July 29, 1941. J. J. McBRIDE 2,250,591

RAILWAY HOPPER CAR OUTLET

Filed Dec. 8, 1938 3 Sheets-Sheet 1

Fig. 1.

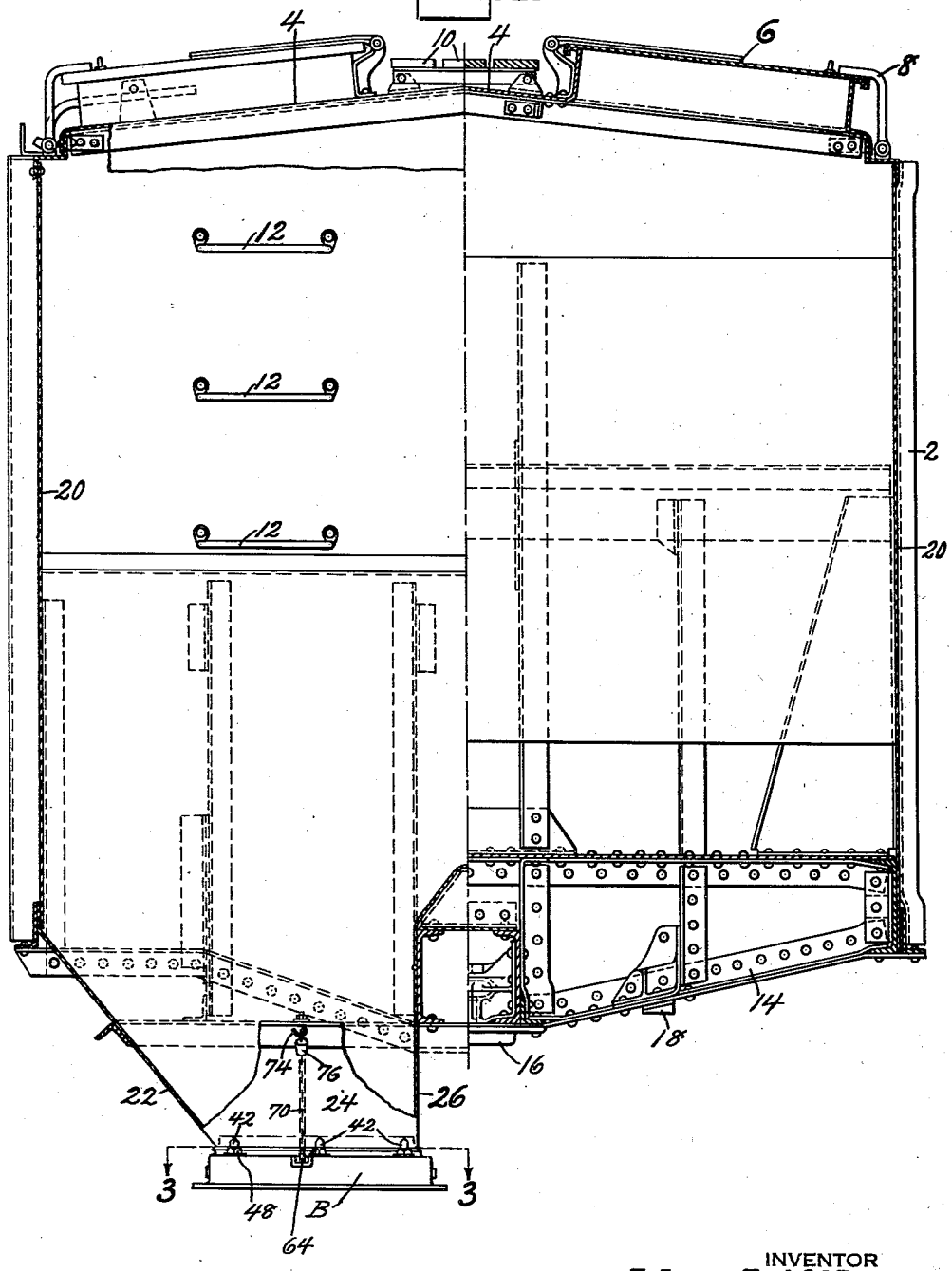

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Fig. 2.

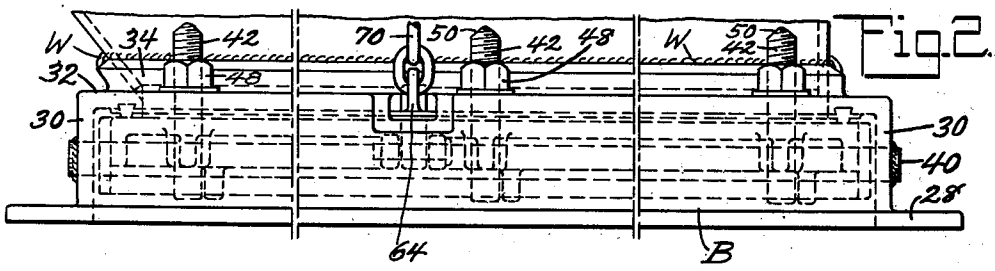

Fig. 3.

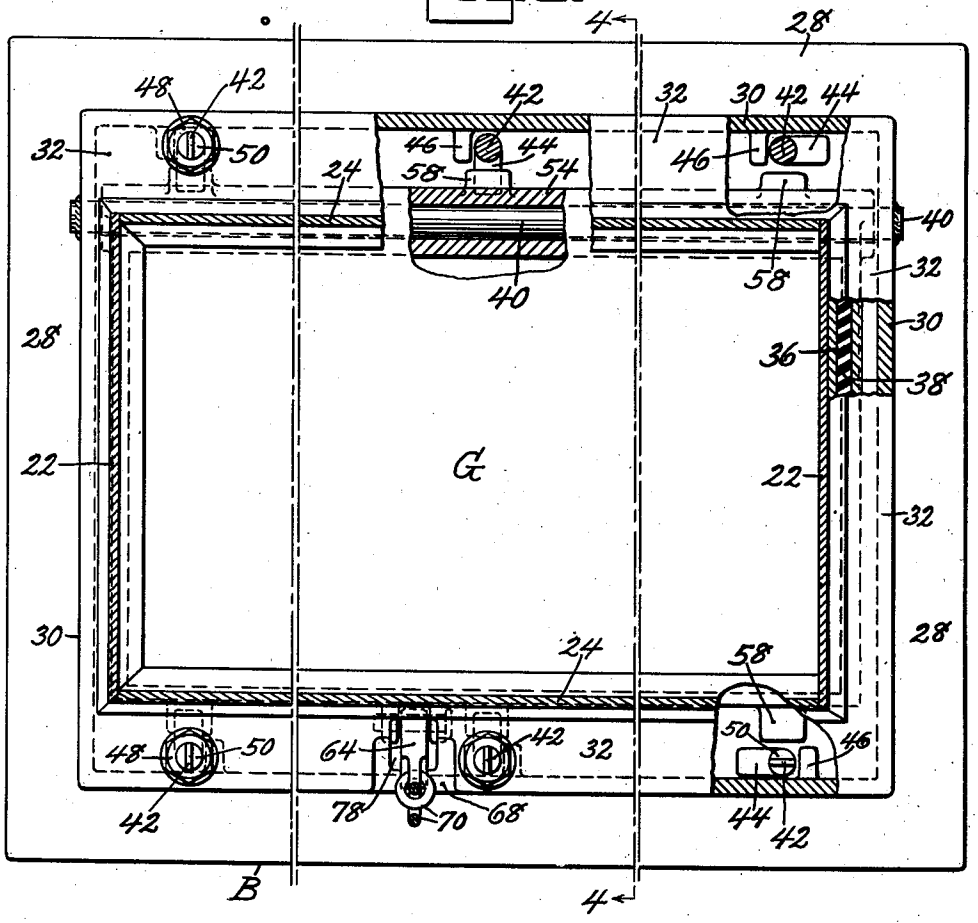

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Fig. 4.

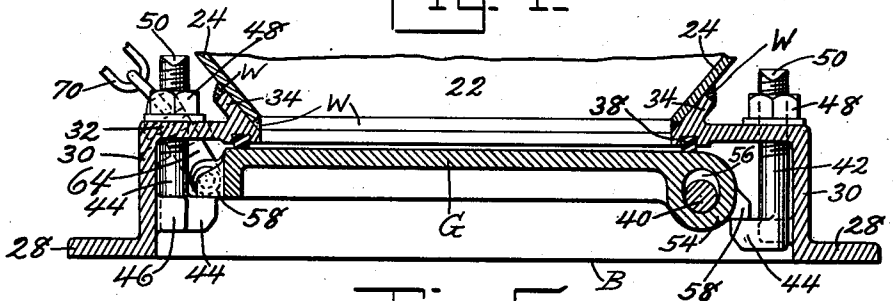


Fig. 5.

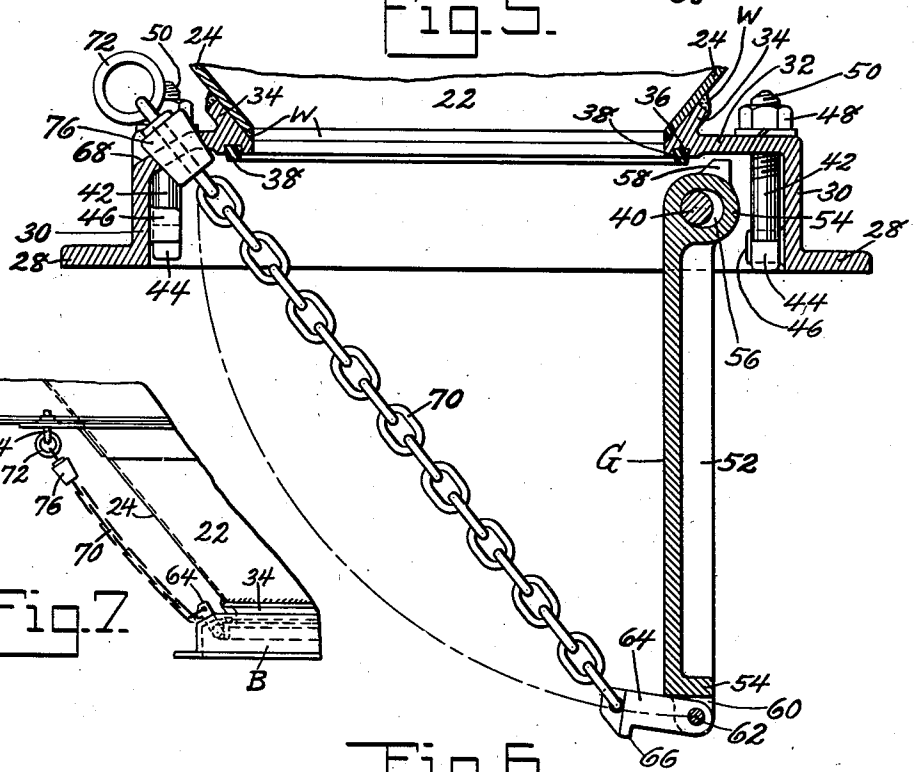


Fig. 7.

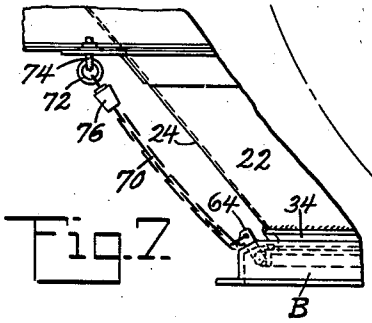
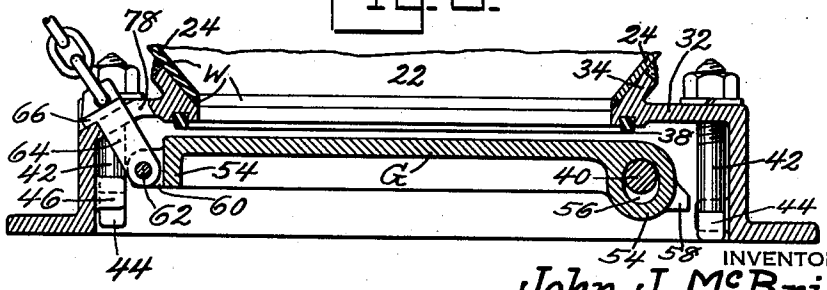


Fig. 6.



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UNITED STATES PATENT OFFICE

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RAILWAY HOPPER CAR OUTLET

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Application December 8, 1938, Serial No. 244,659

13 Claims. (Cl. 105—280)

This invention relates in general to railway hopper cars and in particular to such cars intended for transportation of cement or other fine, granular materials and has particular reference to means for closing the hopper outlet against discharge of lading or ingress of moisture.

Hopper cars intended for transportation of cement, carbon black, sugar or other fine, granular materials must be protected against the elements and accordingly cars of this type are covered and sealed to prevent loss of lading or entrance of moisture. It is comparatively easy to seal the roof, side walls and hopper sheets, but considerable trouble has been occasioned by the hopper outlet. This outlet must be closed by some means which will prevent loss of lading or entrance of moisture to the car and also must be of such form as to permit attachment of a discharge boot or similar means preventing loss of discharging lading or contamination thereof by moisture or foreign matter. The most satisfactory hopper closure so far has been a sliding gate which may be readily operated after attachment of the discharge boot, but this outlet has caused trouble on several instances due to the packing of material in the slide grooves and has also caused trouble due to the displacement of the packing gasket by the sliding gate. It is an object, therefore, of the present invention to provide a hopper outlet gate in which the resilient sealing gasket can not be displaced by the gate.

A further object of the invention is the provision of a hopper outlet gate pivoted to the hopper outlet to swing downwardly but with its pivot so arranged that the gate may be bodily lifted toward the hopper.

A still further object of the invention is the provision of a swinging and vertically shiftable gate which may be operated after attachment of the discharge boot.

Yet another object of the invention is the provision of a swinging and vertically shiftable gate which may be operated after attachment of the discharge boot and with the frame for the gate so arranged as to prevent any entrance of moisture or foreign material at any time.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which

Figure 1 is in part an end elevational and in part a sectional view showing the hopper arrangement with parts broken away to more clearly disclose the construction;

Fig. 2 is an enlarged elevational view of the hopper outlet;

Fig. 3 is an enlarged sectional view taken substantially on line 3—3 of Figure 1;

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 3;

Fig. 5 is a sectional view similar to Fig. 4 but showing the gate in open position;

Fig. 6 is a sectional view similar to Fig. 4 but showing the gate in parallel open position, and

Fig. 7 is a partial elevational view showing the attachment of the operating chain to the car structure.

Referring now to the drawings in detail, it will be seen that the hopper outlet has been applied to a car of more or less conventional type with side stakes 2, roof 4 having covered entrance hatches 6 held in place by locks 8. The customary running board 10 is provided as is also hand-holds 12, permitting entrance and exit to and from the hoppers. The car is provided with bolsters 14, center bearings 16, side bearings 18 and side walls 20, all of more or less conventional type. The hopper outlet opening is formed between side slope sheets 22, and slope sheets 24 and centrally positioned sheet 26, which may be integral with the center sill housing. The lower edge of these sheets forming the hopper opening are secured in any suitable manner, such as welding, at W to the metal frame B forming the outlet proper.

The outlet frame is preferably cast in one piece with the sides preferably of Z cross section, with the lower flange 28 directed outwardly from the lower edge of web 30, while the upper flange 32 extends inwardly from the upper edge of the web and terminates in an inclined reflanged portion 34 conforming to the contour of the hopper forming sheets. The lower surface of the inwardly directed flange 32 is provided adjacent the edge of the flange with a groove 36 adapted to receive a rubber or other resilient gasket 38. Thus it will be seen that an outlet frame is provided for attachment to the hopper forming sheets and having an outlet opening surrounded by a gasket and with the frame carrying outwardly directed flanges 28 to which the customary discharge boot (not shown) may be attached. The outlet frame is roughly rectangular in outline as is clearly shown and the end portions have holes drilled in the web thereof to receive a pivot rod 40 secured to the frame by any suitable means, such as welding. The flange 32 is provided with holes through which securing bolts 42 may extend and which bolts together

with the nuts and washers effectively close the bolt holes at all times. These bolts are L-shaped and of such a length that the L head **44** may contact with lugs **46** cast or otherwise secured to the lower portion of the frame web and which lugs will serve to prevent rotation of the L headed bolt in a clockwise direction as viewed from the threaded end thereof. These L bolts may be raised or lowered relative to the frame by means of nuts **48** and the upper end of each bolt is preferably beveled as at **50** in order to provide an indication of the exact position of the L head at the lower end thereof. The door or outlet gate G is preferably cast in one piece with a flat upper surface reenforced on the under side by stiffening ribs **52** merging into and reenforcing the downturned marginal edges **54**, one of which is enlarged and cored to provide an elongated opening **56** adapted to receive the hinge rod **40** previously referred to and to permit translatory movement between the door and hinge rod. At least two of the marginal edges of the door are provided with lugs **58** formed thereon in such a position as to permit contact with the upper surface of the heads of the L bolts. The edge of the door or gate opposite the hinge rod opening is also provided with a pair of outstanding lugs **60** adapted to receive pin **62** upon which is pivotally mounted between the lugs a latch member **64**. This latch member is provided with a latching shoulder **66** adapted to engage with a surface **68** formed by a part of the flange **32** previously referred to. The upper end of the latch member is connected to one end of a chain **70**, the upper end of which is connected to a ring **72** by means of which a chain may be more readily grasped and also held in position upon a hook **74** carried by the car structure. In the instance shown the uppermost link of the chain is provided with an elastic or other suitable plug **76** adapted to seal the opening **78** in the flange **32** through which the chain must pass as the door moves to open position. This plug will effectively seal the opening and prevent the chain from being pulled through the frame and into the discharge boot.

The operation of the improved hopper outlet is as follows assuming the parts to be in the position clearly shown in Figs. 4 and 7: After attachment of the discharge boot the ring **72** will be disengaged from hook **74** allowing the chain to drop freely over the side of the outlet casting. Rotation of nuts **48** in a counter-clockwise direction will permit the L headed bolts to lower, thus lowering the gate until such time as the free play in elongated pivot opening **56** is taken up and the shoulder **66** of the latch engages surface **68** of the frame. As soon as the door is supported by the hinge rod and latch, the L headed bolts will turn to such a position as to clear the lugs **58** and place the L heads **44** substantially parallel to the outlet casting webs **30** but still effectively sealing the bolt holes against free entrance of moisture due to the presence of the bolt shank in the hole and due to the capping effect of the washers and nuts. The door or gate will now be in the position as shown in Fig. 6 with the door entirely free of the resilient gasket and the L headed bolts turned with the L head parallel to the web of the frame. The latch **64** may now be knocked out of engagement with the surface **68** of the frame, permitting the freed edge of the gate or door to drop, pulling the chain **70** through the opening **78** until such time as the gate is fully opened and the plug has closed and sealed the opening (Fig. 5). In this manner all openings into the frame are closed against entrance of moisture or other matter by the bolts, nuts and washers and plug **76** as well as by the welded hinge rod. After discharge of the lading the operator may grasp ring **72**, pulling the door up to such a position as will permit the latch **64** to engage the frame, holding the door in the position shown in Fig. 6. The L headed bolts are now rotated until the heads engage under the lugs **58** on the door as is indicated by the beveled upper end on the bolt, after which the nuts are tightened to raise the door into sealed position as shown in Fig. 4. The upward motion of the door to final sealed position is, of course, permitted by the elongated hinge opening and by the latch which has a plain shank below the shouldered portion **66**.

It will be seen from the preceding description that an extremely simple outlet casting has been provided in which a door may be mounted for vertical shifting and rotation. Due to the lowering and rotation of the door in the opening, the gaskets are never subjected to any force other than purely compressing and can not be torn from position or injured by discharging material. Likewise, the gate will be easy to operate since it moves in the direction of lading discharge at all times during opening.

While the invention has been described more or less in detail, it is obvious that various modifications and rearrangements of parts may be made and all such modifications and rearrangements of parts are contemplated which will fall within the scope of the following claims.

What is claimed is:

1. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, and means to shift said door transversely of the hinge element toward and away from said frame opening when the plane of the door is substantially parallel to the plane of the frame opening, certain of said means being movable into and out of the path of movement of the free edge of said door.

2. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, means independent of said hinge element to shift said door transversely of the hinge element toward and away from the plane of said frame opening when the plane of the door is substantially parallel to the plane of the frame opening, and means connected to said door and passing through said frame for controlling the swinging of said door upon the hinge element.

3. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element for relative translatory movement and swingable to open or close said opening, resilient gasket means surrounding said opening, and means carried by said frame and independently of the hinge element to shift said door

transversely of the hinge element into compressive relationship with said gasket after the door is in a partially closed position and substantially parallel to the plane of the discharge opening.

4. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, said door being formed with an elongated opening for reception of said hinge element whereby said door may shift transversely of the hinge element, and means carried by said frame and operable to bodily shift the entire door transversely of the hinge element from a partially closed position toward the plane of said discharge opening and in a direction substantially normal to said plane.

5. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, said door and hinge element being so formed and arranged as to permit translatory shifting movement of the doors from a partially closed to a fully closed position, and L bolts extending through said frame and having the heads engageable with said door, said bolts being operable to shift said door transversely of the hinge element from the partially closed position toward said restricted opening.

6. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, said door and hinge element being so formed and arranged as to permit translatory shifting movement of the doors from a partially closed to a fully closed position, lugs projecting from at least one edge of said door, and L bolts extending through said frame and having the heads thereof engageable with said lugs, said bolts being operable to shift said door transversely of the hinge element from the partially closed position toward said restricted opening.

7. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, means for controlling the swinging of said door and connected to the free edge thereof, said means passing through said frame and supporting said door in a partially closed position, and means to shift said door transversely of the hinge element from the partially closed position to a fully closed position and in a direction substantially normal to the plane of the discharge opening.

8. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and provided with a restricted discharge opening, a hinge element carried by said frame, a door carried by the hinge element and swingable to open or close said opening, means for controlling the swinging of said door and connected to the free edge thereof, said means passing through said frame and supporting said door in a partially closed position, and means to shift said door transversely of the hinge element from the partially closed position to a fully closed position, said means being so formed and arranged as to cooperate with said frame to substantially prevent passage of moisture through the frame when the door is in an open position.

9. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and being formed by sides of substantially Z cross section having the upper flanges directed inwardly to provide a restricted discharge opening and the lower flanges directed outwardly to provide ledges for attachment of a discharge boot, a hinge element carried by said frame, a door carried by said hinge element and swingable thereon to clear or obstruct said opening, said door and hinge element being so formed and arranged as to permit translatory shifting movement of the door from a partially closed to a fully closed position, and means carried by said frame and operable to shift said door from the partially closed position transversely of the hinge element toward said upper flanges of the frame.

10. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper, and being formed by sides of substantially Z cross section having the upper flanges directed inwardly to provide a restricted discharge opening and the lower flanges directed outwardly to provide ledges for attachment of a discharge boot, a hinge element carried by said frame, a door carried by said hinge element and swingable thereon to clear or obstruct said opening, said door and hinge element being so formed and arranged as to permit translatory shifting movement of the door from a partially closed to a fully closed position, and means carried by said frame and operable to shift said door from the partially closed position transversely of the hinge element toward said upper flanges of the frame, said upper flanges being provided with a resilient gasket compressible by said door during shifting toward the flanges.

11. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and being formed by sides of substantially Z cross section having the upper flanges directed inwardly to provide a restricted discharge opening and the lower flanges directed outwardly to provide ledges for attachment of a discharge boot, a hinge element carried by said frame, a door carried by said hinge element and swingable thereon to clear or obstruct said opening, said door and hinge element being so formed and arranged as to permit translatory shifting movement of the door from a partially closed to a fully closed position, and L shaped bolts having the shanks projecting through certain of said upper flanges and the heads engageable beneath portions of said door, said bolts being operable to shift said door from the partially closed position transversely of the hinge element toward said upper flanges of the frame.

12. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and being formed by sides of substantially Z cross section having the upper flanges directed inwardly to provide a restricted discharge opening and the lower flanges

directed outwardly to provide ledges for attachment of a discharge boot, a hinge element carried by said frame, a door carried by said hinge element and swingable thereon to clear or obstruct said opening, said door and hinge element being so formed and arranged as to permit translatory shifting movement of the door from a partially closed to a fully closed position, lugs formed on at least two sides of said door, and L shaped bolts having the shanks thereof projecting through certain of said upper flanges and the heads engageable beneath said lugs, said bolts being operable to shift said door from the partially closed position transversely of the hinge element toward said upper flanges of the frame.

13. In a railway hopper car the combination of, a hopper door frame secured to the discharge end portion of the hopper and being formed by sides of substantially Z cross section having the upper flanges directed inwardly to provide a restricted discharge opening and the lower flanges directed outwardly to provide ledges for attachment of a discharge boot, a hinge element carried by said frame, a door carried by said hinge element and swingable to clear or obstruct said opening, operating means connected to said door and extending through said frame to control the swinging of the door and to support the door in a partially closed position, and means to shift said door transversely of the hinge element from the partially closed position to a fully closed position, said door shifting under control of said means in a direction substantially normal to the plane of the discharge opening.

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