No. 719,868. PATENTED FEB. 3, 1903.

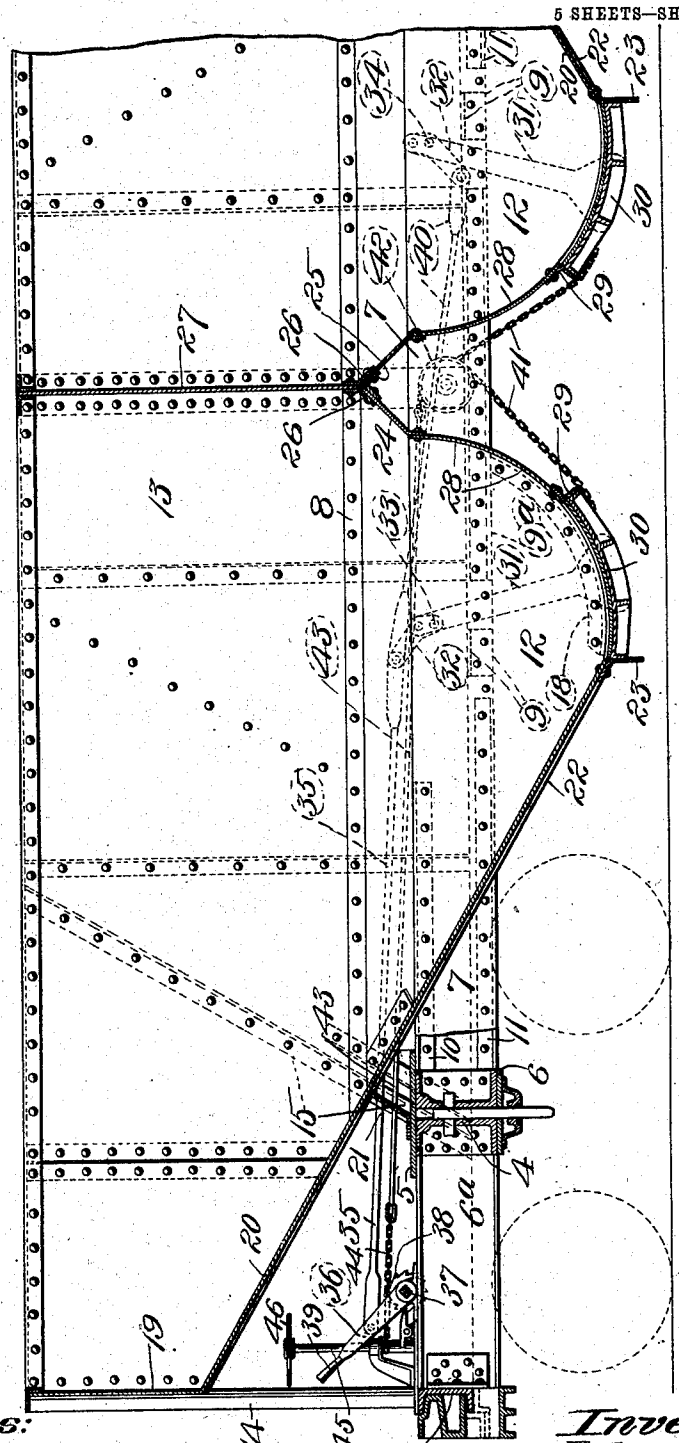
I. A. RANDEL.

HOPPER BOTTOM CAR.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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R. M. Ashby.

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By Baxter & Connell
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 5 SHEETS—SHEET 2.

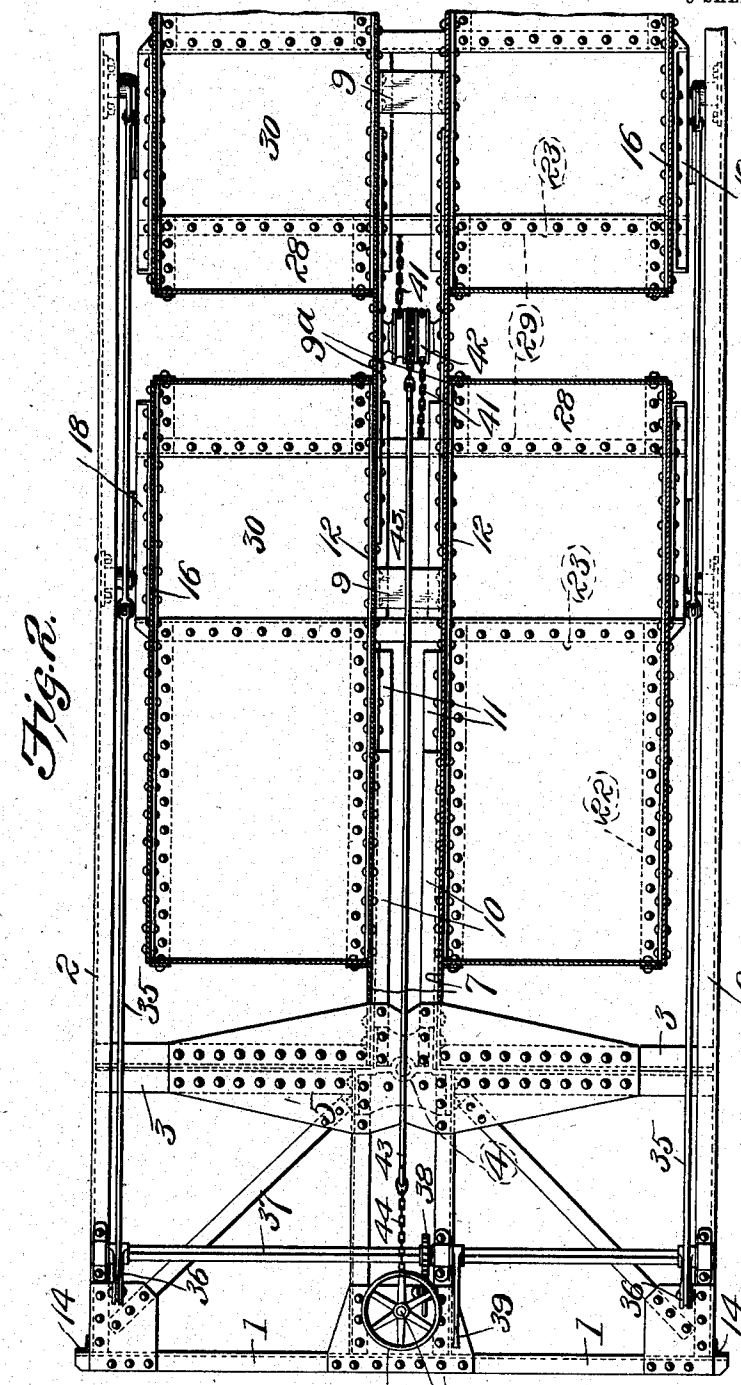


Fig. 2.

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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.

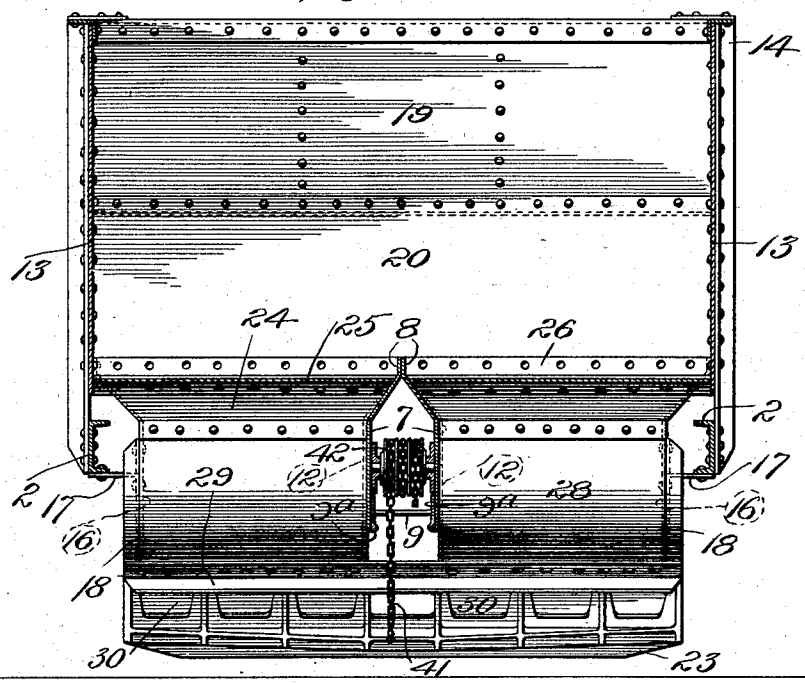
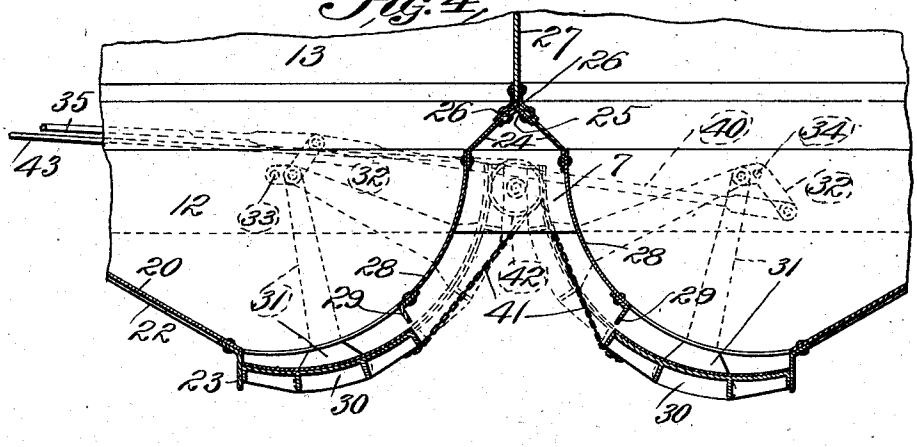


Fig. 4.



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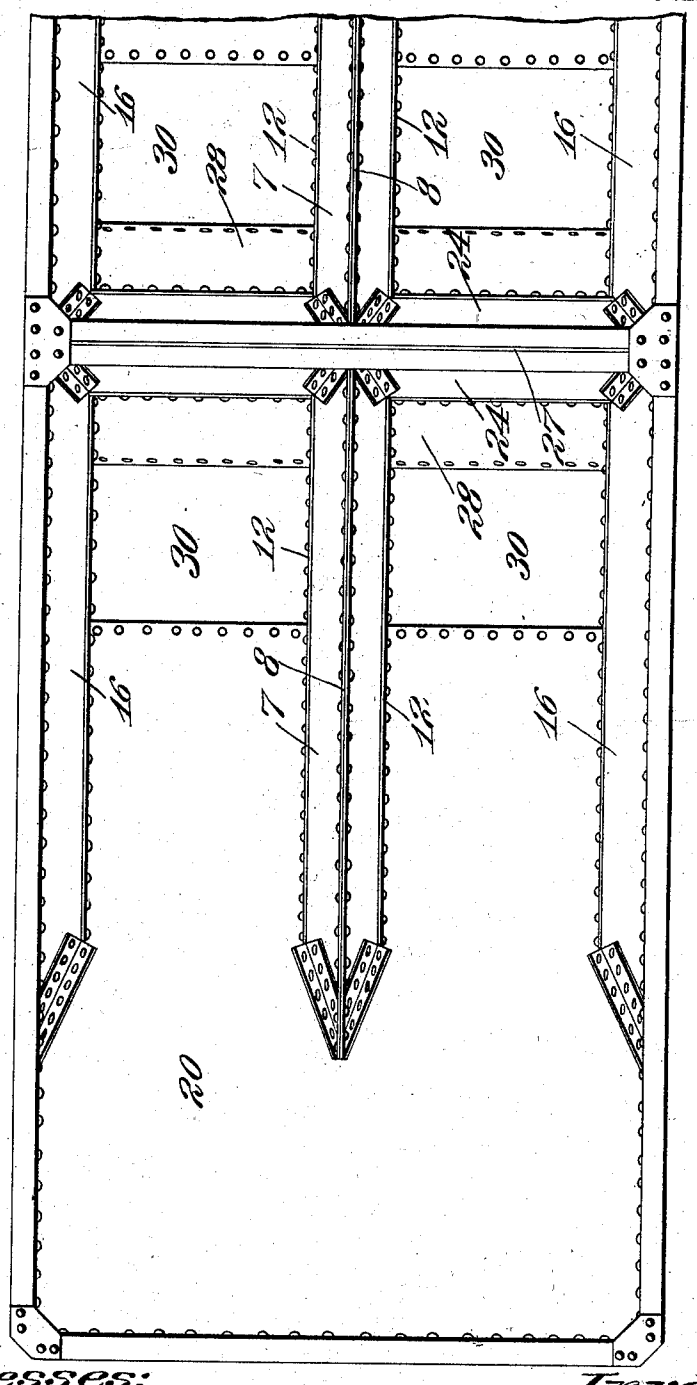
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HOPPER BOTTOM CAR.

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NO MODEL. 5 SHEETS—SHEET 4.

Fig. 5.



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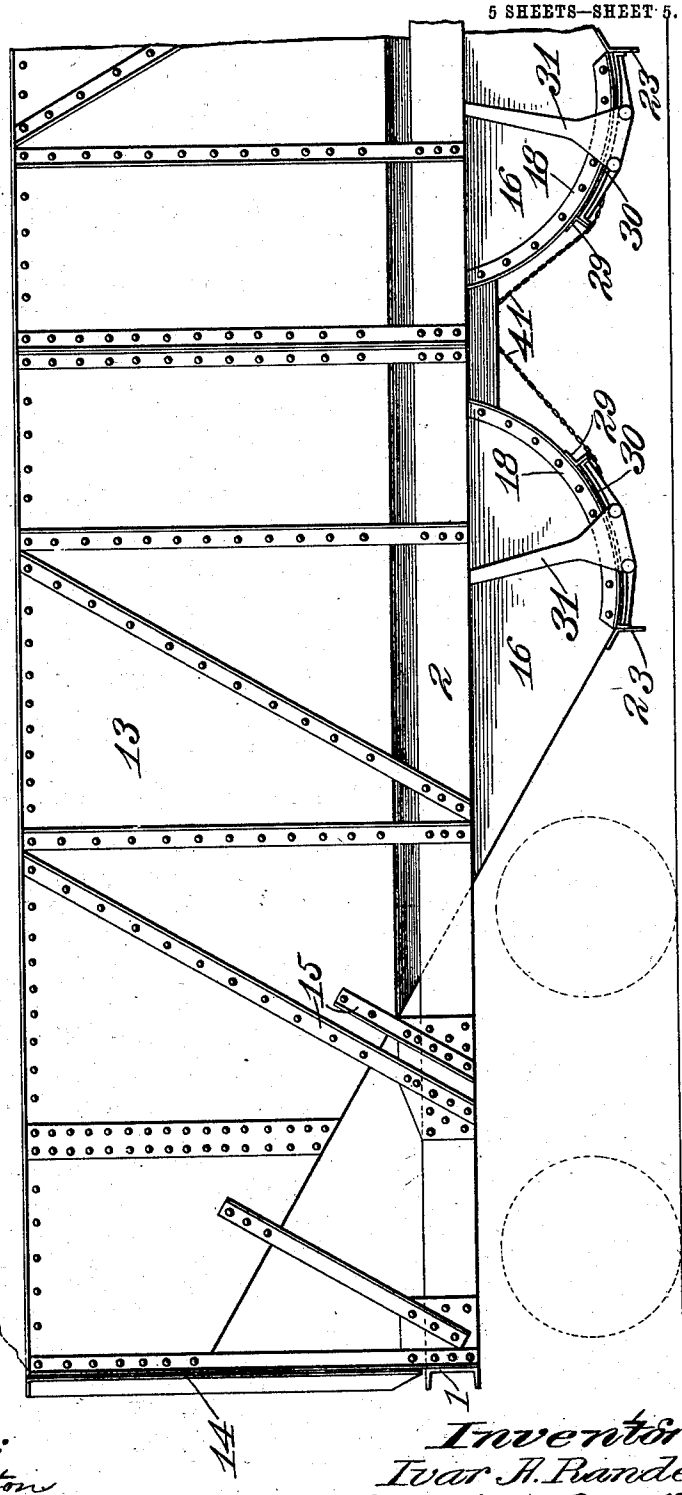
I. A. RANDEL.

HOPPER BOTTOM CAR.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

IVAR A. RANDEL, OF BERWICK, PENNSYLVANIA, ASSIGNOR TO AMERICAN CAR & FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

HOPPER-BOTTOM CAR.

SPECIFICATION forming part of Letters Patent No. 719,868, dated February 3, 1903.

Application filed June 25, 1902. Serial No. 113,123. (No model.)

To all whom it may concern:

Be it known that I, IVAR A. RANDEL, a citizen of the United States, residing at Berwick, Columbia county, Pennsylvania, have invented a certain new and useful Improvement in Hopper-Bottom Cars, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view through a portion of my improved hopper-bottom car. Fig. 2 is a plan view of the underframing. Fig. 3 is a cross-sectional view on line 3 3, Fig. 1. Fig. 4 is a detail vertical sectional view through the central portion of the car, showing the doors in an initial open position. Fig. 5 is a top plan view of one end of my improved hopper-bottom car, and Fig. 6 is a side elevational view of one end of my improved car.

This invention relates to a new and useful improvement in hopper-bottom cars, and particularly to the arrangement of the doors and the door-operating mechanism, whereby the center of gravity of the car is comparatively low and the car for a given capacity—say fifty tons—is comparatively light.

With these objects in view my invention consists in the construction, arrangement, and combination of the several parts, all as will be hereinafter described and afterward pointed out in the claims.

In the drawings, 1 indicates the end sill, and 2 the side sills.

3 indicates the webs of the bolster, which are preferably of channel form arranged back to back. These webs are not continuous from side sill to side sill, but terminate at a centrally-located filler-block or casting 4.

5 indicates the top cover-plate, and 6 the bottom cover-plate, said cover-plates being riveted to the flanges of the channel-webs and to the casting 4.

6^a indicates short draft-sills which extend from the end sill to the filler-block 4, to which the webs of said draft-sills are riveted, the flanges of said draft-sills being riveted, respectively, to the top and bottom cover-plates.

7 indicates what I will term the "center sill," which center sill is made up of two vertically-disposed webs having their upper portions bent inwardly at an angle, flanges 8 being provided along the ridge of these converging portions, through which rivets are passed for well-understood purposes. By this construction the upper portions of the center sills form the central longitudinal ridge for shedding the contents of the car to either side of said center sill in the discharge of the load. The lower edges of the center-sill webs may be spaced apart by brackets 9, (see Fig. 3,) and in order to reinforce the center-sill webs between the hoppers a bulb-iron 9^a or some other suitable section may be employed, the same extending, preferably, some distance along the center sill, so as to take in portions of the center hopper-sheets. At the extremities of the center sills angles 10 and 11 are employed as connection-pieces, the former being riveted to the top cover-plate 5 with respect to its horizontal leg and to the filler-block 4 with respect to its vertical leg. The angle 11 is riveted to the bottom cover-plate and to the filler-block, and said angle is continued some distance inwardly beyond the angle 10 for the purpose of reinforcing the center sill.

12 indicates the center hopper-sheets, which are riveted to the center sill, their lower inner edges being curved, as shown.

13 indicates the side walls of the car, which side walls act as plate-girders. These side walls are stiffened by vertically and diagonally arranged angles, the former extending below the lower edges of the side walls and being riveted to the side sills. End posts 14 are also provided, as is well understood. I prefer to employ stiffeners 15, which are riveted to the side walls opposite the bolsters, said stiffeners forming an efficient support for the side walls at this point.

While I have shown the side walls as terminating above the side sills, it is obvious that these side walls could extend down and be riveted to the side sills.

16 indicates the side hopper-sheets, whose upper edges are riveted to the lower edges of the side walls, said side hopper-sheets being bent inwardly near their upper ends, as shown in Fig. 3, for the purpose of clearing the side sill. Brackets 17 extend from the side sill to brace these side hopper-sheets. These brackets, if desired, may extend continuously along the side sills opposite the side hopper-sheets. Curved angles 18 are employed at the inner curved edges of the side hopper-sheets to reinforce and stiffen the same.

19 indicates the end walls of the car, and 20 the inclined floor-sheets, which are supported by floor-supports 21, arranged above the bolsters. These inclined floor-sheets extend down between the center and side hopper-sheets and are riveted to inturned flanges 22 thereof, which preferably extend under said floor-sheets. An angle 23 is arranged under the inner edges of the inclined floor-sheets, said angle preferably extending entirely across the car or from side hopper-sheet to side hopper-sheet, as shown in Fig. 3. This angle not only serves as a stop, but also as a guide for the doors.

24 indicates a cross-ridge riveted to the side wall of the car, the side hopper-sheets, and the inclined portions of the center sill. This cross-ridge is preferably constructed of two inclined plates, under the apices of which are arranged angles 25, while exteriorly-arranged angles 26 clamp the vertical partition and stiffening-wall 27 between them, said wall being also secured to the side wall of the car.

Riveted to depending flanges extending from the legs of the cross-ridge are curved plates 28, said curved plates being also attached to the center sill and said side hopper-sheets and forming the inner end walls of the hoppers. The lower edges of these sheets are reinforced by angles 29, which preferably extend from side hopper-sheet to side hopper-sheet, said angles serving as guides for the door in a manner now about to be described.

30 indicates the doors, which are preferably reinforced by ribs of the frame-casting entering into their construction. These doors are shown curved to the contour of the curved edges of the hopper-sheets and in operation are designed to fit snugly between the angles 23 and 29, as shown in Fig. 1.

31 indicates hangers attached to the ends of the doors, which hangers are pivoted at their upper ends to levers 32. 33 represents the pivot-point of one these levers 32, which is shown as a lever of the second order, and 34 is the pivot-point of the other of these levers 32, which last-mentionod lever is of the first order. It is of course understood that these levers are duplicated on each side of the car, there being hangers at each end of the doors. To the ends of the levers of the second order are connected rods 35, which rods extend along the side sills and are connected to arms 36 on a rock-shaft 37. This rock-shaft is provided with a ratchet-wheel 38, with which coöperates an operating-handle 39.

40 indicates a set of rods pivotally connected to the power ends of the levers of the second order referred to and also to the power ends of the second set of levers of the first order. The levers 32 are in this manner coupled and move in unison.

Assuming that the parts are in the position shown in Fig. 1, where the doors are closed, it is obvious that if the pawl is thrown out of the ratchet 38 the doors will drop by gravity to the position shown in Fig. 4, in which position the doors are beneath the angles 29.

Chains 41 have one of their ends connected to the doors, their other ends being received in two grooves, respectively, of a three-grooved sheave 42, mounted in the center sill. This sheave is operated by a main chain connected to and wound about the third groove thereof, the other end of said main chain being connected to a rod 43, which rod extends, preferably, toward that end of the car at which the rock-shaft 37 is located, where it is provided with a chain 44, wound about a staff 45, having a hand-wheel 46. After the doors have been lowered to the position shown in Fig. 4 the hand-wheel 46 is operated to wind the chain on the staff and raise the doors inwardly to the position shown by dotted lines in Fig. 4, the doors swinging on an axis coincident with the pivotal points of their hangers. The load may thus be discharged through the exit-openings in the bottoms of the hoppers, (there are four of such openings, closed by two doors,) and when it is desired to close said openings the hand-wheel 46 is released, when the weight of the doors is sufficient to cause them to drop by gravity to the positions shown in Fig. 4, said doors being arrested in their lowermost positions by the angles 23. When in this position, the handle 39 is manipulated so as to rock the lever 32 and raise the doors to a position where they fit snugly between the angles 23 and 29 and in which position they effectually close the hopper-openings.

The axes of movement of the levers 32 and the hanger-suspended doors are such that when the doors occupy their closed positions, as shown in Fig. 1, these pivotal centers are slightly to one side of a position of dead-centers, which tends to relieve the rods 35 and 40 of undue strains, but permits the doors to drop by gravity when the ratchet 38 is thrown out, as before described; also, when the doors are open, as shown by dotted lines in Fig. 4, these pivotal points are substantially in alinement, so that the chain-rod 43 and its connected chains are substantially relieved of all undue strains. It is of course understood that the pawl-and-ratchet mechanism can be employed in connection with the chain-staff,

which can obviously be placed horizontally instead of vertically for the purpose of holding the doors in their elevated positions; but as the doors are intended to occupy these positions only during the time of the discharge of the load the operator can conveniently hold the staff in this position during such period of time, which is comparatively short, as the car is practically self-clearing when the door is open so far as its load is concerned. The doors will then drop to their lowermost position upon the release of the chain-wheel, when it is only necessary for the operator to manipulate the lever 39 to raise the doors to their home or normal positions.

I am aware that many minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car, the combination with bolsters, of a center sill composed of two members whose upper edges converge toward each other and center hopper-sheets secured thereto; substantially as described.

2. In a car, the combination with bolsters, of a center still composed of two members whose upper edges converge toward each other, the said converging members being secured together and center hopper-sheets secured thereto; substantially as described.

3. In a car, the combination with bolsters having top and bottom cover-plates, of a center sill composed of two converging members riveted to each other at their upper edges and whose lower edges are spaced apart, and angles secured to said members and to the bolster cover-plates; substantially as described.

4. In a car, the combination with bolsters having top and bottom cover-plates, of a center sill composed of two web members having their upper edges bent inwardly at an angle and secured together, and angles 10 and 11 of unequal lengths secured to said web members of the center sill and to the bolster cover-plates; substantially as described.

5. In a car, the combination with bolsters, of a single center sill attached thereto and having an integral shedding-surface and hopper-sheets secured to said sill; substantially as described.

6. In a car, the combination with bolsters, of a center sill composed of two vertically-disposed web members having integral extensions forming shedding-surfaces and hopper-sheets secured to said sill; substantially as described.

7. In a car, the combination with bolsters, of a center sill composed of two vertically-disposed web members having integral extensions forming shedding-surfaces, said extensions being flanged and riveted together and hopper-sheets secured to said sill; substantially as described.

8. In a car, the combination with side walls, of a center sill, a cross-ridge having interior and exterior reinforcing-angles, and a transversely-disposed strengthening-piece riveted between the exteriorly-arranged angles; substantially as described.

9. In a car, the combination with hopper-sheets having curved adjacent edges, plates forming the inner end walls of said hoppers, doors, and means for moving said doors upwardly between the inner end sheets of the hoppers; substantially as described.

10. In a car, the combination with hoppers having exit-openings for the load, of doors for closing said openings, and means for moving said doors toward each other and upwardly so as to expose said exit-openings; substantially as described.

11. In a car, the combination with hoppers having exit-openings for the load, angles forming the walls of said exit-openings, doors for closing said exit-openings, and means for dropping said doors beneath said angles and for moving said doors away from said openings when in such lowered position; substantially as described.

12. In a car, the combination with hoppers, of doors for closing the exit-openings thereof, and a variable fulcrum for sliding said doors to open the same; substantially as described.

13. In a car, the combination with hoppers of a door for closing the exit-opening for the load, of a hanger for said door operating the same, and a variable pivotal support for said hanger; substantially as described.

14. In a hopper-bottom car, the combination with a door for closing the exit-opening for the load in the bottom of said car, of a hanger by which said door is suspended, a lever to which said hanger is pivoted, and means for establishing a position approximating dead-centers with respect to the pivotal points of said hanger and said lever when the door is in a closed position; substantially as described.

15. In a car, the combination with a door for closing the exit-opening for the load, of a hanger by which said door is suspended, a lever to which said hanger is pivoted, and means for establishing a position approximating dead-centers with respect to the pivotal points of said hanger and said lever when the door is in an open position; substantially as described.

16. In a car, the combination with a door for closing the exit-opening for the load, of a hanger connected to said door, a lever of the first order to which said hanger is pivoted, and means for operating said lever; substantially as described.

17. In a car, the combination with a door for closing the exit-opening for the load, of a hanger connected to said door, a lever of the second order to which said hanger is pivoted,

and means for operating said lever; substantially as described.

18. In a car, the combination with doors for closing the exit-openings for the load, of hangers coöperating with said doors, levers of the first and second orders to which said hangers are pivotally connected respectively, a connection between said levers, and means for operating said levers simultaneously; substantially as described.

19. In a hopper-bottom car, the combination with a door closing the exit-opening for the load in the bottom of said car, said door being received between the walls of said opening, means for moving said doors beyond the plane of one of said walls relatively vertically, and means for moving said door to one side of the opening; substantially as described.

20. In a hopper-bottom car, the combination with a door closing the exit-opening for the load, said door in its home position being received between the walls of said exit-opening, hangers by which the door is suspended for dropping said door below one of said walls, and means connected therewith for moving said door laterally when in such lowered position; substantially as described.

21. In a dumping-car, the combination with a door for closing the exit-opening for the load, said door in its home position being received between the walls of said opening, a hanger connected to the upper face of said door by which said door is suspended, a variable fulcrum for said hanger, whereby said door may be dropped below one of said walls, and means for operating the door to unclose the opening when in such lowered position; substantially as described.

22. In a car, the combination with a cross-ridge, of sheets depending from the legs thereof and forming end hopper-walls, angles secured to the lower edges of said sheets, doors for closing the exit-openings for the load, which doors coöperate with said angles, means for dropping said doors from their home position to a position under said angles, and means for drawing said doors upwardly and inwardly between the inner end sheets of the hoppers; substantially as described.

23. In a hopper-bottom car, the combination with a door closing the exit-opening for the load, of hangers connected with the upper face of the door adapted to move the said door in a relatively straight line away from said opening, and means for moving said door laterally away from said opening; substantially as described.

24. In a hopper-bottom car, the combination with a door closing the exit-opening for the load in the bottom of said car, of means for moving said door in a relatively straight line away from said opening, and means for moving said door laterally and in an arc of a circle away from said opening; substantially as described.

25. In a hopper-bottom car, the combination with a door suspended below the hopper for closing the exit-opening for the load, of means for moving said door in a relatively straight line away from said opening, and independently-operable means for moving said door laterally away from said opening; substantially as described.

26. In a hopper-bottom car, the combination with a door suspended below the hopper for closing the exit-opening for the load, of means for moving said door in a relatively straight line away from said opening, and independently-operable means for moving said door laterally in an arc of a circle away from said opening; substantially as described.

27. In a car, the combination with doors for closing the exit-openings for the load, of hangers for each of said doors, levers of different orders to which said hangers are respectively connected, a connection between said levers, means for operating said levers, and a sheave-and-chain mechanism for operating the doors; substantially as described.

28. In a hopper-bottom car, the combination with a hopper, of a door for closing the exit-opening for the load, the walls of said exit-opening being of unequal depths, and means for moving said door against one of said walls which extends across said opening and acts as a stop for said door; substantially as described.

29. In a car, the combination with a hopper having an exit-opening for the load whose walls are of unequal depths, and a door designed to move past one of said walls and be arrested by the other of said walls; substantially as described.

30. In a car, the combination with a hopper having an exit-opening for the load, of walls of unequal depths forming said exit-opening, a door, means for moving said door in an arc of a circle past one of said walls and against the other of said walls, and means for moving said door inwardly between said walls; substantially as described.

31. In a car, the combination with center and side hopper-sheets, an inclined end sheet and a sheet forming the inner wall for the hopper, of members 23 and 29 forming walls for the hopper-opening, said member 23 being the longer, a door, means for moving said door past the member 29 and against the member 23, and means for moving said door inwardly between the members 23 and 29; substantially as described.

32. In a car, the combination with center and side hopper-sheets, of an inclined end sheet having a downward extension 23, a sheet 28 forming the inner end wall of the hopper and having a downward extension 29, a door 30 designed to fit between said downward extensions, means for moving said door to and from its position between said extensions, and means for swinging the door laterally past the extension 29; substantially as described.

33. In a car, the combination with center

and side hopper-sheets, of angles 23 and 29 forming the walls for the hopper-openings, said angles extending from side hopper-sheet to side hopper-sheet, and reinforcing-angles 18 on the side hopper-sheets; substantially as described.

34. In a car, the combination with center and side hopper-sheets, of curved reinforcing-angles on the side hopper-sheets, doors for closing the exit-openings for the load, and hangers for said doors, said hangers being guided in their movement by said curved angles; substantially as described.

35. In a car, the combination with hopper-sheets, of curved angles secured thereto, a door for closing the exit-opening for the load, hangers for suspending said door, said hangers being guided in their movements by said reinforcing-angles, and a chain connected to said door for swinging the same in an arc of a circle; substantially as described.

36. In a car, body-bolsters, center sills converging at the upper side thereof and there joined together, said center sills terminating at the body-bolsters, means for connecting said center sills to said bolsters, short draft-sills extending from said bolsters to end sills, and means for connecting said draft-sills to said bolsters and end sills; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 19th day of June, 1902.

IVAR A. RANDEL.

Witnesses:
S. W. DICKSON,
S. R. PEALER.