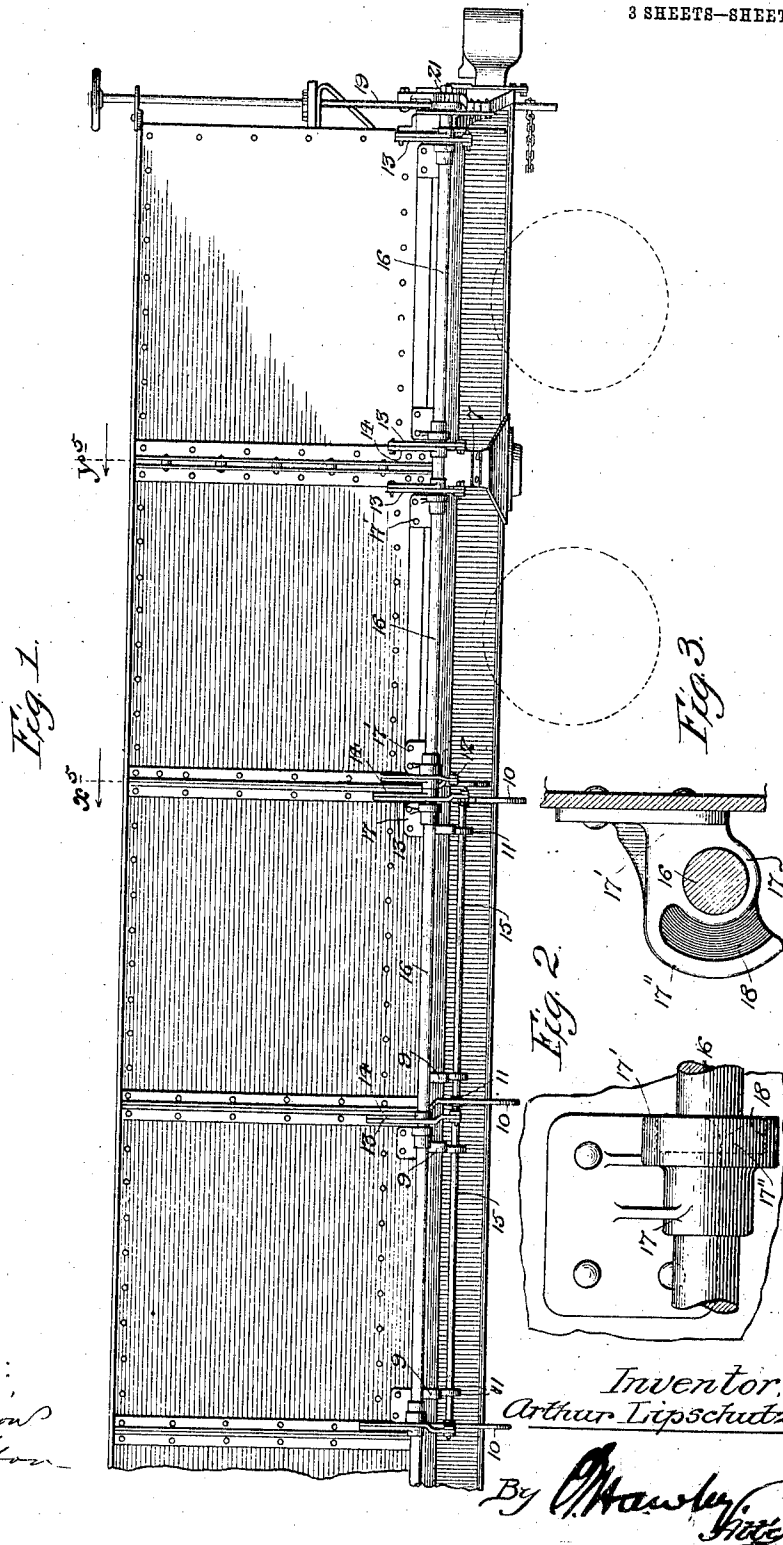


A. LIPSCHUTZ.
DUMP CAR.
APPLICATION FILED APR. 1, 1904.

957,616.

Patented May 10, 1910.

3 SHEETS—SHEET 1.



Witnesses:
Geo. C. Davis
B. K. Leffler

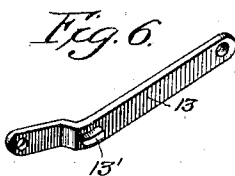
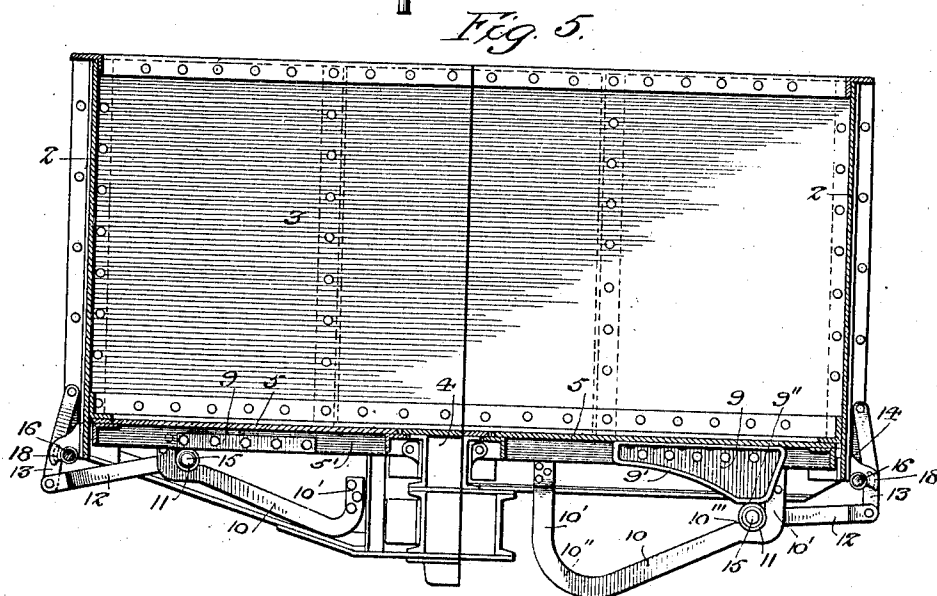
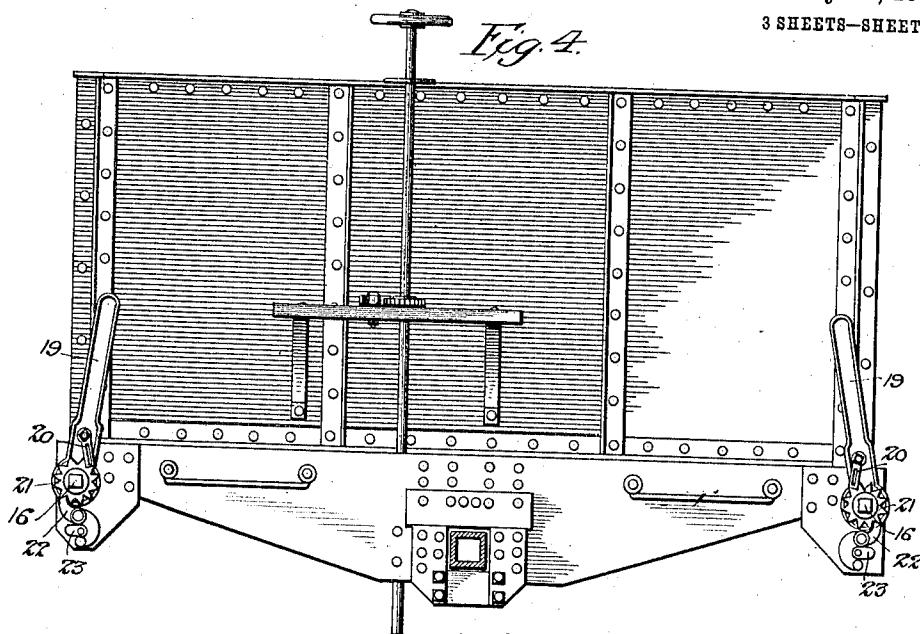
Inventor:
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3 SHEETS—SHEET 2.



Witnesses:
Geo. C. Ransom,
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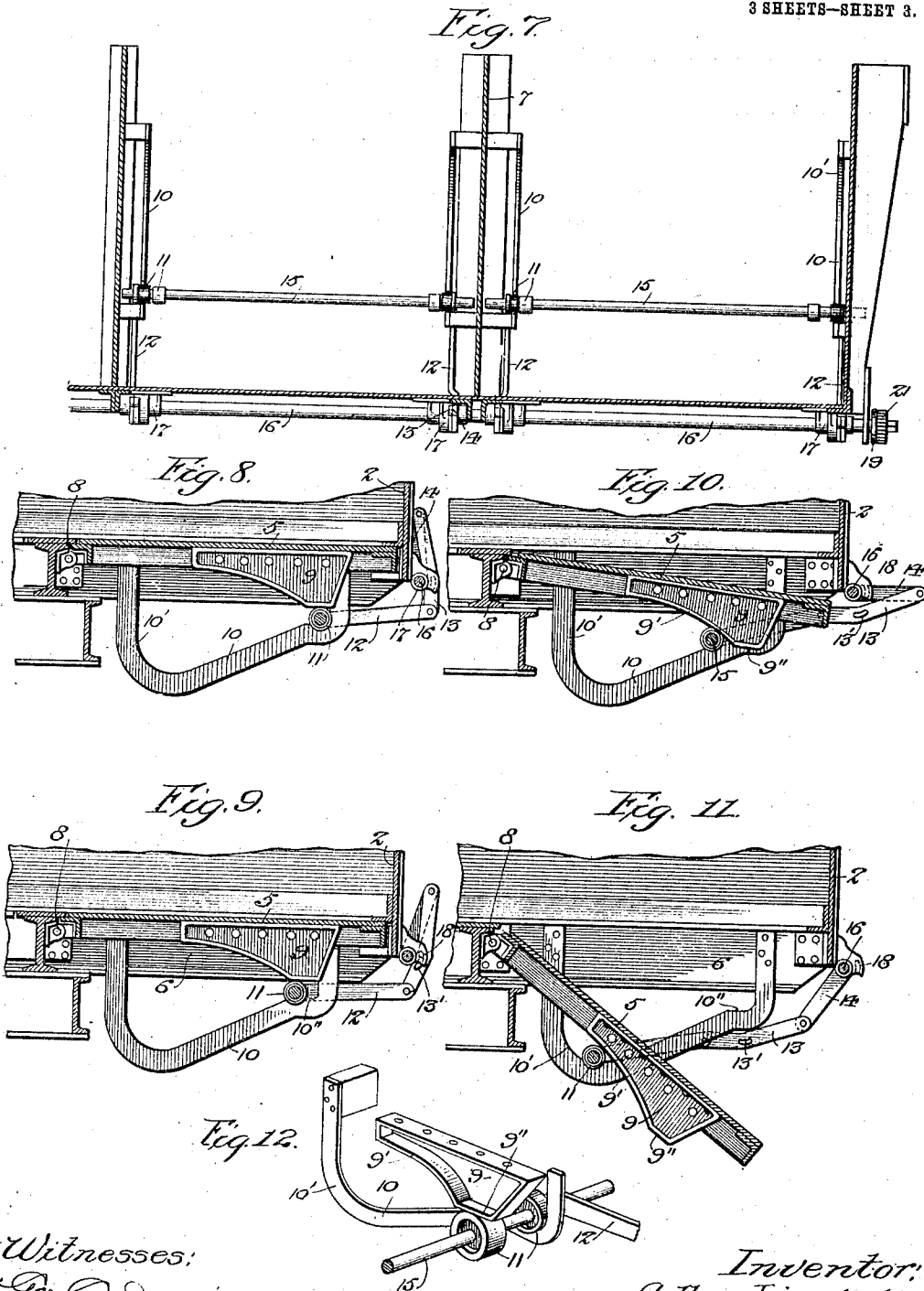
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

ARTHUR LIPSCHUTZ, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO NATIONAL DUMP CAR COMPANY, A CORPORATION OF MAINE.

DUMP-CAR.

957,616.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed April 1, 1904. Serial No. 201,047.

To all whom it may concern:

Be it known that I, ARTHUR LIPSCHUTZ, a resident of St. Louis, State of Missouri, have invented certain new and useful Improvements in Dump-Cars, of which the following is a specification.

My invention relates to freight cars, and particularly to that class of cars known as dump, or dumping cars, which have doors forming their floors and adapted to be dropped to discharge a load.

It has been the practice to build dumping cars having inclosed ends and with drop doors only at the middle section of the car. The tendency of the present time is toward a car which shall have vertical ends as well as sides and which shall be self cleaning from end to end, that is, adapted to discharge every part of its load when the doors are opened. A car of the new class, if provided with a level floor, may be used in ordinary traffic, or as a dump car, as conditions may necessitate; but while the demand for such cars has been recognized and attempts have been made to meet the requirements of railroads in this regard, much difficulty has been experienced through failure to properly support the great number of doors forming the bottom of such a car and to provide means for quickly opening and closing the drop doors. The weight carried by a horizontal drop door is so great that the ordinary winding shafts and chains heretofore used with inclined doors cannot be relied upon. When these supports were discarded and rolling and sliding parts were substituted to lock and support the doors, the great obstacle of friction was encountered, and it was found that too much power was required to operate the doors.

The object of my invention is to provide a dumping car which, in its preferred form, shall have a level, or substantially level, floor, almost wholly composed of drop doors and which shall be provided with adequate, efficient and easily operated means for supporting and locking such doors, and for opening them.

With this object in view, my invention consists of a metallic or wooden car body, having its floor either wholly or partially composed of doors occupying either horizontal or inclined positions and hinged at either their inner or outer edges, in combination with a plurality of wedge-like or

wedging devices or members beneath said doors, and means for operating said devices to raise said doors and to lock them, or permit them to fall. And further, my invention consists in various details of construction and in combinations of parts all as hereinafter described and particularly pointed out in the claims.

The invention is adapted for use with either inward or outward-opening dump car doors, upon any part of a car, and, will be fully and readily understood by reference to the accompanying drawings, in which:

Figure 1 is an elevation of a portion of a car embodying my invention; Figs. 2 and 3 are details of the lever-restraining device, or temporary pivot, used upon the side of the car; Fig. 4 is an enlarged end view of the car; Fig. 5 is a compound section, on the lines x^x , y^y of Fig. 1; Fig. 6 is a perspective detail of one of the wedge-operating levers; Fig. 7 is a plan view of the car, on a plane beneath the floor thereof, showing the door lifting mechanism; Fig. 8 is a detail, transverse, vertical section, taken from the right-hand side of Fig. 5; Fig. 9 is a similar view, showing the door operating mechanism as it appears after being started from its locking position. Figs. 10 and 11 similarly show the door mechanism in the intermediate and fully dropped positions, and Fig. 12 is a perspective detail of the mechanism minus the operating levers.

The chief objection to the methods hitherto proposed for operating the doors of dump cars, namely, the great force required to move the door-restoring and locking devices, results, I apprehend, from the fact that in all of these plans it has been proposed to begin the lifting of the doors by engaging or attacking them at a point close to their hinges or at equivalent leverage. Furthermore, the friction between the parts of the door-operating devices thus far devised, when loaded, has been so great as to practically prevent their proper operation.

The special object of this invention is to provide a door-operating mechanism that shall start the door upward by engaging it at a point remote from its hinge, and which shall lock the door in its raised position, without being firmly bound in place, either by the weight of the door, or by any mechanical restraining device, to the end that

the doors may be raised and locked with ease and as easily unlocked and permitted to fall.

A further and distinct object of my invention is, to provide a door-operating and locking mechanism that may be employed with practically any kind of underframe. In other words, a mechanism which may be adapted and applied to a car without altering its underframe, or necessitating the building of a special underframe.

The body of the car shown in the drawings is composed of the sides, 2, 2, the ends, 3, and underframe, 4, having a floor formed by a plurality of drop doors, 5, 5. The under frame is provided with a plurality of transverse members or beams, 6, including the two bolsters, 7, these parts being arranged between the several doors and serving in part to frame the door openings. The doors are arranged in two rows and are preferably hinged substantially at the center line of the car floor, 8, 8, being the hinges thereon. The four drop doors, adjacent to each bolster, are preferably and usually of less width than the other doors in the floor of the car and as a rule do not drop as far as the intermediate doors, that is, to as great an angle. It is preferable that the intermediate doors shall be so arranged that they may drop to an angle of substantially 45 to 50 degrees to the horizontal, but it is rare that the doors immediately above the trucks of the car can be dropped to a greater angle than 35 degrees.

A particular object of my invention that may well be mentioned at this point is, to provide a drop-door mechanism which, save for alteration in dimensions, may be employed upon both the end and intermediate drop doors of a dump car with equally good results. The manner in which this desirable end is accomplished will appear hereinafter.

The door-lifting, locking and dropping mechanism which I employ, is composed of a number of parts or sets of parts duplicated at the edge of each drop door; and save for a few particulars pertaining to connecting devices, a description of the mechanism for one door will suffice for all. This mechanism comprises a lifting iron or cam upon the drop door, an inclined track and a roller, or equivalent, for coöperation with said iron or cam, and a folding lever, or system of levers, pivotally connected with the body of the car or its underframe and which serve to operate said roller upon said track or way, to lift and lock said doors or permit same to fall.

In the drawings, 9 represents the iron or cam upon the door; 10 represents the inclined track or way; 11, the roller or equivalent; and 12, 13 and 14, the folding lever or system of levers referred to. One of these complete contrivances may be arranged at

each transverse edge of each door, or one of the same may serve for the adjacent edges of two doors, according to the construction and arrangement of the ways, 10, and the roller; or, as shown in the drawings, the rollers of one door, or of two adjacent doors, may be connected by a shaft, 15, for equalizing their movement and to give the structure increased rigidity. Details of this character, involved in my invention, may be modified by a skilful person possessed of the principle or idea of my invention, and I therefore shall not confine my invention to any such details of construction or arrangement. Furthermore, sliding parts or members may be substituted for the rolling parts herein shown, it being to a great extent immaterial to my invention whether sliding or rolling parts be arranged between the doors and the inclined tracks, so long as positively-acting means, such as folding or collapsing levers are employed for actuating the movable lifting or wedging members. I prefer that the inclined way or track, 10, shall take the form of a hanger having upright arms, 10', that are riveted to the overlying or adjacent transverse member or element of the underframe. The lower end of the incline merges into the vertical by a curve, 10'', and the upper end of the incline terminates in a flat or level portion, 10''', adapted to serve as a rest for the actuating or wedging part, 11. The straight or level portion of the incline or track may be of any desired length, and need not be wider than the member, 11. As the space between the bottom of the car and the top of the truck is limited, I prefer to arrange the inclines or tracks, 10, of the four end doors of the car, at the level of the bolster, it being seldom advisable to allow the door-sustaining tracks to hang below the level of the bottom of the body bolster at points directly above the trucks. Tracks or inclines of this construction or arrangement are illustrated at the left-hand side of Fig. 5 of the drawings. Tracks of the same dimensions are arranged upon the end sill of the car and upon the body cross-member, 6, adjacent to the bolster. In these cases the wedging roll, 11, may engage the bottom flanges, 5', of the drop doors directly, or through the medium of the straight lifting irons, 9. There is more available space beneath the mid portions of the car, and in the case of the middle doors, 5, I prefer to lower the locking positions of the rollers, 11, and provide the doors with cam-like lifting-irons, 9, having inclined rear edges, 9', and a straight bottom section, 9'', to rest upon the roller, 11, as shown at the right end of Fig. 5 and in Figs. 8 to 12 inclusive. The deep lifting-cam serves to compensate for the lower position of the incline or track and the roller thereon, causing the door to be lifted to the full height when the oper-

ating roller is drawn forward or outward upon the incline, 10.

It is obvious that the cam, 9, and the track, 10, cannot be in the same vertical plane, and that this fact necessitates the employment of a roller or rollers of sufficient length to engage both parts; otherwise the construction of this element of my mechanism is in no wise peculiar or difficult. But to simplify the construction and arrangement of the rollers, I prefer to connect adjacent rolls, or pairs of rolls, by means of a light shaft or rod, 15. There may be one of these shafts for each door; this is the preferable arrangement over the trucks, or a single shaft may be used for two or more doors, preferably not more than two. When the rollers of more than two doors are connected by a single shaft, there is danger that this light connecting rod or shaft will be flexed, thereby throwing the connected parts out of line and rendering their operation difficult. The employment of a number of the light shafts, 15, is not objectionable because all those, on either side of the car, may be worked simultaneously, as will be hereinafter explained.

The lever, 12, is attached to the roll or rolls, 11, in any suitable manner, as by connecting it to the shaft, 15. Its outer end is pivotally connected to the lower end of the link or lever, 13. The joined ends of the levers or links, 12 and 13, are preferably offset, as indicated in Figs. 5 and 6, but this features is not essential to the success of my invention. The upper end of the link or lever, 13, is pivotally connected to the upper or free end of the lever or arm, 14. The arm, 14, is secured upon the main operating shaft, 16. This shaft is supported in bearings or boxes, 17, formed upon the brackets, 17', that are attached to the side of the car, or to some portion of the underframe, depending upon the car design.

The restraining device or temporary pivot, before alluded to, is preferably made a part of the bearing, 17, and its bracket. It comprises the extension, 17'', provided with the curved, vertical slot or recess, 18, substantially concentric with the bearing and open at its lower end. The link or lever, 13, is provided with a lug, 13', extending from its side. This lug is preferably curved, as indicated in Figs. 6, 9, 10 and 11. The link is slightly bent, and when in its substantially vertical position, is raised to such point that its curved lug, 13', passes into the recess or slot, 18, on the bearing bracket, ready to serve as a fulcrum for the lever, 13, as will be explained later.

The shaft, 16, may be continuous from end to end of the car, and this is the way in which it is applied to short cars; but when a long car is equipped I prefer to divide the shaft, to avoid the detrimental results oc-

casioned by load deflection of the car. The shaft, 16, is operated from the end of the car, and when it is turned, will either drop or lift all of the doors to which it is connected by the folding levers. The operating mechanism of the shaft, 16, may be of any desired or suitable construction, but I prefer a simple jack lever and pawl 19, 20, arranged on the end sill and engaging the ratchet wheel, 21, on the shaft, 16. The ratchet wheel and shaft may be operated in either direction by this means.

22 represents a lock or pawl, whereof, 23, is a button, by which the pawl may be held out of engagement with the ratchet wheel when the doors are to be dropped. The button, 23, is always disengaged, and the pawl, 22, permitted to engage with the ratchet wheel when the shaft is being turned to close the doors.

The operation of my door mechanism is as follows:—The normal or closed position of the door and of the operating mechanism is shown in Figs. 1, 5, 7 and 8. In this position the wedging part or roller, 11, is at the top of the incline, 10, and rests upon the flat or level part thereof, the door, through the medium of cam, 9, resting upon the roller, 11. At this time, also, the arm, 14, is in its vertical position, directly against the side of the car, while the lever, 13, is thereby cramped over the shaft, 16, and has its lug, 13', in the slot, 18, in the bearing, 17. If it is now desired to drop or open the door, the shaft, 16, will be turned by means of the jack lever, 19, at the end of the car, whereupon the arm, 14, will be thrown out into the position shown in Fig. 9. This movement of the arm throws the end of the lever, 13, away from the side of the car, and said lever being restrained by the engagement of its pivot lug, 13', with the slot, 18, the lower end of said lever, 13, will be thrown inwardly, thereby thrusting the link, 12, and the roller inward, unseating the roller from the flats upon the track, 10, and the door cam. As soon as the roller passes on to the inclined part of the track, the weight of the door will cause it to travel down the track, thereby drawing down the levers, as shown in Figs. 10, and 11. This movement continues until the roller strikes the upwardly curved part of the track, which will stop both the roller and the door resting thereon; see Fig. 11. Meantime, the load formerly resting upon the door will have been discharged therefrom. It will be noted that the links forming a compound or folding lever are relieved from great strain by the engagement of the roller with the lower curved end of the track before the lever as a whole is completely straightened. This may be accomplished by proportioning the parts in the manner shown, and very light parts will serve all purposes and be

long lived because of the slight forces exerted thereon and the fact that they will be little worn by use. The door is raised and closed by turning the shaft, 16, in the reverse direction. The force exerted on the shaft will be transmitted to the doors, first, through the arm, 14, of the compound lever, until such arm reaches approximately the position shown in Fig. 10, after which the link or lever, 13, will engage with the under side of the shaft 16. When this occurs, the lifting force of the arm, 14, will be transmitted through the link, 13, fulcruming upon the shaft, 16, at a point near the lower end of the lever, 13, so that great force is exerted to accomplish the final lifting movement of the roller and its return to the flat or level portion of the track. The final movement of the shaft, 16, causes the lever, 13, to house its curved lug in the slot, 18, of the bearing bracket and also causes its upper center to snap by the plane of its lower center, making it possible to hold the compound lever in the position of Fig. 8 by the exertion of a very slight restraining force at the end of the operating shaft 16. The throw of the drop doors over the trucks of the car is not so great as the throw of the intermediate doors, but the difficulty presented by this fact is easily overcome by simply reducing the lengths of the parts of the compound levers belonging to such doors. For comparison of dimensions, see Fig. 5. The principal reduction is in the length of the arm 14. By this simple expedient I am able to secure the operating arms, 14, of all of the door-mechanisms, to a single shaft, 16, and have the different mechanisms operate simultaneously, although to different degrees, concerning their relative movements.

It is obvious that numerous modifications of my invention will readily suggest themselves to one skilled in the art and I therefore do not confine my invention to the specific constructions herein shown and described.

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

1. A car provided with a drop door, in combination with an inclined track or tracks beneath said door, a part or parts movable upon said track or tracks, and a compound lever connected to said part and to said car, for actuating said movable part, substantially as described.

2. A car provided with a drop door, in combination with a wedge-like device beneath said door, a part for it to travel on and a plurality of levers extending beneath said door for operating said device to raise and lock said door or permit it to fall, substantially as described.

3. A car provided with a drop door, in combination with inclined hangers beneath said door, and a wedge part movable on said hangers to raise and lock said door or permit it to fall, a plurality of compound levers for actuating said wedge part substantially as described.

4. A car provided with a drop door, in combination with an inclined hanger beneath said door, and a wedge part movable on said hanger to raise and lock said door or permit it to fall, a compound lever for positively operating said part in both directions, and a rocking shaft for operating said lever, substantially as described.

5. A car provided with a drop door, in combination with an inclined track beneath said door and provided with a "flat" or level portion, a part movable on said track and whereon said door rests, means for moving said part, and said track having an upwardly curved lower end, substantially as described.

6. A car provided with a drop door, in combination with an inclined track beneath said door and provided with a "flat" or level portion, a part movable on said track and whereon said door rests, and a system of levers interposed between said part and a fixed point on said car, for actuating said movable part, substantially as described.

7. A car provided with a drop door, a lifting and locking device beneath said door, a rotary part on said car, a compound lever connecting the same with said device, and a temporary pivot for said lever, substantially as and for the purposes specified.

8. A car provided with a plurality of drop doors in its bottom, in combination with a plurality of door-lifting and locking devices, a plurality of compound levers connecting said devices with the side of the car, and a single means upon said car, for simultaneously operating said compound levers to simultaneously raise and lock said doors or permit them to fall, substantially as described.

9. A car provided with a drop door, in combination with a lifting and locking device beneath said door, a rotary part on said car, a three-part compound lever connecting the same with said device and an intermittently operating pivot for the middle part of said lever, substantially as described.

10. A car provided with a drop door, in combination with means beneath the door for operating it, a rotary part on the side of the car and suitable operating levers, extending therefrom to said means beneath said door, substantially as described.

11. A car provided with a plurality of drop doors in its bottom, in combination with a door lifting mechanism beneath each door, a single door operating member on

the side of the car, and a plurality of compound levers connecting said member to said mechanisms, substantially as described.

12. A car provided with a drop door in its bottom, in combination with transverse tracks beneath said door, door lifting means movable on said tracks, a rocking shaft at the side of the car and levers connecting said shaft and said door lifting means, substantially as described.

13. A car provided with a drop door in its bottom, in combination with door locking means beneath the door, a rocking shaft, a three-part lever connecting same with said rocking means and a temporary pivot or restraining part for the middle section of said lever, substantially as described.

14. A car provided with a drop door, in combination with a track beneath said door, a door operating part movable on said track and a three-part compound lever operating from the side of the car, connected with said part upon said track and capable of greater movement than that which said part is allowed upon said track, substantially as described.

15. A car provided with a drop door, in combination with a door locking device beneath said door and a shifting-leverage mechanism for operating said device, substantially as described.

16. A car provided with a drop door, in combination with a door lifting and locking device beneath said door and a shifting-leverage mechanism for operating said device, substantially as described.

17. In a dump car, the combination of a car frame, dumping doors pivotally mounted in such car frame movable to open and closed positions, a shaft reciprocally mounted beneath and supporting such doors, and supporting mechanism secured to the car frame having an upwardly and outwardly inclined supporting surface portion provided with a hook or loop portion at its lower end for limiting the inward and downward movement of the shaft and thereby the door and having a substantially horizontal supporting portion at the upper and outer end of such inclined portion for supporting the shaft in its outer raised position and thereby supporting the door in its closed position, substantially as described.

18. In a dump car, the combination of a dumping door, with a reciprocatory door supporting member in operative engagement with such door and movable upward and outward at an incline to close the door, and mechanism for operating said member transversely of the car, said mechanism comprising a rock shaft extending longitudinally of the car and a crank and links substantially in alinement with the transverse path of movement of said reciprocatory member for operating it and thereby the door.

19. In a dump car, the combination of a dumping door, with a reciprocatory door supporting and operating member in operative engagement with such door and movable upward and outward transversely of the car to close the door, and an operating shaft on the car and provided with cranks having their swinging ends connected with said door supporting member for operating the same.

20. In a dump car, having a frame comprising a center sill and cross sills, in combination with a dumping door, a door operating member in operative engagement with and movable relative to the door, and an operating shaft mounted at the outer ends of the cross sills extending along the side of the car and connected to said door operating member for operating said member and thereby the door.

21. A car provided with a drop door in its bottom, in combination with a track or tracks beneath said door, said track or tracks being inclined downwardly from the free edge of the door toward the pivotal axis of said door, a part or parts movable on said track or tracks, a winding shaft extending along the side of the car, means for operating said shaft, and mechanism or mechanisms connecting the said shaft with said part or parts, and adapted to force the latter down or draw the same upward upon said track or tracks, substantially as described.

22. A car provided with a drop door in its bottom, in combination with downwardly and inwardly inclined hangers or tracks arranged beneath said door, a wedge part or parts movable upon said tracks, adapted, when moved out and raised, to close said door, a rotary power mechanism at or upon the side of the car, and a compound lever or levers positively connecting said wedge part or parts to the said rotary mechanism, substantially as described.

23. A car provided with a drop door, in combination with tracks arranged beneath point adjacent to the free end of the door, the door and inclined downwardly from a wedge devices for operation upon said tracks to raise and lock said door or permit it to fall, and a compound lever or levers operated from a point adjacent to the free end of said door, and adapted to move said wedge devices, as and for the purpose specified.

24. A car provided with a drop door, in combination with door raising and locking mechanism located beneath said door, an operating shaft arranged at the side of the car, means for rotating said shaft, and a three-part compound lever connecting said mechanism with said shaft, and through the medium of which the said mechanism is positively actuated in both directions, substantially as described.

25. A car, provided with a drop door, in combination with a downwardly and inwardly inclined track beneath the door, said track being provided with a level portion at its upper end in alinement with the inclined part of the track, a part movable upon the track and whereon the said door rests in all of its positions and a suitable draft device for drawing said part upward and outward upon said track to lift and lock said door, substantially as described.

26. A car provided with a drop door, in combination with wedge parts on which said door rests, tracks supporting said wedge parts and inclined downwardly in the direction of the hinge of said door, a rotary part adjacent to the free end of said door, compound levers actuated by said rotary part and in turn actuating said wedge parts and said compound levers being self-locking, substantially as described.

27. A car provided with a drop door, in combination with a suitable track arranged beneath the door and inclined downwardly from a point adjacent to the free end of said door, a wedge member movable on said track, for operating and supporting said door, a compound lever, means adjacent to the free end of said door for actuating said compound lever, to positively move said wedge device outwardly and upwardly to close the door, and inwardly and downwardly to open the door, substantially as described.

28. A car provided with a drop door, in combination with a winding or power shaft at the side of said car, tracks beneath said door and inclined downwardly from a point adjacent to the free end of the door, said tracks having flat portions at their upper ends in alinement with the inclined portions, a wedge device or roller interposed between each track and said door, and means in connection with said shaft for positively forcing said wedge devices off the flat portions of said tracks, and also adapted to positively draw said devices outwardly and upwardly to close and lock said door, substantially as described.

29. A car provided with a plurality of drop doors, in combination with tracks arranged beneath said doors and inclined downwardly from points adjacent to the free ends of said doors, wedge devices interposed between said tracks and doors, a winding or power shaft at the side of said car, and a plurality of compound levers connecting the individual wedge devices with said shaft, for operation thereby, substantially as described.

30. A car provided with a plurality of drop doors, in combination with tracks arranged beneath the doors and inclined downwardly from points adjacent to the free ends of said doors, wedge devices in-

terposed between said tracks and doors, a winding or power shaft at the side of said car and approximately in the normal plane of said doors, and a plurality of compound levers connecting the individual wedge devices with said shaft, for operation thereby, substantially as described.

31. A car provided with a plurality of drop doors, some of which are located over the car trucks, in combination with a winding or power shaft at the side of the car, inclined tracks arranged beneath said doors, wedge members movable thereon, a plurality of compound levers connecting said wedge members with said shaft, the dimensions of said levers and of said tracks varying to correspond with the relative locations of said doors and said trucks, substantially as described.

32. A car provided with a drop door, having depending cams upon its under surface, in combination with tracks arranged beneath said door and inclined downwardly from a point adjacent to the free end of said door, wedge devices revoluble upon said tracks, and means upon the side of the car for actuating said wedge devices, substantially as described.

33. A car provided with a drop door, having depending cams upon its under surface, in combination with tracks arranged beneath said door and inclined downwardly from a point adjacent to the free end of said door, wedge devices operable upon said tracks, and means upon the side of the car for positively actuating said wedge devices, in both directions, substantially as described.

34. A dump car having its floor mainly composed of a plurality of groups of drop doors, each door being hinged closely adjacent to the center line of the floor, in combination with door supporting and operating mechanisms arranged beneath said doors, means supporting said mechanisms, in such manner that the same are vertically movable, and also movable toward and from the hinges of said doors, and crank shafts extending along the car sides for actuating said door supporting and operating mechanisms in groups corresponding to the groups of doors.

35. A dump car having its floor mainly composed of a plurality of groups of drop doors each door being hinged closely adjacent to the center line of the floor, in combination with door supporting and operating mechanisms arranged beneath said doors, means supporting said mechanisms and adapting the same for movement vertically and toward and from the hinges of said doors, a crank shaft for each group of doors, and links forming a positive connection between said crank shaft and the supporting and operating mechanisms of its group.

36. A dump car having its floor mainly composed of a plurality of groups of hinged drop doors in combination with door operating mechanisms, always engaged with the bottoms of respective doors for supporting the same in opened and closed positions, means supporting said mechanisms and adapting the same for vertical movement, and for movement toward and from the hinges of respective doors, and means extending along the sides of the car for actuating said mechanisms.

37. A dump car having its floor mainly composed of a plurality of groups of hinged drop doors, having their free ends normally in substantial abutment with the sides of the car, a door supporting and operating mechanism arranged beneath each said door, said mechanism comprising a reciprocating shaft, an inclined track supporting said shaft, and an operating shaft extending lengthwise of the car for each group of doors for actuating respective groups of mechanisms.

38. A dump car having its floor mainly composed of a plurality of groups of hinged drop doors, each door being hinged closely adjacent to the center line of the floor, having their ends normally in substantial abutment with the sides of the car, a door supporting and operating mechanism arranged beneath each said door, and a shaft extending along the side of the car and having independent connections with the mechanism beneath each door.

39. A dump car having a plurality of groups of drop doors, in combination with a supporting and operating mechanism beneath and movable relatively to each door, shafts extending longitudinally at the sides of the car, one for each group of doors, and means connecting each said shaft with respective door supporting and operating mechanisms.

40. A dump car having its floor mainly composed of a plurality of groups of hinged drop doors having their free ends in a substantial abutment with the sides of the car, each door being hinged closely adjacent to the center line of the floor, in combination with door operating mechanisms whereon said doors rest, and a crank shaft extending along the car side in connection with each group of doors for moving the mechanisms thereof vertically and transversely to raise and lower said doors.

41. A dump car having its floor mainly composed of a plurality of groups of hinged drop doors having their free ends in a substantial abutment with the sides of the car, each door being hinged closely adjacent to the center line of the floor, in combination with door operating mechanisms whereon said doors rest, and means in connection with each group of doors for moving the mechanisms thereof vertically and trans-

versely to raise and lower said doors, said mechanisms in one position being adapted to positively lock respective doors in closed position.

42. A dump car having its floor mainly composed of drop doors in combination with door operating means beneath and movable relative to each door and supporting the same in both closed and extreme opened positions, shafts suitably journaled adjacent the sides of the car and extending longitudinally the car adjacent the free edges of said doors, and means connecting said shafts with individual door operating means, to raise and lower the same, and to move them beneath the free ends of the doors to lock them in closed position.

43. A dump car having its floor mainly composed of a plurality of groups of hinged doors arranged on opposite sides of the center line, and, when closed, having their free ends in substantial abutment with the sides of the car, each door being hinged closely adjacent to the center line of the floor, in combination with door supporting and operating mechanisms arranged beneath said doors, means supporting each said mechanism in such manner that it is adapted for vertical movement, and for movement toward and from the center line of the car, and crank shafts extending along the sides of the car for actuating said mechanisms in groups corresponding to the groups of doors.

44. A dump car having sides and ends and an underframe the latter composed of longitudinal members and cross sills or bearers, in combination with doors hinged in the openings of said underframe and extending substantially to the ends of said cross bearers, an operating mechanism beneath each said door and longitudinally extending operating shafts at the ends of said cross bearers, said shafts being each connected with the mechanisms of its respective group of doors to operate the same simultaneously.

45. A dump car having an underframe composed of longitudinal and transverse members, in combination with drop doors filling the openings in said underframe, the free ends of said doors extending substantially to the ends of said transverse members, said doors forming portions of the car floor, a longitudinally extending shaft arranged at the ends of said transverse members beneath the floor line of the car, operating mechanisms supporting said doors and movable toward and from the longitudinal axis of the car and suitable devices connecting said mechanisms with said shaft for operation thereby, substantially as described.

46. A dump car having a plurality of door openings in its bottom, in combination with dumping doors normally closing said openings and forming part of the car floor,

said doors being hinged parallel to the longitudinal axis of the car and extending to the side of the car, inclined hangers depending from the underframe of the car, a longitudinal shaft movable toward and from the axis of the car, rollers upon said shaft in engagement with respective doors to support the same in closed and opened positions and means extending lengthwise at the side of the car for operating said shaft to raise and lower said doors simultaneously.

47. A car having a plurality of dumping doors in its bottom, in combination with hangers depending from the car underframe, each hanger comprising an intermediate inclined portion and terminal vertical portions, a shaft supported by said hangers for operating said doors, said shaft being movable from and toward the axis of the car and also vertically and means for thus moving said shaft.

48. A car having a plurality of dumping doors in its bottom, in combination with hangers depending from the car, a shaft supported by said hangers for operating said doors, said shaft being movable from and toward the axis of the car and also vertically and longitudinally extending means at the side of the car for thus moving said shaft.

49. A dump car having an opening in its bottom, in combination with a dumping door forming part of the car floor said door being hinged on a line parallel with the longitudinal axis of the car, and extending to the side of the car; hangers depending from the car underframe, each hanger comprising an intermediate inclined portion and terminal vertical portions, a door-operating shaft supported by said hangers and carrying parts in rolling contact with the bottom of said door, and means for operating said shaft in said hangers, to lower said door and to raise the same.

50. A dump car having an opening in its bottom, in combination with a dumping door forming part of the car floor, said door being hinged on a line parallel with the longitudinal axis of the car, and extending to the side of the car; hangers depending from the car underframe, a door operating shaft supported by said hangers and carrying parts in rolling contact with the bottom of said door, each hanger comprising an intermediate inclined portion and terminal vertical portions and means for operating said shaft in said hangers to lower said door and to raise and lock the same in raised position.

51. A dump car comprising an underframe composed of members disposed at right angles and having a floor mainly composed of two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, the doors at the ends of the car being hinged at a greater distance from the

longitudinal axis of the car than are doors in the middle portion of the car, in combination with a supporting and operating shaft for the doors, and means for operating the shaft.

52. A dump car comprising an underframe composed of members disposed at right angles and having a floor comprising two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, the doors at the ends of the car being hinged at a greater distance from the longitudinal axis of the car than are the doors in the middle portion of the car, in combination with door-operating mechanisms suspended from said underframe and adapted to support said doors in both opened and closed positions, the mechanisms for the doors at the ends of the car being of smaller size than the others and means at the sides of the car for simultaneously operating the mechanisms of both end and middle doors.

53. A dump car having an underframe composed of members disposed at right angles and having a floor mainly composed of two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, the doors at the ends of the car being hinged at a greater distance from the longitudinal axis of the car than are the doors at the middle portion of the car, in combination with a supporting and operating shaft for said doors and shafts at the sides of the car adapted to operate the supporting shafts.

54. A dump car having an underframe composed of members disposed at right angles and having a floor mainly composed of two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, the doors at the ends of the car being hinged at a greater distance from the longitudinal axis of the car than are the doors at the middle portion of the car, in combination with inclined hangers depending from said underframe, the hangers beneath the end doors of the car being smaller than the others, wedge devices adapted for movement on said hangers and supporting respective doors and operating shafts arranged at the sides of the car for actuating said wedge devices.

55. A dump car comprising an underframe composed of members disposed at right angles and having a floor mainly composed of two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, the doors at the ends of the car being hinged at a greater distance from the longitudinal axis of the car than are the doors at the middle portion of the car, in

combination with inclined tracks or hangers beneath said doors, wedge devices movable thereon, connecting shafts which are common to the wedge devices of the end doors, other connecting shafts common to the wedge devices of the middle doors and means at the sides of the car for moving said shafts transversely of the car to raise and lower said doors.

56. A dump car comprising an underframe composed of members disposed at right angles and having a floor mainly composed of two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, the doors at the ends of the car being hinged at a greater distance from the longitudinal axis of the car than are the doors at the middle portion of the car, in combination with inclined tracks or hangers beneath said doors, door supporting wedge devices movable thereon, connecting shafts which are common to the wedge devices of the end doors, other connecting shafts common to the wedge devices of the middle doors, operating shafts disposed at the ends of the transverse members of the underframe and each connected with and common to a plurality of end and middle door connecting shafts and mechanisms.

57. A dump car comprising an underframe composed of members disposed at right angles and having a floor mainly composed of two sets of dumping doors hinged adjacent to the longitudinal axis of the car and extending to the car sides and from end to end of the car, in combination with inclined tracks or hangers beneath said doors, door supporting wedge devices movable thereon, connecting shafts which are common to the wedge devices of the end doors, other connecting shafts common to the wedge devices of the middle doors, operating shafts disposed at the ends of the transverse members of the underframe and each connected with and common to a plurality of end and middle door connecting shafts and mechanisms.

58. In a dump car an underframe, in combination with a plurality of doors constituting a portion of the floor of the car, inclined ways suspended from said underframe between each pair of doors, wedging members movable on said ways and supporting respective doors, and a shaft arranged at the side of the car and co-extensive with the series of doors thus supported.

59. A dump car comprising an underframe, sides and ends, in combination with two sets of dumping doors extending from end to end of the car and to the sides thereof, shafts arranged at the sides of the car, means connected with said shafts for raising and locking said doors and for unlocking and lowering said doors, the first portion of the

movement of said shaft in one direction being utilized to unlock said doors, and the last portion of the movement of the shaft in the opposite direction being utilized to lock said doors.

60. A dump car having a floor forming door, in combination with a door operating member adapted for lateral non-rotative reciprocation beneath said door to support the same in opened and closed positions, a track supporting said member, parts on said member in rolling contact with said door and means for operating said member.

61. A dump car having a floor forming door, in combination with a door operating member adapted for lateral non-rotative reciprocation beneath said door to support the same in opened and closed positions, parts on said members in rolling contact with said door and an actuating shaft located adjacent to the free end of said door for reciprocating said member.

62. A dump car having a floor forming door, in combination with inclined hangers arranged beneath said door, a member adapted for lateral non-rotative reciprocation on said hangers and carrying rotary parts which support said door in opened and closed positions and an actuating shaft at the side of the car for reciprocating said member.

63. A dump car having a door opening in its floor, in combination with a dumping door hinged therein, a reciprocatory door supporting and operating member in operative engagement with said door to raise and lower the same and an operating shaft on the side of the car and provided with cranks having their swinging ends connected with said member for operating the same, substantially as described.

64. A dump car having a door opening in its floor, in combination with a dumping door hinged therein, a reciprocatory door supporting and operating members in operative engagement with said door to raise and lower the same, an operating shaft on the side of the car and provided with cranks having their swinging ends connected with said members for operating the same, said cranks in one position operating to lock said members in raised position thereby locking said door, substantially as described.

65. A dump car having a door opening in its floor, in combination with a dumping door hinged therein, a reciprocatory supporting and operating member in rolling engagement with said door, an operating shaft at the side of the car, cranks thereon, said cranks being connected with said member and in one position operating to lock the same and thereby said door.

66. A dump car having a plurality of floor forming drop doors hinged adjacent to the longitudinal axis of the car and extending into substantial engagement with

the side of the car, in combination with a door supporting and operating shaft, a rocking shaft provided on the side of the car and self locking crank levers provided on said shaft and operatively connected with said supporting shaft for lowering the doors and raising and locking them.

67. A dump car having a plurality of floor forming drop doors hinged adjacent to the longitudinal axis of the car, in combination with a door supporting and operating shaft, a rocking shaft arranged at the side of the car beneath the floor, lever means operatively connecting said shaft with said supporting shaft, means for turning said rocking shaft and the first part of the movement of said shaft in one direction being adapted to unlock said door and the last part of the movement thereof in the other direction being adapted to lock said door.

68. A car provided with drop doors, in combination with vertically and laterally bodily movable devices operating individually upon each of said doors after the manner of a wedge to raise and lower the same, and means extending along the side of the car and connected separately to each of said devices.

69. A car provided with a drop door, in combination with a part or member whereon said door rests when open, and means at the side of the car for moving said part outwardly and upwardly to raise said door.

70. A dump car comprising sides and ends and an underframe, the latter containing a plurality of door openings, in combination with doors arranged in said openings and hinged parallel with the longitudinal axis of the underframe, each said door extending into substantial abutment with the side of the car, door actuating mechanisms comprising movable members and supporting tracks suspended from the underframe beneath respective doors, and means at the side of the car for actuating said mechanisms to simultaneously open and close said doors.

71. A dump car, comprising sides and ends and an underframe, the latter containing a plurality of door openings, in combination with drop doors hinged in said openings and normally constituting parts of the car floor, mechanisms comprising movable members and supporting tracks arranged beneath said doors and continuously supporting the same and a shaft at the side of the car connected with said mechanisms for actuating the same to open and close said doors.

72. A dump car, comprising sides and ends and an underframe, the latter containing a plurality of door openings, in combination with drop doors hinged in said openings and normally constituting parts of the car floor, mechanisms comprising movable members and supporting tracks arranged be-

neath said doors and continuously supporting the same and a shaft at the side of the car connected with said mechanisms to open or drop said doors and to raise and lock said doors.

73. A dump car comprising sides and ends and an underframe, in combination with floor forming doors hinged in said underframe, door supporting and operating mechanisms hanging by vertical supports from said underframe and comprising stationary tracks and members in rolling contact with respective doors and means for simultaneously operating said mechanisms to raise and lower said doors.

74. A dump car comprising sides and ends and an underframe, in combination with floor forming doors hinged in said underframe, door supporting tracks hanging from said underframes and operating mechanisms for each door in rolling contact with respective doors and means extending along the side of the car for simultaneously operating said mechanisms to raise and lower said doors.

75. A dump car having its floor mainly composed of drop doors hinged parallel with the longitudinal axis of the car and extending into substantial abutment with the sides of the car, in combination with door supporting shafts arranged beneath said doors on the opposite sides of the axis of the car, rollers thereon directly supporting respective doors, supporting tracks for said shafts hanging by vertical supports from the underframe of the car and means for operating said shafts to move said rollers transversely of the car to raise and lower said doors.

76. A dumping car having an underframe comprising longitudinal and transverse members, floor forming doors hinged in the openings between said members and extending substantially to the ends of said transverse members, supports beneath and movable relative to said doors, a rocking shaft journaled adjacent and extending longitudinally of the side of the car, and link connections extending transversely of the car between said shaft and said supports, and adapted to push said supports toward the hinge axis of said doors and to pull said supports away therefrom.

77. A dumping car having an underframe comprising a center sill and transverse members, drop doors hinged longitudinally of the car adjacent the center sill, and extending substantially to the ends of said transverse members, door supporting mechanism beneath the doors and having a movement of translation relative thereto, and rocking shafts at the ends of said transverse members connected to the door supporting mechanism, link connections between said rocking shafts and supporting mechanism operative

under tension and compression for raising and lowering the doors by reciprocating said supporting mechanism.

78. A dump car provided with a plurality of floor forming drop doors, in combination with tracks hanging from the car and extending downwardly in the direction of the hinged ends of said doors, a door supporting member movable on said tracks to raise and lower said door said tracks being at all points relatively remote from the hinged ends of the doors.

79. A dump car provided with a plurality of floor forming drop doors, in combination with tracks hanging from the car and extending downwardly in the direction of the hinged ends of said doors, a door supporting member having rollers engaged with respective doors and movable on said tracks to raise and lower said door said tracks being at all points relatively remote from the hinged ends of the doors.

80. In a dump car, a downwardly opening door, hinges connecting said door to the car, tracks beneath said door inclining downwardly toward the hinge axis thereof, a door support movable between said tracks and door to close said door and to permit it to drop, and stops at the lower ends of said tracks, said stops being sufficiently remote from said hinges to arrest the downward movement of said door without injurious strain to said hinges.

81. A dump car having a plurality of groups of drop doors, in combination with a supporting and operating mechanism beneath each door, a depending cam on each door, longitudinally rotatable shafts at the sides of the car, one for each group of doors, and means connecting each said shaft with respective door supporting and operating mechanisms.

82. A dump car having its floor mainly composed of drop doors extending into substantial abutment with the sides of the car and rocking shafts arranged at the sides of the car, inclined tracks beneath said doors, operating members between said tracks and doors for raising, lowering and locking the same, and connections between said rock shafts and operating members.

83. A dump car having a plurality of floor forming drop doors, in combination with inclined tracks arranged beneath said doors, parts movable on said tracks and supporting said doors in both opened and closed positions, rocking shafts arranged at the sides of the car and means connecting said shafts with individual parts on said tracks for op-

erating the same to raise and lower said doors.

84. In a car of the class described, a dumping door provided on its under surface with an inclined track, a co-acting inclined track secured to the car frame, a reciprocatory shaft co-acting with said tracks, and means for actuating said shaft.

85. In a car of the class described, an underframe comprising a center sill and cross members, dump doors, inclined tracks depending from and secured to said cross members, and operating means coacting with said tracks and doors.

86. In a car of the class described, an underframe comprising a center sill and cross members, dump doors, supporting tracks each comprising an inclined intermediate part, and substantially vertical end parts secured to said cross members, and operating means coacting with said tracks and doors.

87. In a dump car, a center sill, cross members, floor forming doors hinged adjacent the center sill, supports beneath said doors and movable transversely of the hinge axis thereof, a longitudinally extending shaft journaled adjacent the car side, crank arms on said shaft, and links extending from said crank arms to said supports for moving them toward and from the hinge axis of said doors, the parts being so proportioned and arranged that when said doors are closed said crank arms and the links directly connected thereto lie adjacent the car side.

88. In a car, floor forming doors, supports beneath and movable relative to said doors, a rocking shaft adjacent the free edges of said doors, and link connections between said shaft and supports operative under compression and tension for moving said supports respectively toward and from the hinge axis of said doors.

89. In a dump car, a downwardly opening hinged door, and tracks beneath said door, each of said tracks comprising an inclined section upturned at its lower end to form a stop, said stop being sufficiently remote from the hinge of said door to arrest its downward movement without injurious strain to the hinges.

In testimony whereof, I have hereunto set my hand this 1st day of March A. D., 1904, at St. Louis, Missouri, in the presence of two witnesses.

ARTHUR LIPSCHUTZ.

Witnesses:

HERBERT W. WOLFF,
WM. STEVENSON.

It is hereby certified that in Letters Patent No. 957,616, granted May 10, 1910, upon the application of Arthur Lipschutz, of St. Louis, Missouri, for an improvement in "Dump-Cars" errors appear in the printed specification requiring correction as follows: Page 5, lines 112 and 113 should be transposed; and page 7, line 77, before the words "the car" the word *of* should be inserted; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of June, A. D., 1910.

[SEAL.]

F. A. TENNANT,
Acting Commissioner of Patents.