement by the crank shaft.

The valve 22 is provided with a stem 50 secured by a nut 52 and projecting vertically upward therefrom as shown particularly in Figs. 4 and 6, the stem 50 being of a length sufficient to extend through the bottom cover plate 54 of the center sills 2, the latter being shown as channels and having a top cover plate 56. To the bottom cover plate 54 of the center sills 2 is welded as at 58 or otherwise suitably attached a tubular member 60 which may be a section of pipe or the like, the lower end portion of tubular member 60 being arranged below the bottom cover plate 54 while the upper end portion of said tubular member projects through the top cover plate 56 of the center sills and through the ridge sheet 64 and is welded to the latter as shown at 66. The upper end of the tubular member 60 is preferably closed by a cap 68.

The lower end portion of the pipe section 60 has a pipe flange 70 secured thereto as by being threadedly engaged therewith as shown at 72 and, fastened to this pipe flange 70 by suitable means such as the bolts 74 is a guide plate 76 provided with elongated or enlarged bolt receiving openings 78 (see Fig. 9). At its central portion the guide plate 76 is provided with a plurality of openings 80 which define contacting shoulders 82 for engaging the valve stem 50 as shown clearly in Figs. 4 and 9. Due to the elongated or enlarged openings 78 in the plate 76 it will be apparent that the plate 76 may be adjusted to position the valve stem within the tube 60 whereby the shoulders 82 engage said valve stem and properly locate the stem 50 and the valve for efficient operation. It is obvious that the provision of the openings 78 compensate for inaccuracies in construction and the plate 76 may be adjusted to a position such that the valve stem will be so held within the tubular member 60 that the valve 22 will properly contact with the valve seat member or gasket 16 in the casting E when in closed position. The plate 76 obviously serves to hold the valve in a proper position for seating against the gasket 16 and movement of the valve in this position is controlled by contact of the members 46 with the guides 48.

Secured to the skirt portion 12 of the casting E and preferably formed integral therewith and projecting radially therefrom are a plurality of sets of lugs 84 which pivotally support bolts 86 adapted to engage ears 88 formed with a cover 90 for closing the open end of the casting E as shown more clearly in Fig. 5. This cover serves as an additional closure element for the discharge portion of the hopper as will be apparent.

The lower end portion of casting E is provided with an annular bead 92 which is adapted to support a flexible boot 94 when the cover 90 is removed for the purpose of conveying material discharged through the hopper to a place of deposit.

In operation with the hopper C loaded the valve 22 is normally in the position shown in Fig. 4 whereby to prevent leakage of material from the hopper. It is to be noted that an efficient seal is provided by reason of the contact of the peripheral portion of the valve 22 with the gasket 16. The cover 90 is normally in the position shown in Fig. 5. To discharge material from the hopper the cover 90 is removed by unfastening the bolts 86 and the boot 94 is supported or attached to the skirt portion of the casting at the bead 92. Operation of the crank handle 30 from the position shown in full lines in Fig. 5, clockwise, to the position shown in dotted lines in said figure, obviously rotates the crank shaft 26 to permit the valve 22 to move vertically downward in the casting E and open the hopper to discharge the lading therefrom. The amount of valve opening is determined by the position of the pin 38 in either of the openings 36 in quadrant 32. For a full open position the handle 30 will be moved its full distance, the quadrant 32 being provided with a stop element or shoulder 96 to limit movement of the handle 30 (see Figs. 5 and 8). During downward movement of the valve 22 the latter is vertically guided by reason of the cooperative relation of the members 46 and the guides 48. The valve is further guided at its valve stem 50 by contact of the stem 50 with the projecting portions 82 of the guide plate 76. Reversal of movement of the handle element 30 causes an upward movement of the valve 22 as will be obvious to either restrict the discharge opening or to completely close the same when the valve 22 contacts with the gasket 16. It is to be understood that this invention includes the use of a valve, indicated at 22, the same being the element which controls movement or discharge of lading from the hopper and this valve is provided with a stem which extends upwardly therefrom.

The drawings herein illustrate one embodiment of the present invention but it is to be understood that they are for illustrative purposes only and various changes in the form and proportions of the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper and having a valve seat therein, a valve body arranged within the frame and adapted to cooperate with the valve seat to close the hopper, a crank shaft journaled in the frame below the valve body and operative to shift the valve body longitudinally relative to the hopper, and guide elements in the frame with which the valve body cooperates during its movements.

2. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper, a resilient valve seat in said frame, a valve in the frame adapted to cooperate with the valve seat to close the discharge end of the hopper, said valve having a stem projecting into the hopper, guide means for said stem, bearings depending from the valve, and a crank shaft journaled in the frame below the valve and engaged with said bearings.

3. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper, a gasket in said frame, spring elements secured to the frame and holding said gasket, a valve in the frame adapted to cooperate with the gasket to close the discharge end of the hopper, bearing elements depending from the valve, a crank shaft journaled in the frame and engaging the bearing elements, said crank shaft being operative to shift the valve longitudinally in the frame into and out of engagement with the gasket, guides in the frame

with which the valve cooperates during its movements, a valve stem projecting upwardly from the valve, and means cooperating with the valve stem to guide the latter during movements of the valve.

4. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper and provided with a resilient valve seat, a valve convex in cross section arranged in the frame and adapted to seat on the valve seat to close the hopper, a crank shaft journaled in the frame below the valve and connected with the valve whereby the latter is supported, means for operating the crank shaft to actuate the valve to and from closed position with respect to the hopper, guide members projecting radially into the frame at the lower portion thereof adapted to cooperate with the valve during its movements, and means for holding the crank shaft in predetermined positions whereby to regulate the extent of movement of the valve relative to the hopper.

5. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper and provided with a resilient valve seat, a valve convex in cross section arranged in the frame and adapted to seat on the valve seat to close the hopper, a crank shaft journaled in the frame below the valve and connected with the valve whereby the latter is supported, means for operating the crank shaft to actuate the valve to and from closed position with respect to the hopper, guide members projecting radially into the frame at the lower portion thereof adapted to cooperate with the valve during its movements, a valve stem rising upwardly from the valve, and means for guiding the valve stem during movements of the valve.

6. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper and provided with a resilient valve seat, a valve convex in cross section arranged in the frame and adapted to seat on the valve seat to close the hopper, a crank shaft journaled in the frame below the valve and connected with the valve whereby the latter is supported, means for operating the crank shaft to actuate the valve to and from closed position with respect to the hopper, guide members projecting radially into the frame at the lower portion thereof adapted to cooperate with the valve during its movements, a valve stem rising upwardly from the valve, means for guiding the valve stem during movements of the valve, and means for holding the crank shaft in pre-determined positions whereby to control the extent of movement of the valve relative to the hopper.

7. In a railway hopper car comprising an underframe having center sills provided with top and bottom cover plates and a ridge piece secured to the top cover plate, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper and provided with a valve seat, a valve movable longitudinally in said frame and adapted to cooperate with the valve seat to close the hopper, means for actuating said valve, a tubular member extending through the top and bottom center sill cover plates and through the ridge piece and connected to said bottom cover plate and the ridge piece, a valve stem rising upwardly from the valve and extending into said tubular member, and means secured to said tubular member and arranged in cooperative relation with the valve stem to guide the latter during movements of the valve.

8. In a railway hopper car, a hopper outlet arrangement comprising a frame secured to the discharge end portion of the hopper and having a valve seat therein, a valve arranged within and movable longitudinally relative to said frame and adapted to cooperate with the valve seat to close the hopper against discharge of lading, a crank shaft journaled in the frame below the valve and secured to the latter to actuate said valve, and a cover for the lower end of the frame detachably secured to said frame.

9. In a railway hopper car formed with a discharge outlet, a control means for said outlet including a casing depending from the hopper and having a valve seat, a plurality of spaced guide elements formed in the casing and arranged below said valve seat, a valve for said valve seat positioned by said guide elements and movable upwardly in the casing into seating position, and actuating means for said valve including means journaled in the casing and secured to the valve and so formed and arranged as to retain said valve in any desired position relative to the outlet.

10. In a railway hopper car formed with a discharge outlet, a control means for said outlet including a casing suspended from and supported by the lower end portion of said outlet having a valve seat, guide elements within said casing extending downward from said valve seat, a reciprocating valve for cooperating with said valve seat normally engaging said guide elements during its travel, a stem fixed to said valve and extending within said car, means within said car for guiding said stem, and means for operating said valve.

11. In a railway hopper car formed with an outlet opening, a discharge casing fixed below said opening including an upper reduced portion formed with a valve seat, and a lower enlarged portion, a valve for cooperating with said valve seat movable within the enlarged portion of said casing, ribs radiating inwardly of the enlarged portion of the casing for guiding said valve during its movement, means for operating said valve, and means for closing the lower end of said casing.

12. In a railway hopper car formed with an outlet opening, a discharge casing fixed below said opening including an upper reduced portion formed with a valve seat, and a lower enlarged portion, a valve for cooperating with said valve seat movable within the enlarged portion of said casing, ribs radiating inwardly of the enlarged portion of the casing for guiding said valve during its movement, a stem fixed to said valve extending within said car, guide means for said stem above said outlet opening, means for operating said valve, and means for closing the lower end of said casing.

13. In a railway hopper car formed with an outlet opening, a discharge casing fixed below said opening including an upper reduced portion formed with a valve seat, and a lower enlarged portion, a valve for cooperating with said valve seat movable within said casing, ribs radiating inwardly of the casing for guiding said valve during its movement, means for operating said valve including a crank fixed to said casing and connected with said valve.

14. A discharge outlet casing for hopper cars including a body having a reduced portion so formed as to be adapted for attachment to a hopper at its discharge end portion and provided with a valve seat and an enlarged portion formed with inwardly radiating guide ribs.

15. In a railway hopper car having a discharge outlet, a casing arranged at the outlet and provided with a valve seat, a valve within the casing and movable upwardly therein into seated position to close said outlet, said valve comprising a head portion provided with bearings, and a crank supported by the casing and having its offset portion engaged with said bearings whereby operation of said crank will actuate said valve.

16. In a railway hopper car formed with a discharge outlet, a discharge casing arranged at the outlet and having a reduced portion formed with a valve seat, a valve within the casing provided with a stem projecting into the discharge outlet, guiding means for the stem, said valve being adapted to engage the valve seat to seal the discharge outlet, and means secured to the valve for actuating the latter.

17. In a railway hopper car having a hopper discharge outlet, a frame arranged at the outlet exterior thereof and provided with a valve seat, a valve arranged within said frame and below the outlet, said valve having a stem projecting into said outlet, guiding means for the stem, said valve being movable downwardly away from the outlet whereby movement of material through the outlet during discharge is unobstructed within said outlet, and valve actuating means supported by the frame and engaged with said valve.

18. In a railway hopper car, a hopper outlet arrangement including a valve and valve stem positioned for vertical movement with respect to the hopper and adapted to close the discharge end of the latter, means above the valve cooperating with the valve stem to guide said stem in its movements, means below the hopper outlet so arranged as to engage the valve to guide the latter in its movements, and valve operating means below the hopper and engaged with said valve.

19. In a railway hopper car, a hopper discharge outlet arrangement comprising a frame secured to and supported by the outlet and provided with a valve seat, a valve arranged in the frame adapted to engage the seat, valve operating means supported by the frame and secured to the valve, a valve stem extending upwardly into the hopper, and guide means engaging said stem, said guide means being so formed as to be capable of adjustment to maintain proper movement of said valve.

WILLIAM F. DIETRICHSON.
VICTOR WILLOUGHBY.