July 9, 1940. A. CAMPBELL 2,206,938

RAILWAY DUMP CAR CONSTRUCTION

Filed July 2, 1938 4 Sheets-Sheet 1

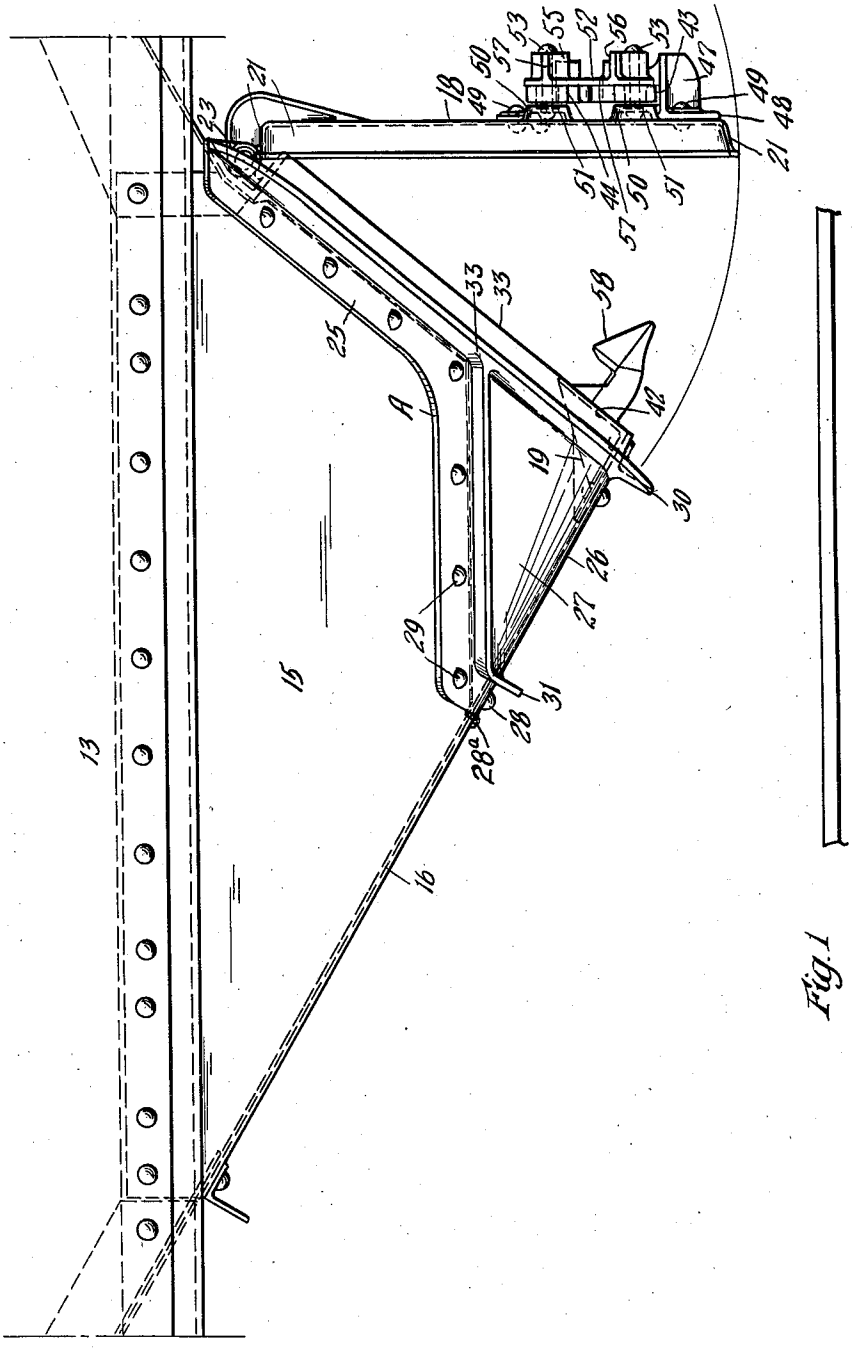


Fig. 1

INVENTOR.
Argyle Campbell

BY George I. Haight

ATTORNEY.

July 9, 1940. A. CAMPBELL 2,206,938

RAILWAY DUMP CAR CONSTRUCTION

Filed July 2, 1938 4 Sheets-Sheet 2

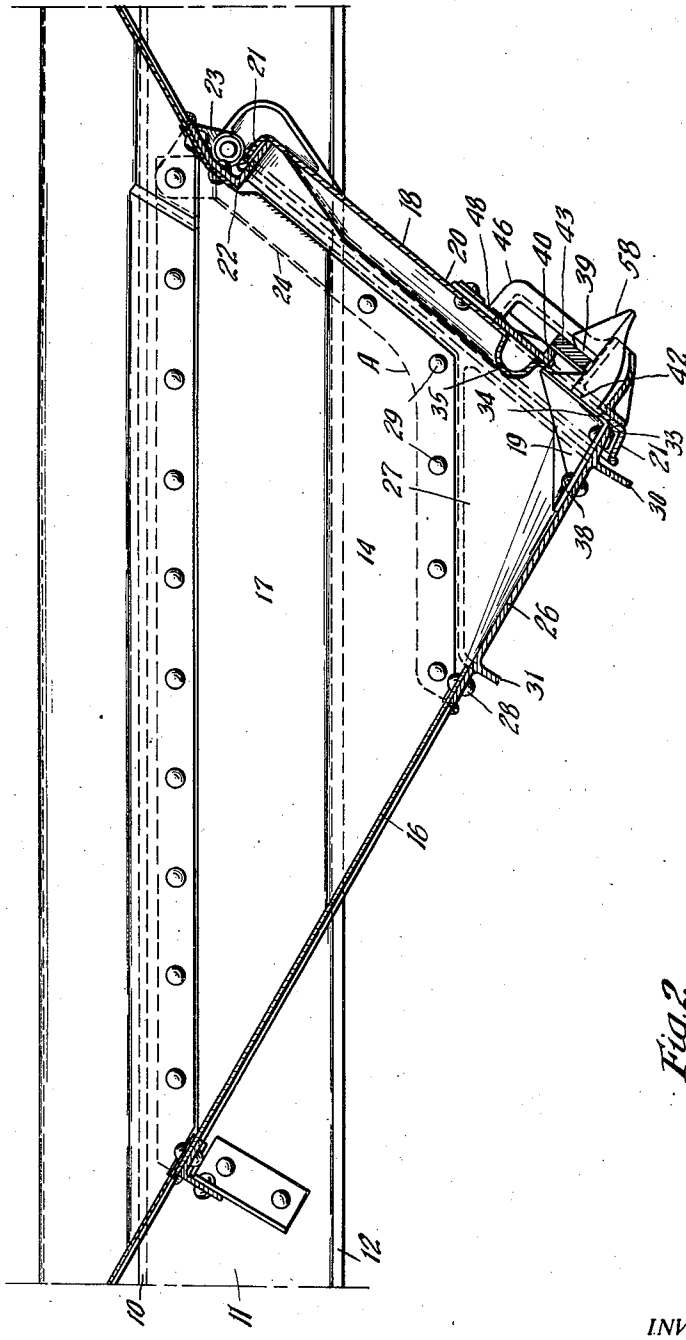


Fig. 2

INVENTOR.
Argyle Campbell
BY George I. Haight
ATTORNEY.

July 9, 1940. A. CAMPBELL 2,206,938

RAILWAY DUMP CAR CONSTRUCTION

Filed July 2, 1938 4 Sheets-Sheet 3

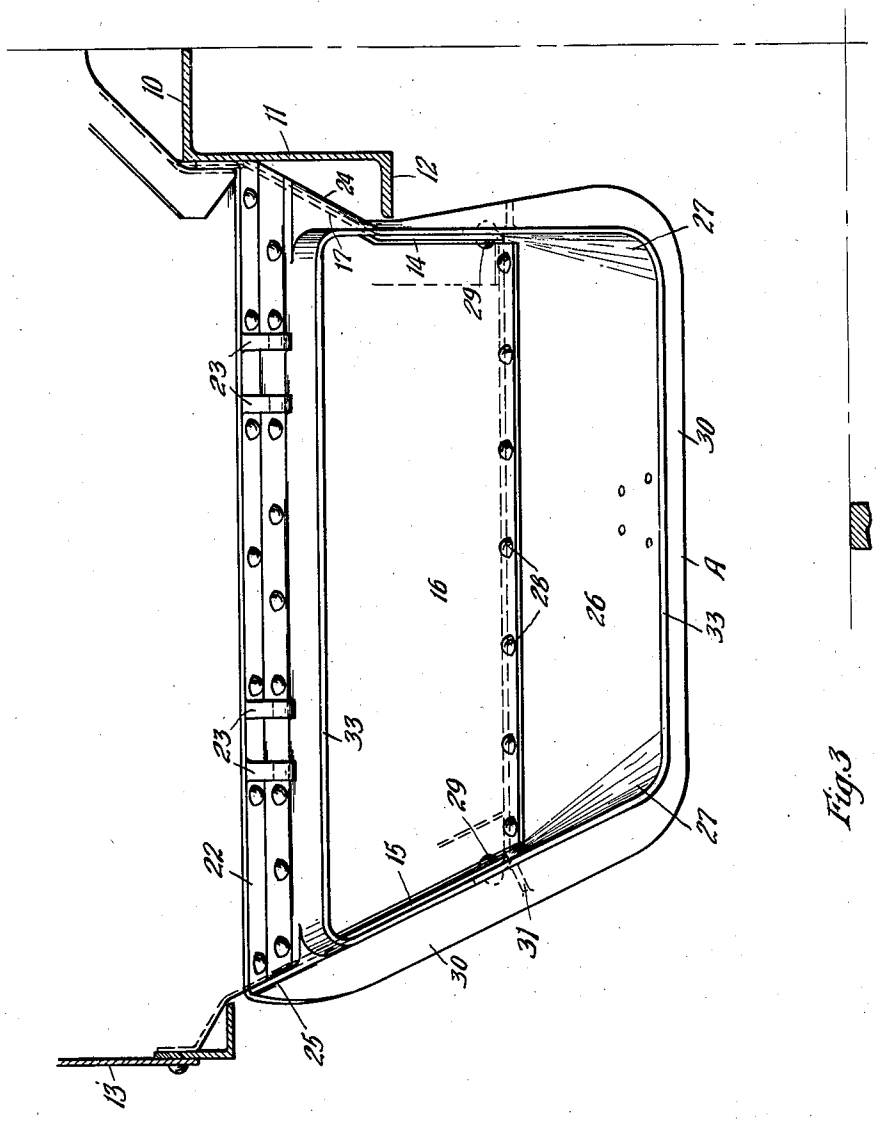


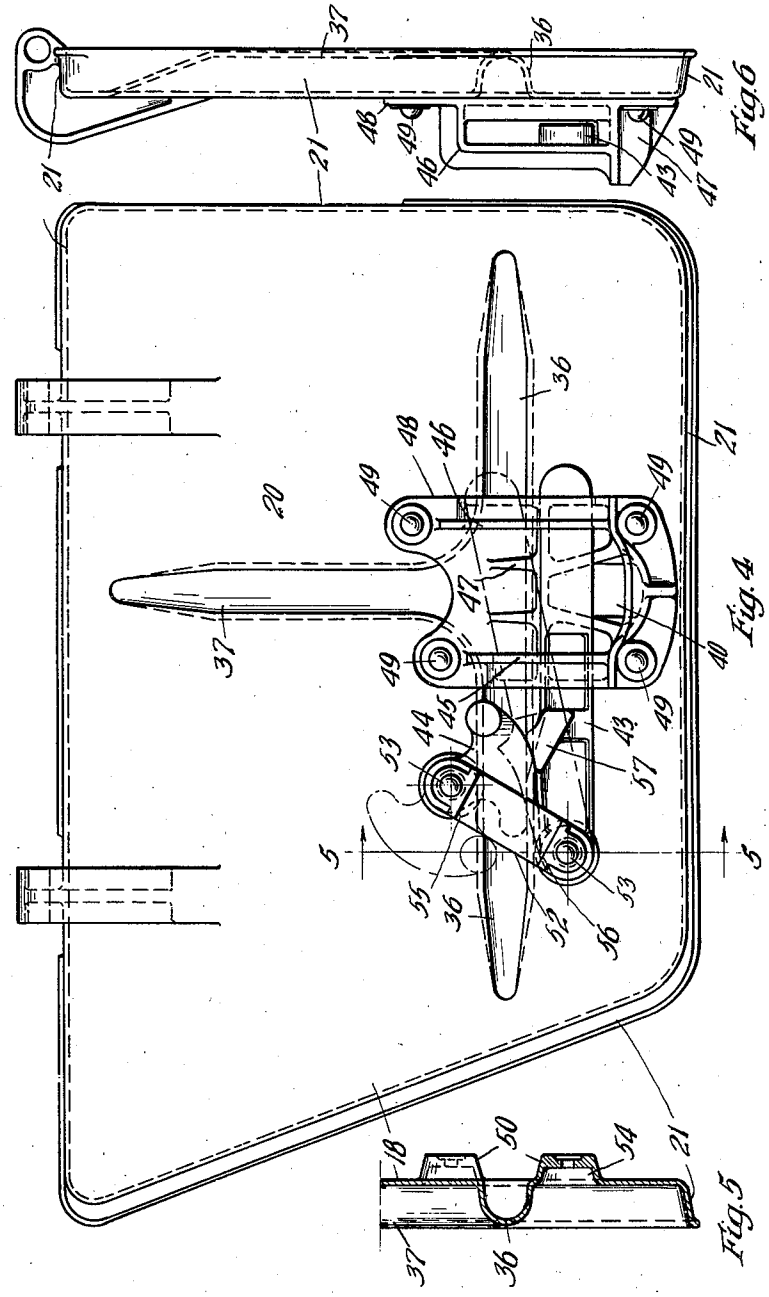
Fig. 3

INVENTOR.
Argyle Campbell
BY George D. Haight
ATTORNEY.

July 9, 1940. A. CAMPBELL 2,206,938

RAILWAY DUMP CAR CONSTRUCTION

Filed July 2, 1938 4 Sheets-Sheet 4



INVENTOR.
Argyle Campbell
BY George D. Haight
ATTORNEY.

Patented July 9, 1940 2,206,938

UNITED STATES PATENT OFFICE

2,206,938

RAILWAY DUMP CAR CONSTRUCTION

Argyle Campbell, Chicago, Ill., assignor to Enterprise Railway Equipment Company, Chicago, Ill., a corporation of Illinois

Application July 2, 1938, Serial No. 217,250

4 Claims. (Cl. 105—249)

This invention relates to an improved construction for railway dump cars having dumping hoppers and dumping doors associated therewith. The improvements are more particularly related to the construction associated with the hopper construction, hopper doors and door latching mechanism.

The improved construction is particularly applicable to that type of dump car having a sloping floor which directs lading to a discharge opening and wherein a door of the vertically suspended type is adapted to meet with the lower edge of the sloping floor and to be secured thereto when in closed position.

In cars of the identified construction, especially when tightly closed doors are employed, there is a tendency for moisture to collect in the bottom part of the hopper resulting in rapid deterioration of the metal plates due to corrosion, and it is one of the objects of the present invention to provide a structure which will guard against corrosion at the more vulnerable locations. The rusting tendency associated with the usual sheet metal plate used in the construction of the side and bottom hopper walls has resulted in the use of comparatively narrow door frames around the discharge openings. Such frames, due to their comparatively narrow construction, are only partially effective in remedying the troubles. It has been proposed to use large hoppers of a depth to include the entire hopper construction below the center sills and below the side walls of the car, these being formed with upwardly extending side walls for attachment to the center sills and side walls, but such structures are necessarily cumbersome and expensive.

My improvements contemplate the employment of the usual type of door frame construction for the upper part of a hopper discharge opening and the provision at the lower part of the frame of an integral cast metal extension which forms the lower portions of the hopper sloping floor and side walls of the hopper, thereby providing in effect a cast fractional hopper at the lower portion of the discharge opening.

The rearward extension of the frame which forms the lower portion of the sloping floor of the hopper, forms a wide bottom crosspiece which provides a strong beam substantially normal to the plane of the door when the latter is in closed position. This feature is of importance when the door retaining keeper is positioned at the central portion of the hopper wall, in such manner as is embodied in the present structure.

My improvements involve the use of a cast steel door and a hopper, which, for an appreciable distance above the lower portion of the hopper, is formed on all sides of cast steel. The improved door has special means to prevent distortion whereby a close fit is obtained between the door and frame, said means being arranged to compensate for shrinkage of the metal in the body of the door and allow for the contraction which takes place intermediate the margins of the door, as the cast metal cools. The means employed consists of a deformation in the body of the plate which provides a comparatively narrow corrugation or a plurality of intersecting corrugations arranged at an angle to each other.

My invention further relates to a very simple form of door latch which can be readily and safely operated by means of a removable bar from a position adjacent the side wall of the car.

My invention involves a hopper structure, door and door latching mechanism which may be assembled and fitted together prior to mounting on the car and applied as a self contained unit. The improved unitary structure is applicable to old and new cars, and in the case of application to old cars where the parts in the lower portions of the hopper have corroded, it is only necessary to cut out the lower portion of the side hopper sheet and sloping floor and apply my improved assembly in substitution.

In the accompanying drawings, my improved construction is shown as applied to a hopper car of the so-called W type, in which hoppers depend below the center sill and are arranged on opposite sides of the center sills with the hoppers on the respective sides disposed in transversely aligned relation.

Referring to the drawings:

Fig. 1 is a view in side elevation of my improved hopper and door construction, the door being illustrated in open position.

Fig. 2 is a vertical longitudinal section of the hopper and door structure shown in Fig. 1, except that the door is shown in closed position.

Fig. 3 is a view in elevation, looking longitudinally at the hopper, at the discharge opening end—the door being removed.

Fig. 4 is an enlarged view in elevation of the outside of the door illustrating the door latching mechanism.

Fig. 5 is a detail section on line 5—5 of Fig. 4; and

Fig. 6 is a side elevation of the door illustration in Fig. 5.

The drawings show one of the beams 10 of the center sill, said beam being of Z-shape in section and having a vertical web 11 and an outstanding lower flange 12. One of the side walls of the car is indicated at 13. Between the center sill and side wall is shown a longitudinally discharging hopper having an inner wall 14 and an outer wall 15, said walls being spaced apart and united by a sloping floor 16 which leads downwardly to a lading discharge opening. The hopper inner side wall 14 extends downwardly from the center sill web, but at its upper por-

tion it is formed with an inclined portion 17 to direct lading from above the center sill lower flange 21. From the flange the wall extends downwardly substantially vertically. The outer wall 15 extends downwardly from the side wall 13 of the car, and converges inwardly toward the opposite wall 14.

Positioned in the discharge opening is a pivotally mounted door 18 adapted to swing to a substantially vertical position as shown in Fig. 1 when in opened position and engageable with a keeper 19 when in closed position. The door is pan shaped and preferably formed of cast metal, and consists of a main body portion 20 reinforced around the edges by a continuous flange 21 turned upwardly away from the load contacting inner surface of the door.

The discharge opening with which the door cooperates is defined by a combination frame and hopper structure A, which is integrally formed of cast metal and includes a four-sided door bordering frame portion. This frame portion has an upper beam like portion 22 extending along the top of the door opening and secured at one end to the center sill web. It is provided with hinge butts 23 for supporting the door. Extending downwardly from the ends of said portion 22 is a three-sided stirrup-like portion which includes inner side portion 24 and outer side portion 25, and a lower flat-like plate portion 26 extending crosswise between the side portions—all formed integrally. The crosswise portion 26 forms the lower part of the frame and is extended lengthwise and inclined upwardly in the direction of flow of the material well beyond the upper portion of the frame. The said extended portion of the frame at each side of the hopper is united with its associated downwardly extending stirrup portion by means of triangular shaped integral side wall portions 27. The sloping floor crosswise extending portion 26 in combination with the triangular shaped side walls 27 provides a fractional hopper at the lower part of the car hopper.

The hopper side sheet metal side walls 14 and 15, and the sloping floor 16, which are all formed of commercial sheet metal plates and therefore subject to corrosion, terminate at an appreciable distance above the apex of the hopper and the distance intermediate the edge portions of said plates is bridged by the fractional hopper. The plane of the sloping floor 16 is continued to the door opening by the cross plate portion 26 which underlies the end portion of said floor plate 16, and the edges of said floor plate and cross plate 26 are united by a series of rivets 28 and by welding 28a along the seam. Similarly, the triangular shaped portions 27 continue the plane of the side wall sheets 14 and 15, and are united by rivets 29 along a substantially horizontal line disposed appreciably above the apex of the hopper.

The inner side stirrup portion 24 of the frame, at its upper end, is merely a flat plate underlying the sloping floor portion 17 of the inner hopper side wall. Commencing from a location immediately below the center sill, the three sides of the stirrup portion of the frame are reinforced by an integral outstanding flange 30. Likewise the edge portions of the fractional hopper are reinforced by an integral outstanding flange 31. This flange extends from the side members 24 and 25 horizontally adjacent the rows of rivets and then crosswise beneath the hopper adjacent the rivets 29. The flange 30 is spaced away from the door contacting margins of the frame a sufficient distance to clear the door flange 21. The flanges 30 and 31 merge into each other at a location 32 intermediate the depth of the frame and thus provide for a strong well braced structure.

The margins 33 of the frame structure provides an even bearing surface against which the door 18 bears, and the door is provided for this purpose with a flat bearing surface 34 extending all around adjacent the marginal flange 21 of the door. In order to maintain an evenly formed door free from distortions, the door is provided with a deformed portion 35 of substantially semicircular section of comparatively narrow width whereby shrinkage in the door body portion may be compensated for, such shrinkage being one of the factors which must be taken into consideration when cast metal is employed. It is a common difficulty experienced with cast metal for unequal shrinkage to develop in the body part as the metal cools after being cast, and this condition is very prevalent with doors of the character described in which the main body of the door is of thin plate-like section and the margins are surrounded by a continuous reinforcement. It is very necessary that dumping doors should be free from distortion in order that the doors and frames shall fit uniformly, and to this end my improvements incorporate a corrugation extending contiguously with the swinging edge of the door, as indicated at 36, and another corrugation 37 extending at an angle centrally of the first named corrugation and merging therewith. This arrangement strengthens the door in the directions of greatest stress both longitudinally and transversely of the pivotal axis of the door.

The keeper 19 is disposed centrally of the hopper, being securely riveted to the sloping floor of the hopper, as indicated at 38, and projecting beyond the hopper is the shouldered portion 39 of the keeper. The shouldered portion 39 projects through an opening 40 in the door when the door is in closed position. The keeper 19 is of triangular formation to provide shedding surfaces and prevent lodgement of material thereon. The triangular portion has an abutment wall 42 against which the door abuts—this wall being somewhat larger in area than the opening in the door to provide a seal against leakage.

The latching mechanism carried by the door comprises a pivotally mounted latch bar 43 and a pivotally mounted locking dog 44 cooperable with the latch for retaining said latch in operative latching position. The latch and dog are mounted on the door intermediate the outer side margin of the door and the keeper. The latch extends inwardly towards the center sill beyond the keeper to engage with the shouldered portion 39 of the keeper. The latch member is guided in its pivotal movement by guides 45 and 46 formed integrally with a reinforcing and bearing member 47 having a base portion 48 riveted at 49 to the door. The member 47 forms a bearing on which the latch is adapted to bear when the door latch is in operative latching position. The base member 48 is located at the junction of the door corrugations 36 and 37 and riveted on each side thereof to the body of the door plate so that the strength of the corrugations is utilized to rigidify the door both transversely and longitudinally from the keeper to the edges of the door.

The latch and dog are spaced outwardly from the door plate a distance corresponding to the

thickness of the bearing portion **47** of the base plate portion **48**, this spacing being accomplished by means of integral bosses **50** formed in the door.

The pivots on which the latch and dog are mounted consist of ferrules **51** formed integrally with an outer guide strap or tie plate **52** which overlies the dog and latch, and which is secured in place by rivets **53** which extend through the ferrules **51** and the bosses **50**. The bosses **50** are formed with indentations **54** (Fig. 5) on the inner face of the door to accommodate the rivet heads.

Those portions of the guide strap **52** through which the securing rivets **53** pass are extended outwardly beyond the outer face of the strap to provide outstanding upper and lower fulcrum projections **55** and **56**, respectively, said fulcrums being for the purpose of providing abutments on which a removable bar is adapted to rest whereby the latch bar may be levered to either open or closed position. The latch bar is provided with a cooperating fulcrum **57** disposed in the plane of the said fulcrums **55** and **56**, and extending outwardly from the main body of the latch bar at a location approximately midway of the pivot **44** and the keeper.

The latch bar, by reason of the concentration of weight on the keeper side of its pivotal axis, gravitates to locking position in engagement with the keeper when the door reaches closed position. It is automatically raised by the beveled nose **58** of the shouldered keeper during the closing movement of the door.

I claim:

1. In a railway car having a discharge hopper formed with an opening adapted to be closed by a door, said door being pivotally mounted on the car structure; means for retaining the door in closed position, said means including a shouldered keeper disposed in the plane of the door and a latch pivotally mounted on the door and having the end of the latch remote from its pivotal mounting adapted to engage with the shoulder of the keeper; a dog pivotally mounted on the door and adapted to engage with the latch for preventing unlatching movement thereof; a tie plate overlying the latch and dog and secured in position by the latch and dog pivots; and means for moving the latch, including outwardly projecting lug means on the tie plate and latch, respectively, whereby a removable tool may be temporarily inserted to engage said lug means to swing the latch either in an unlocking or locking direction.

2. In a railway hopper car of the type having a sloping floor adapted to direct lading to a discharge opening having a pivotally mounted discharge door adapted to close the opening, said door being pivotally mounted adjacent the upper part of the discharge opening and adapted when in closed position to have its swinging edge latched in relation to the sloping hopper and in engagement therewith; a keeper carried by the sloping floor and disposed in the angle presented by the floor and door, said door having a reinforcing embossment formed of intersecting corrugations rising above the load contacting plane of the door and extending from side to side of the door above the keeper, said embossment being in the form of an inverted T with a horizontal corrugation disposed substantially horizontally and the other of said corrugations extending vertically above the keeper and in alignment therewith; and a reinforcing and latch guiding member disposed on the underside of the door to overlie the intersecting part of the corrugations, said member being secured to the body of the door on each side of the corrugations and extended downwardly from the embossment to a location below the keeper; and a latch pivotally mounted on the door and adapted to bear on the said reinforcing member and engage the keeper for maintaining the door in closed position, said reinforcing member having means for guiding the latch in its pivotal movement.

3. In a railway car of the type having a center sill and side sill construction, a load discharging hopper including a sloping floor and side walls extending appreciably below said sill construction and terminating in a discharge opening, said side walls and sloping floor for an appreciable distance below the top of said opening consisting of commercial sheet metal plates, a unitary cast metal frame member bordering said opening and secured to the terminal edges of the respective side wall and sloping floor sheet metal plates and having an integral outstanding reinforcing flange extended around its sides and bottom, said frame member having a portion defining a door opening and having an integral cast metal hopper section forming the lower portion of the hopper and including side walls and a bottom wall connected to the lower terminal margins of said sheet metal plates and forming continuations of said sheet metal side walls and sloping floor respectively, said cast metal hopper section adjacent the terminations of the sheet metal plates being reinforced with an integral outstanding flange extending continuously around the margins of said hopper section walls and merging integrally with the flange on said frame member, and a door for said door opening hinged at the top of said frame.

4. In a railway dump car of the type having center and side sill construction and having a hopper comprising spaced side walls and a sloping floor, said side walls and sloping floor leading to a discharge opening and formed throughout the major portion thereof below said sill construction of commercial sheet metal plates, an integral cast metal door framing structure extending around the opening and including a beam-like portion extending across the upper part of the door opening and a stirrup-like portion depending from the ends of said upper portion and extending around the side walls and sloping floor below the terminals of said sheet metal plates, said stirrup-like portion including an integral lower plate-like cast metal section extending crosswise between the hopper side walls and forming a continuation of the sloping sheet metal floor, integral cast metal side wall sections connecting said crosswise section of the frame with the side pieces of said stirrup-like portion, said side wall sections overlying the lower margins of the hopper side wall sheet metal plates and united therewith along a substantially horizontal line disposed intermediate the top and bottom of the opening, a continuous outstanding integral reinforcing flange extending around the stirrup-like portion, and a horizontally disposed flange integrally connected with said other flange and extending therefrom horizontally around the cast metal plate-like sections and side wall sections adjacent the juncture of the margins thereof with said sheet metal plates.

ARGYLE CAMPBELL.