P. J. HARRIGAN.

DUMP CAR.

APPLICATION FILED DEC. 9, 1909.

987,877. Patented Mar. 28, 1911.

3 SHEETS—SHEET 1

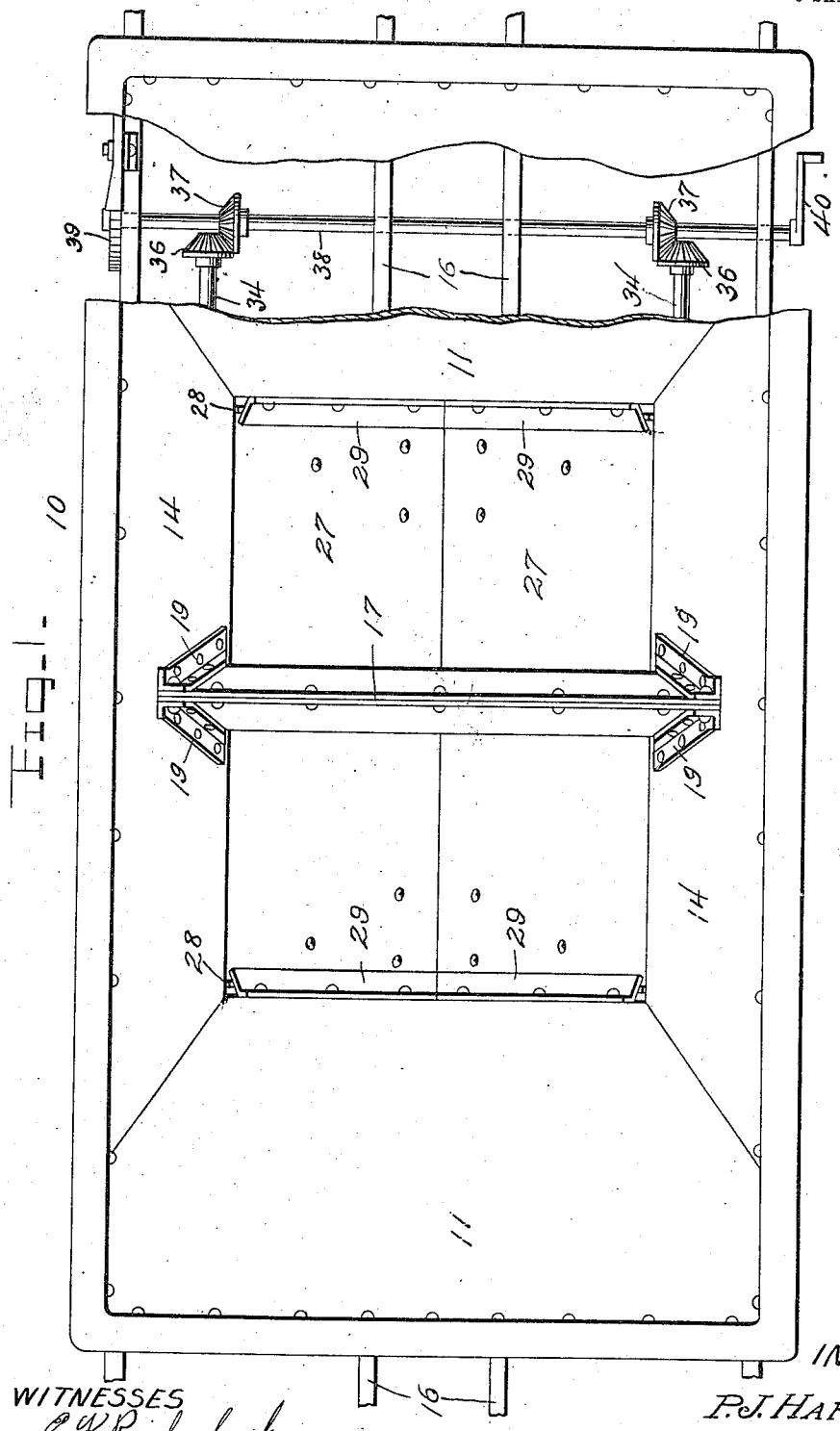

FIG. 1.

WITNESSES

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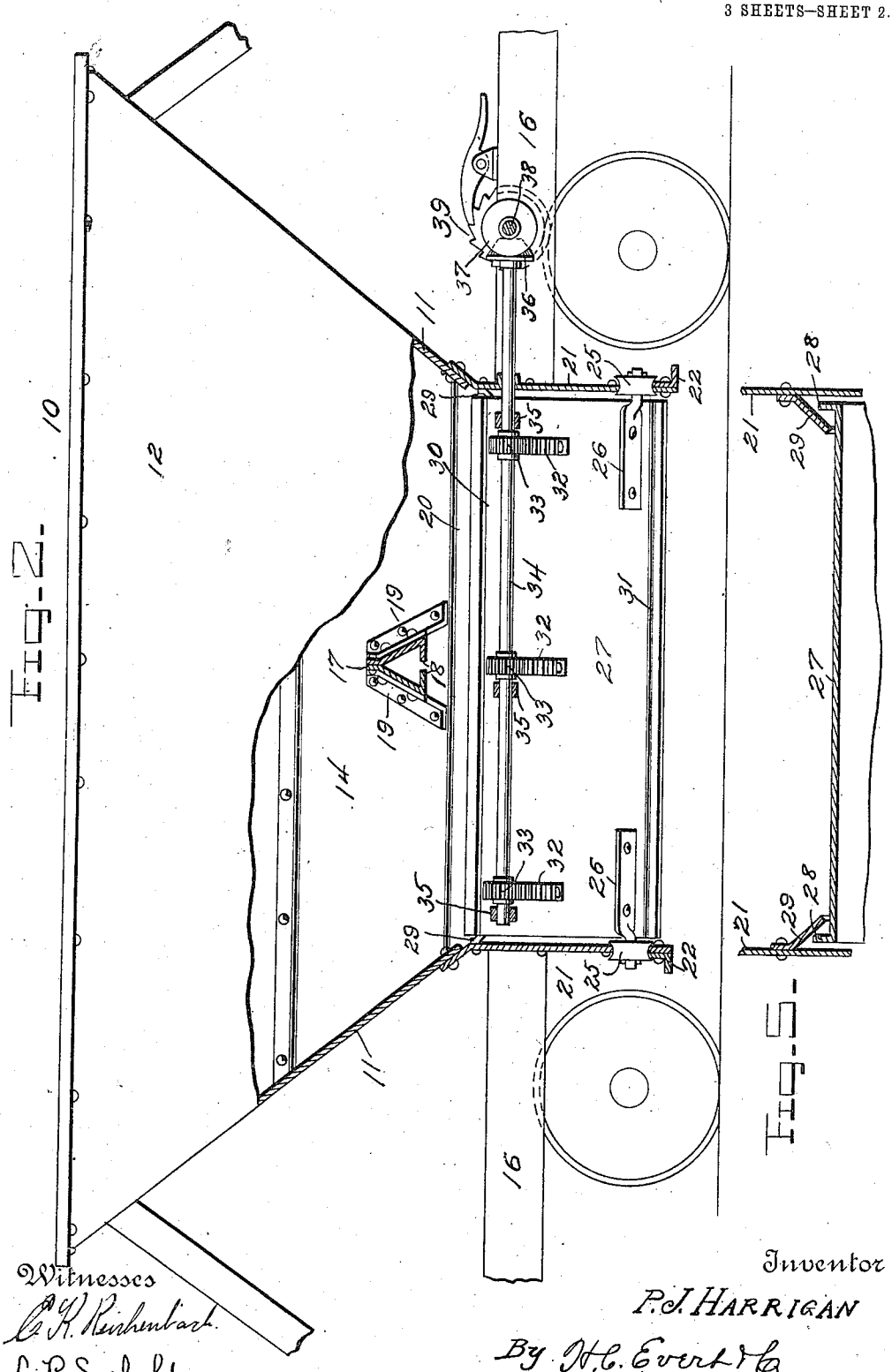

FIG. 2.

FIG. 5.

Witnesses

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3 SHEETS—SHEET 3.

Fig. 3.

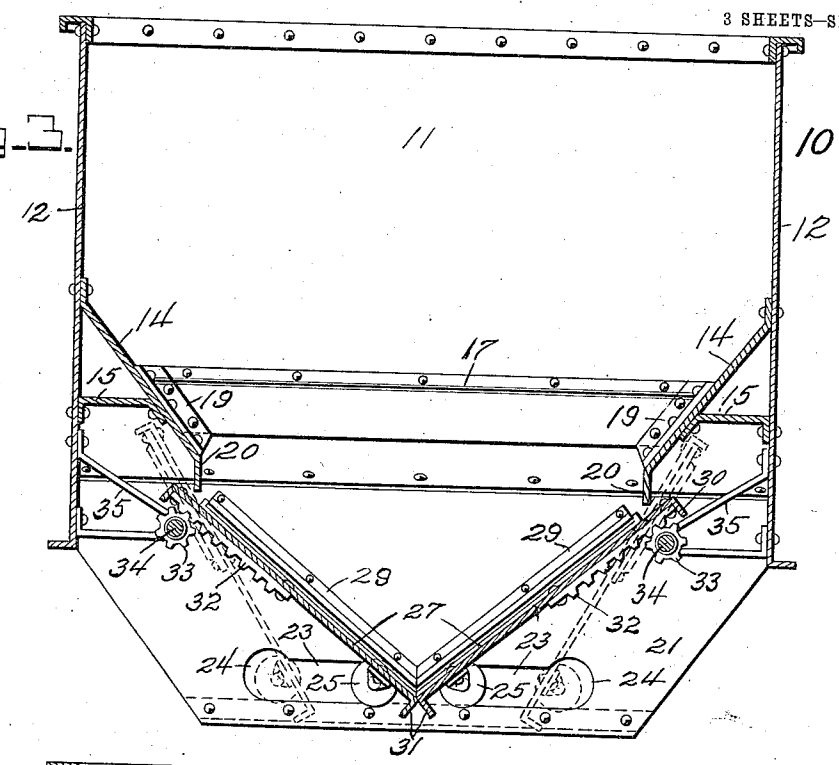
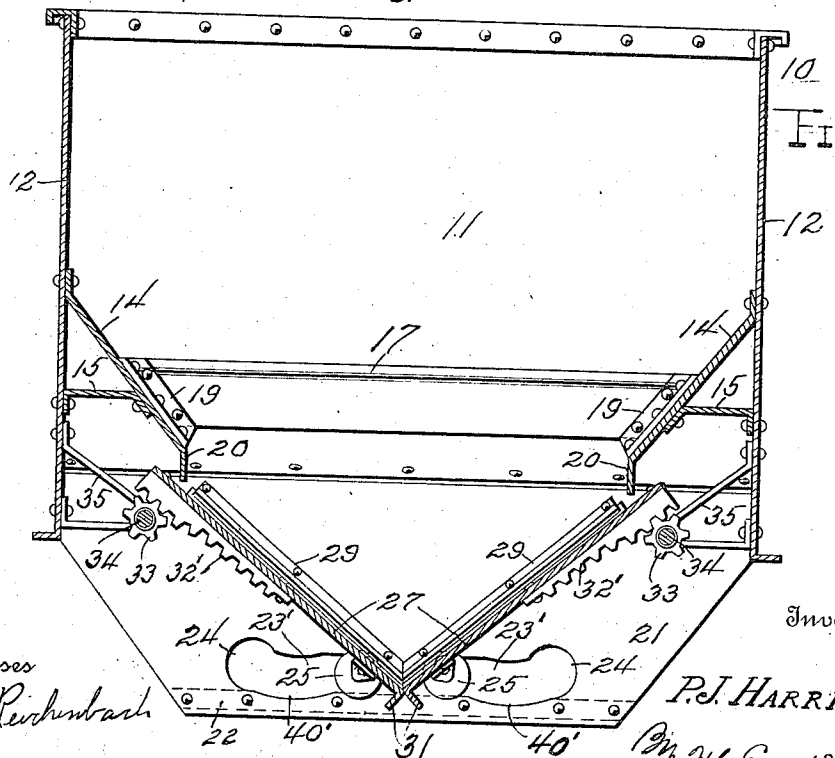


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

PATRICK JOSEPH HARRIGAN, OF McKEESPORT, PENNSYLVANIA.

DUMP-CAR.

987,877. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed December 9, 1909. Serial No. 532,189.

To all whom it may concern:

Be it known that I, PATRICK J. HARRIGAN, a citizen of the United States of America, residing at McKeesport, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Dump-Cars, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to certain new and useful improvements in dump cars, and relates more particularly to that type of cars generally known as hopper bottom cars which are provided with movable doors that constitute either the bottom of the car or a portion of such bottom, and which doors are movable to open position to permit of the discharge of the lading.

The present invention relates particularly to an improvement in the door mechanism of cars of this type, the main object of the invention being to provide a hopper bottom car particularly adapted for use in connection with the hauling of ore or like material of low specific gravity, though not in any wise confined to such use, being applicable for the transportation of any material usually conveyed in cars of this type.

The invention contemplates the provision of a car of this type wherein the movable doors are arranged to be readily and easily operated so as to provide a discharge opening of large area in order to obtain a rapid discharge of the material from the car and effectually prevent the bridging of the material during such discharge.

The invention also has for its object the provision of a car of this type in which all chains or similar door suspending means such as is quite generally employed in connection with cars used for hauling ore and like material are dispensed with.

A still further object of the present invention is to provide a movable door or doors to form the bottom of the car and dispose the doors at such an angle with relation to the car sides that as the lading begins to discharge from the car, the weight thereof is directed against the door or doors whereby to effect a rapid full opening of the door or doors, the doors in their completely open position however, being still so disposed with relation to a vertical line, that their tendency is to automatically return to the closed position as soon as the weight of the lading is relieved therefrom.

A still further object of the invention is to provide novel supporting and actuating means for the door or doors, so disposed in relation thereto that the door or doors ride upon the supporting means in their opening and closing movement, the supporting means acting as the pivot or pivots of the door or doors and guiding same in their movement.

With the above and other objects in view, which will hereinafter more particularly appear as the invention is described in detail, the invention consists of the novel construction, combination and arrangement of parts as will be specifically described and then claimed, and in describing the invention in detail, reference will be had to the accompanying drawings forming a part of this application, and wherein like numerals of reference will be employed to designate like parts throughout the different views, in which:

Figure 1 is a top plan view of a hopper car constructed in accordance with my invention, one of the end walls of the car body being partly broken away, Fig. 2 is a side elevation partly broken away and partly in longitudinal section to better show the door operating mechanism, Fig. 3 is a transverse vertical sectional view of the car body and doors, showing the latter in closed position in full lines and in open position in dotted lines, Fig. 4 is a similar view showing a slight modification in construction, and, Fig. 5 is a longitudinal sectional view of a part of one of the doors and of a part of the end walls of the car body.

In the embodiment of the invention as herein illustrated, I have shown the same as comprising a pair of twin doors operable in a manner to be hereinafter set forth; but I do not wish to be understood as confining myself to the employment of a pair of doors, as obviously, a single door or a series of doors could be constructed and arranged so as to be operated in the same manner as the pair of doors herein shown. Also, in the present illustration of the invention, the same is shown as applied to a hopper bottom railway dump car, but it is obvious that the invention can be used in connection with dump bins and like receptacles with which no truck is used, and in such use, suitable means may be provided for imparting initial opening movement to the doors.

The body 10 of the car is in general form of the usual type. The end walls 11 of the car body of the type shown are usually

placed at an incline to the vertical of not over 45°, and the side walls 12 are generally disposed vertically. My improvement in so far as the body of the car resides consists in the provision of the auxiliary side walls 14 which are attached to the inner faces of the vertical walls 12 at the upper edges of the auxiliary or supplemental inclined side walls 14 and also secured to the side walls 12 by brace members 15, these auxiliary or supplemental side walls together with the lower portions of the side walls 12 forming a casing into which the upper edges of the doors are received.

With the type of car herein shown, the sills 16 of the car frame extend only to the car body, so that there are no sills extending across the discharge opening to interfere with the free discharge of the lading. The inclined supplemental sides 14 are tied together by a cross-tie or ridge 17 which extends across the interior of the car body at a point some distance above the discharge opening, and is herein shown as being formed of two angle-bar members 18 secured at their ends to angle-plates 19, which latter are firmly riveted or otherwise secured to the supplemental sides 14. The doors to be hereinafter described have their upper edges received back of the supplemental sides 14, and in order to fully protect the opening which receives the upper edge of these doors from the material either when the car is loaded or during the discharge, the lower edges of the sides 14 are bent downwardly so as to lie in vertical planes as shown at 20, and constitute shields for effectually excluding the material from the space behind the supplemental sides 14.

Each end wall 11 is provided with a depending end plate 21, which plates lie in vertical planes, and since with the construction of doors to be hereinafter described, it is not necessary to make any provision for a swinging movement of the doors, the said end plates are extended relatively close to the track, and the doors are also placed so that their lower edges are relatively close to the track. The lower edges of the end plates 21 are reinforced by track rails 22, which as shown may be conveniently formed of angle-bar material. Each end plate 21 is provided adjacent its lower edge with elongated openings 23, the lower walls of which are on a plane with the upper edges of the track rails 22, and which openings are each provided with an enlarged outer end 24 to allow of the placing within the openings 23 of grooved or flanged traveler wheels 25 carried by the doors, these wheels traveling on the upper edges of the slots or openings 23 and the lower edges thereof as well as on the track rails 22, and which wheels are rotatably mounted on the outer pintle-like ends of straps 26 secured to the lower faces of the doors 27. The doors 27 are preferably provided with up-turned ends 28, which are received back of deflectors 29 riveted to the inner faces of the end plates 21, the said construction being for the purpose of preventing the material in the car interfering in any manner with the free and easy movement of the doors in both the opening and closing movement thereof. The doors may or may not be provided with the flanged upper edges 30, and at their lower edges are preferably provided with flanges 31, which reinforce the doors at their lower edges, and insure a more perfect seat between the lower edges of the doors.

The doors are disposed at such an angle with respect to the car sides that the weight of the car lading will be directed against the doors so as to have a tendency to hold them in closed position, the angle at which the doors are placed however being such that the doors may be easily shifted to a more acute angle in order that the weight of the load will then be directed against the doors to effect a rapid opening movement thereof. It is necessary therefore to exercise great care in positioning the doors at the proper angle so that the desired functions will be obtained, that is, that the doors are at such an angle that when closed, the weight of the lading is exerted against the doors in such manner as to hold the doors closed, and yet, this angle must be such that the initial opening movement may be imparted to the doors without undue effort, to move the doors to such angle as to position them so that the weight of the lading is directed against the doors to force them to fully open position. The angle at which the doors are placed to accomplish this result is therefore, it will be noted, less than a forty five degree one, and in practice, I have found that the placing of the doors at an angle (when the doors are closed) of substantially thirty eight degrees to the horizontal works admirably, the movement of the doors from this angle to one more obtuse so as to shift the weight of the lading against the doors to force them open being comparatively easy, but when at this angle, the weight of the lading tending to maintain the doors closed. To actuate the doors and initially start the same on their travel toward open position, I provide the doors on their underneath faces at suitable points, with racks 32, which racks engage with pinions 33 mounted on shafts 34 that are journaled in brackets 35 carried by the side walls 12 of the car body. The said shafts 34 are each provided on one end with a beveled pinion 36, which pinions mesh with beveled pinions 37 carried by an operating shaft 38 that is journaled in the sills of the car frame, and which may be held stationary in any desired manner, as by means of the pawl and ratchet 39 shown, or any other

desired device; the shaft 38 is adapted to receive a crank 40 on one end thereof, or as will be obvious, an operating wheel may be employed if desired. The pawl and ratchet mechanism may be placed at one end of the shaft, or at any point desired for instance, located in proximity to the crank end of the shaft within easy reach of the person turning the crank.

In Fig. 4 of the drawings, I have illustrated the same conception as above described, showing in addition, means for accelerating or accentuating the rapid opening movement of the doors, and also insuring a return movement of the doors to closed position after the lading has been discharged. This may be accomplished by using racks 32′ of the form shown in Fig. 4, and the provision of curved depressions 40′ in the tracks for the wheels 25. In the present illustration, the racks 32′ are shown with the teeth thereof on a curved line, and when the doors are initially moved, these racks will have a tendency to impart an impetus to the door in its opening movement, and as the wheels 25 reach the depressions 40′, this impetus will be accelerated so as to cause the door to rapidly move to open position. Obviously, the racks 32′ may be employed alone, or the curved openings 23′ may be employed alone, or the double accentuating means illustrated employed, and I therefore do not wish to be understood as confining the construction to both of the accentuating means shown.

It will be understood that the car body is so mounted in the frame as to effectually support the former, and that the end walls 21 may be secured to the sills of the car frame so that the suspended weight will not be delivered onto the car body to which the upper ends of the end plates are attached.

Obviously, when the load of the car has been discharged, the angle which the doors have assumed in their completely open position is insufficient to destroy the tendency of the doors to move toward closed position, and this remains true whether the accelerating means is employed in connection with the doors or not. Since the doors have their lower edges moving in a horizontal plane, and no provision is therefore required for a swinging movement of the doors, the same can be brought down close to the track which, as is well known, is a desideratum in devices of this character. Furthermore, by reason of the inherent tendency of the doors to automatically move to closed position, should they for any reason remain in the open position, the jarring of the car when the latter is moved will be sufficient to cause the doors to assume their closed position.

With the constructions shown and described it will be observed that the pivotal point for the doors is the pinion or pinions 33. In the present illustration, a plurality of these pinions is provided on each shaft 34, but obviously, a single pinion could be employed together with a single rack 32 (or 32′) for each door. Since these pinions are disposed underneath the doors and the latter rest thereon at all times the doors are constantly supported throughout their opening and closing movements, and the arrangement of the pinions to engage with racks on the underneath faces of the doors enables me to apply the mechanism to certain types of cars in which difficulty has oftentimes been encountered with other types of operating mechanism by reason of interfering sills, etc. In my device the pivot point of the door or doors remains at the same point at all times, the door or doors rolling over the same in their movement in both directions.

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

1. In a dump car, the combination with a car body having vertical side walls and inclined end walls, inclined supplemental side walls secured to the first mentioned side walls, doors forming the bottom of said car body, said doors disposed at an angle with respect to the side walls of the car body, end plates depending from the end walls of the car body and provided with elongated openings, wheels carried by said doors and traveling in said openings, brackets carried by the side walls of the car, shafts journaled in said brackets and provided with pinions, racks secured to the under face of the doors and engaging said pinions, and means for operating said shafts for actuating the doors.

2. In a dump car, the combination with a car body, and end plates depending therefrom and provided with elongated openings, of doors forming the bottom of said car body and having wheels traveling in the openings in said end plates, shafts supported from the car body and provided with pinions, racks carried by the doors and engaging said pinions, and means for operating said shafts to actuate the doors.

3. In a dump car, the combination with a car body having a discharge opening, of a door controlling said opening and so disposed as to have a normal tendency when open to move to closed position by gravity, end plates depending from said car body and each provided with a track, wheels carried by the door at the ends thereof engaging said tracks, a shaft carried by the car body and provided with pinions, racks secured to the under face of the door and engaging said pinions, and means for operating said shaft.

4. In a dump car, the combination with a car body having a discharge opening, and end plates depending from the car body and

each provided with a track, of a door for said discharge opening, wheels carried at the ends of the door engaging the tracks of said end plates, an actuating shaft provided with pinions, said actuating shaft constituting a support for the upper edges of the door, racks carried by the door engaging said pinions, and means for operating said actuating shaft.

5. In a dump car, the combination with a car body having a discharge opening, of doors forming the bottom of said car body, said doors disposed at such an angle with respect to the walls of the car body when in the closed position that the lading of the car is directed against the doors in a direction tending to force the doors toward closed position, means for primarily moving the doors to shift the same to partially open position and at an angle with respect to the car body walls more acute than that occupied by the doors when in the closed position, whereby the weight of the contents of the car body is then directed against the doors in a direction to force the latter to full open position as the contents of the car discharges, said means comprising an actuating shaft for each door, pinions carried by each actuating shaft, racks on the doors engaging said pinions, and means connected with the ends of the actuating shafts for operating the latter.

6. In a dump car, the combination with a car body having a discharge opening, end plates depending from the car body and provided with tracks, doors forming the bottom of said car body and having wheels engaging said tracks, said doors disposed at such an angle with respect to the car body as to have a natural tendency when in open position to move to closed position, an actuating shaft for each door, pinions carried by said shafts, racks carried by the doors and engaging said pinions, and means connected with said actuating shafts for operating the same.

7. In a dump car, the combination with a car body having a discharge opening and end plates depending from the car body and provided with tracks, of doors forming the bottom of said car body and having wheels engaging the tracks of said end plates, said doors disposed in inclined positions within the car body and having up-turned ends, deflectors secured to the end plates and overlying said up-turned ends of the doors, actuating shafts supported from the car body and provided with pinions, racks carried by the car doors and engaging said pinions, and means for operating said actuating shafts.

8. In a dump car, a car body provided with depending end plates, each of said end plates provided adjacent its lower edge with a track, doors forming the bottom of said car body and provided with wheels engaging said tracks, said doors so disposed with respect to the walls of the car body as to have a normal tendency to move to closed position, door operating means comprising actuating shafts carrying pinions, racks carried by the car doors engaging said pinions, and means for operating said actuating shafts.

9. In a dump car, the combination with a car body, and end plates depending therefrom and provided with tracks, of doors forming the bottom of said car body and having wheels at their ends traveling on said tracks, said doors so disposed with respect to the walls of the car body as to have a normal tendency to move to closed position, and means constituting a support for the upper edges of the doors and also constituting an actuating means for imparting opening movement to the doors.

10. In a dump car, the combination with a car body, end plates depending therefrom and provided with tracks, of doors forming the bottom of said car body and having wheels engaging said tracks, said doors so disposed with respect to the walls of the car body as to have a normal tendency to move to closed position, of means constituting a support for the upper edges of the doors and also constituting a means for actuating the doors, and means for accelerating the opening and closing movement of the doors.

11. In a dump car, the combination with a car body, and end plates depending therefrom and provided with tracks, of doors provided at their ends with wheels engaging said tracks, said doors so disposed with respect to the walls of the car body as to have a normal tendency to move to closed position, actuating shafts for the doors, pinions carried by said shafts, means carried by the doors for engaging said pinions whereby the doors are moved as the actuating shafts are operated, and means for operating said shafts.

12. In a dump car, the combination with a car body, and end plates depending therefrom and provided with tracks, of doors forming the bottom of said car body and having wheels traveling on said tracks, said doors so disposed with respect to the walls of the car body as to have a normal tendency to move to closed position, an actuating shaft for each door, means connecting the shaft with the door whereby when the former is actuated, the door is moved, and means for operating said shafts.

13. In a dump car, the combination with a car body and end plates depending therefrom and provided with tracks, of doors forming the bottom of said car body and guided at their lower edges in their opening and closing movement by said tracks, of actuating shafts disposed beneath the doors adjacent the upper edges thereof and con-

stituting supports for said doors at their upper edges, gearing connecting said shafts with the doors, and means for operating said shafts.

14. In a dump car, the combination with a car body having a discharge opening and provided above said opening with inclined walls, of doors forming the bottom of said car body, supports for the lower edges of said doors by which they are guided during the opening and closing movement of the doors, actuating shafts constituting supports for the upper edges of the doors, gearing connecting the actuating shafts to the doors, and means for operating said shafts.

15. In a dump car, a car body having a discharge opening, and having inclined side walls above said opening, end plates depending from the car body and provided with tracks, doors forming the bottom of the car body and having their lower edges guided in their opening and closing movement by said tracks, the upper edges of said doors lying beneath and in the rear of the said inclined walls, actuating shafts disposed beneath said doors and constituting supports for the upper edges of the doors, gearing connecting the shafts with the doors whereby the latter are operated upon the actuation of the shafts, and means for operating said shafts.

16. The combination of doors adapted to control a discharge opening, tracks for guiding the lower edge of said doors in a horizontal plane, and means disposed beneath the doors for guiding the upper edges of said doors during the opening and closing movement of the doors.

17. The combination with a car having an inclined bottom, of a casing therein, a pivoted door forming a portion of said bottom, and means for raising the upper portion of said door into said casing without moving the pivotal point of the door.

18. The combination with a car having an inclined bottom, of a casing therein, a pivoted door forming a portion of said bottom, a device disposed beneath said door for raising the upper portion of said door into said casing, said device constituting the pivot for the door, and means disposed beneath said bottom to engage the free edge of said door during its opening and closing movement.

19. The combination of doors adapted to control a discharge opening, means for guiding the lower edges of said doors in a horizontal plane, means for guiding the upper edges of said doors in curved paths while the lower edges are traveling in said horizontal plane, and means disposed beneath the doors for raising the doors and acting as the pivot therefor.

20. The combination of doors adapted to control a discharge opening, tracks for guiding the lower edges of said doors in a horizontal plane, and a combined supporting and actuating means for operating the doors, said means acting to guide the upper edges of the doors in curved paths while the lower edges are traveling in said horizontal plane.

21. The combination of doors adapted to control a discharge opening, means for guiding the lower edges of said doors in a horizontal plane, and pivots for said doors over which the doors ride in their opening and closing movements.

22. The combination of pivoted doors adapted to control a discharge opening, means for guiding the lower edges of said doors in a horizontal plane, and means for actuating the doors to move the upper edges thereof in curved paths while the lower edges are traveling in said horizontal plane without moving the pivotal point of said doors.

23. The combination with a dump car body having a bottom discharge opening, of doors forming the bottom of said car body, said doors disposed at an angle less than forty-five degrees with respect to the horizontal when in closed position so that the lading of the car is directed against the doors in a direction tending to force the doors toward closed position and said doors when moved slightly from closed position being positioned at such an angle so that the weight of the lading of the car is then directed against the doors in a direction to force the latter to full open position as the contents of the car discharges, said doors at all times so disposed as to have a normal tendency to move to closed position by gravity.

24. The combination with a dump car having a discharge opening, of doors controlling said opening, and pivots acting as supports for the upper edges of said doors and over which the doors ride in their opening and closing movements.

25. The combination with a dump car having a discharge opening, of doors controlling said opening and so disposed with respect to the walls of the car as to have a normal tendency to move to closed position, and pivots acting as supports for the upper edges of said doors and over which the doors ride in the opening and closing movements thereof.

In testimony whereof I affix my signature in the presence of two witnesses.

PATRICK JOSEPH HARRIGAN.

Witnesses:

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JAMES L. HARRIGAN.