

C. A. LINDSTRÖM.
DOOR OPERATING MECHANISM FOR DUMP CARS.
APPLICATION FILED DEC. 27, 1910.

1,002,856.

Patented Sept. 12, 1911.

5 SHEETS—SHEET 1.

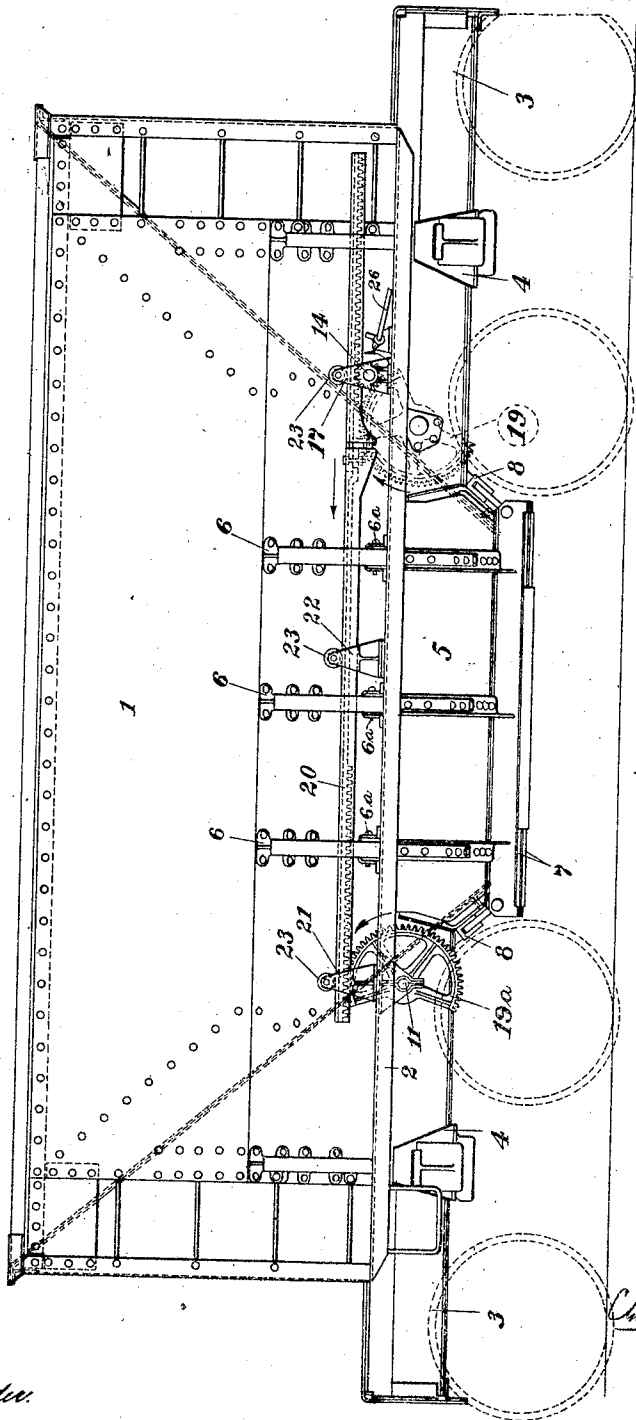


Fig. 1.

Witnesses
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Lela M. Grunder.

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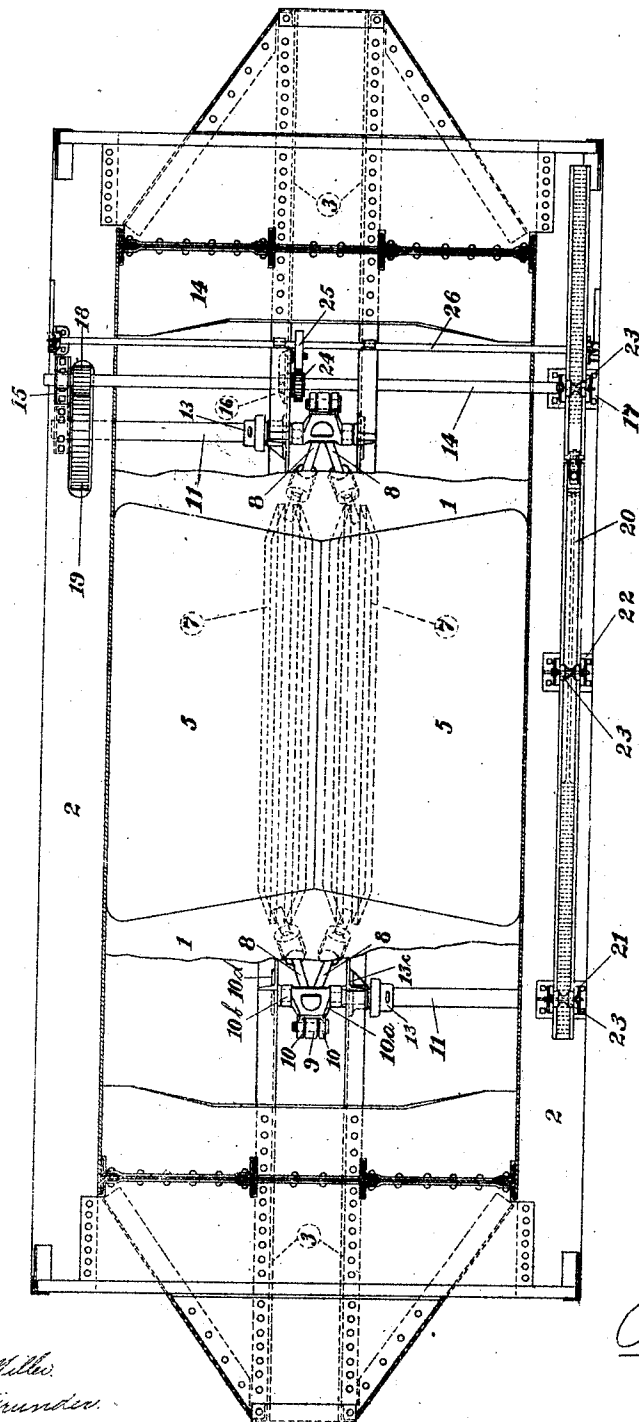


Fig. 2.

Witnesses

Frank C. Miller.

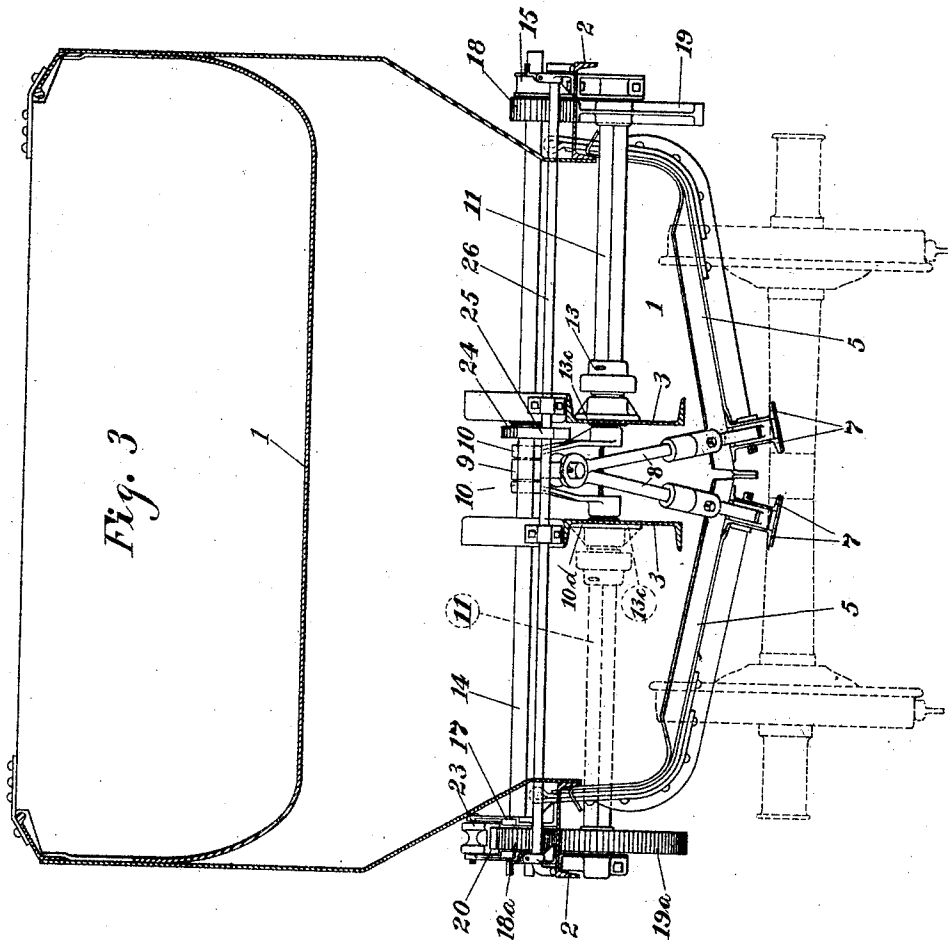
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5 SHEETS—SHEET 3.



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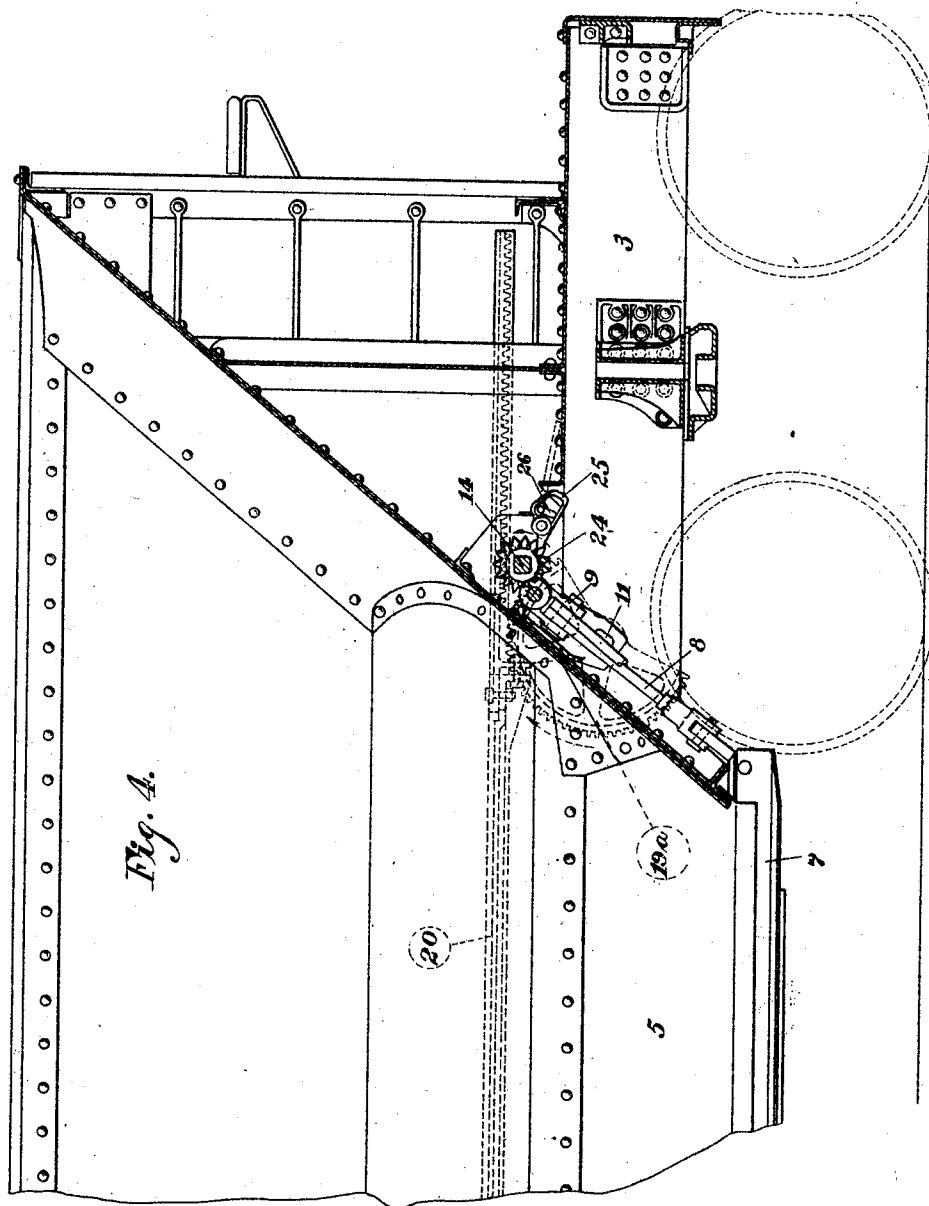


Fig. 4.

Witnesses

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6 SHEETS—SHEET 5.

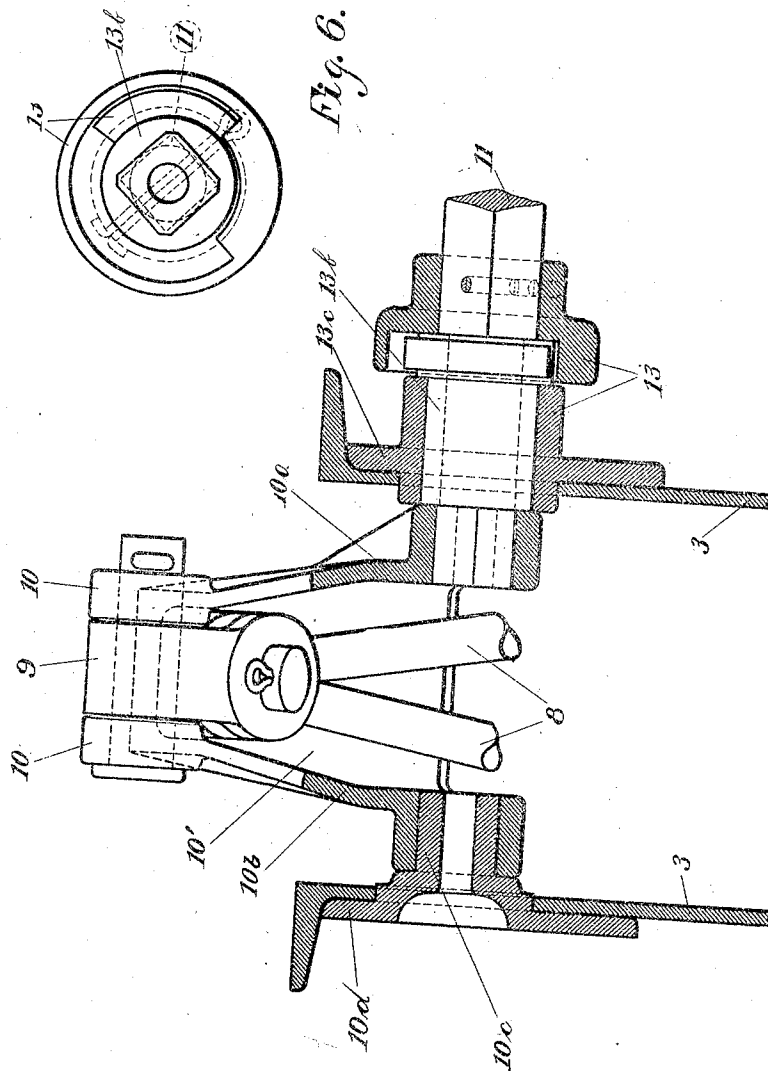


Fig. 5.

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES A. LINDSTRÖM, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO PRESSED STEEL CAR COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

DOOR-OPERATING MECHANISM FOR DUMP-CARS.

1,002,856.

Specification of Letters Patent.

Patented Sept. 12, 1911.

Application filed December 27, 1910. Serial No. 599,507.

To all whom it may concern:

Be it known that I, CHARLES A. LINDSTRÖM, citizen of the United States, residing at No. 138 Stratford avenue, E. E. Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Door-Operating Mechanism for Dump-Cars, of which the following is a specification.

An object of the present invention is to provide an improved construction of dump door operating mechanism for that type of railway car generally known as an "ore car," in which the lading is discharged through the central portion of the car bottom, such as that described in my pending application for United States Patent, Serial No. 536,479, filed January 5th, 1910.

A specific object of the present invention is to provide a dump door mechanism which is speedy, efficient, simple, strong and inexpensive as well as easy and safe to operate.

Since ore has a greater tendency to arch or bridge above the discharge opening in the bottom of the car than most other classes of lading, it is essential and practice has dictated that the opening in the bottom of the car be made as large as possible, and that the usual center sills and longitudinal and cross cones be dispensed with in order to gain such large unobstructed opening. Furthermore, the length and distances between the pockets in the ore docks, where these cars are unloaded, having been fixed for years to correspond with the location of the hatches in the ore ships, has had the effect of limiting the modern ore car of greater capacity to the same length as the older ore cars of lighter capacity. The result of this increase in the size of the discharge opening and maintenance of the old length of car has been to increase the slope of the bottom sheets to such an extent as to throw a very great proportion of the entire weight of the lading on the drop doors at the discharge opening of the car, and since ore is by far heavier than any of the other classes of dumpable material or lading it is highly essential that a door operating mechanism be provided having great strength; which will lock automatically and securely and have no tendency to operate from the jars of transit; which will, when started, operate

independently of the operating lever, which will be free from the usual chains supporting the doors, thus insuring safety to the operator; and which is so simple that it will be inexpensive and not get out of order when subjected to great strains, and may be successfully and economically operated by unskilled labor, either by hand alone or by either hand or air power when such combination is required.

A mechanism having all of the above features and advantages is herein described and shown in the accompanying drawings in which like reference characters refer to like parts, and in which—

Figure 1 is a general side elevation of an ore car provided with the improved mechanism; Fig. 2 is a plan view of the same, portions of the sloping floor sheets being broken away to more clearly show the mechanism, Fig. 3 is a sectional end elevation of the car showing an end view of the mechanism; Fig. 4, is a half longitudinal sectional elevation of the car through one of the door operating cranks; Fig. 5 is an enlarged detail section through one of the door operating cranks, and one of the safety clutches and showing a portion of one of the crank operating shafts; Fig. 6 is a view of the trunnion, clutch member and shaft, with the crank, draft sill and trunnion bearing removed, looking toward the right hand in Fig. 5.

Referring now in detail to the drawings, 1 represents the car body which is V-shaped in longitudinal section by reason of its being provided with floor sheets sloping downwardly to the discharge opening of the car. The two lower edges of the sloping floor sheets and the two sides of the car, which sides are bent inwardly at their lower portions define the central discharge opening in the car bottom. The two lower edges of the sloping floor sheets are angular in form, with their apices at the transverse center of the car and projecting toward each other at the longitudinal center line of the car, so that the discharge opening is narrowest at the longitudinal center line of the car. This particular shape of discharge opening is the natural result of the necessity of obtaining the largest possible door opening, and the use of doors to close said opening of

such shape that they will not in their operation come in contact with the car wheels the location of which is standard.

The car comprises body 1, side sills 2, draft sills 3 and bolsters 4. The central discharge opening is closed by doors 5, which are hinged at 6^a to the lower portion of the member 6 which supports the sloping portion of the side sheets, the free edges of the doors meeting in a line extending longitudinally at the transverse center of the car. The underframe of the car may be of any suitable construction provided no portion of it projects into or through the central discharge opening of the car. As shown in the drawings, draft sills are provided, which sills extend only from the ends of the car to the sloping floor sheet and do not extend into or through the central discharge opening. The underframe further comprises as side sills, channels 2 with their flanges projecting downwardly, as in this position they form a convenient support for portions of the door mechanism hereinafter described. These side sills 2 however may be of any suitable shape.

For the purpose of closing the doors 5, the following mechanism is employed: Each of the drop doors is provided with a beam 7, composed of channel or other suitable section or sections, extending along and under its free edge and projecting slightly on each side of the door. Beams 7 are connected through the medium of universally jointed turnbuckle links 8, at each end to a yoke 9, pivoted in a crank frame 10, similar to the crank frame shown in my pending application for U. S. Patent Serial No. 243,703, the crank frame 10 being located between the draft sills 3. That is to say, there is a pair of turnbuckle links 8 at each side of the drop doors, each of said links 8 being connected at one end to the end of its respective beam 7, and its other end being brought together with the corresponding end of the adjacent link and pivotally mounted in the yoke 9. There are, therefore, a pair of crank frames 10, a pair of yokes 9 and four links 8. Crank frames 10 face oppositely, or are oppositely disposed. Each of the crank frames 10 consists of a pair of crank arms 10^a, 10^b, connected, through the medium of a web 10^c of the crank frame 10 which is angular in shape for the purpose of strength and to provide for clearance of the sloping floor sheet. Each of the crank frames 10 is journaled, as later described, in the draft sills 3 in such a position that when the drop doors 5 are closed the turnbuckle links 8 and the yoke 9 are at the dead center of the crank frame 10, or slightly beyond the same toward the sloping floor sheet, so that the load strain on the doors 5 tends to force crank frame 10 in the closing direction and thus the doors 5 are automatically locked

against opening from jars or shocks during transit. It will be noted from Fig. 2 that crank frames 10 are oppositely disposed so that through the medium of the yokes 9 and the links 8 they oppose each other, which arrangement is a further safeguard against accidental opening of the doors during transit.

Crank frames 10 are journaled on trunnions 10^c and 13^b, each of the trunnions 13^b, being also one of the members of the safety clutch hereinafter referred to. Trunnions 10^c form a bearing for crank arm 10^b and are provided with an annular enlargement to form a bearing against the crank arm 10^b, also an enlarged cylindrical outer bearing portion which projects through a perforation in the draft sills 3. Trunnions 10^c are further provided with a flange 10^d which is secured to the outer face of the draft sills 3. Trunnions 10^c are shown in the drawings as being hollow to save weight and material. Trunnions 13^b are provided with squared inner ends which engage squared perforations in the crank arms 10^a. Trunnions 13^b are also provided with an enlarged cylindrical outer bearing portion journaled in trunnion castings 13^c, which are secured to the outer face of the draft sills 3. Trunnion castings 13^c are also provided with an annular boss projecting through the draft sill 3 and forming an annular bearing against the crank arm 10^a. The bearing portion of the trunnions 13^b being larger than the squared inner portion, it is impossible to force the trunnions 13^b entirely through the crank arms 10^a, so that the trunnions 13^b must be removed, in disassembling the parts, from the crank arms 10^a toward the outside of the car.

For operating the crank frames 10, shafts 11 are provided, which are secured in the outer halves of the clutches 13, by means of cotters. The shafts 11 extend transversely from the clutches to the sides of the car, and are supported at their outer ends by suitable bearings. Near to the outer ends of the shafts 11, segments of gears are secured thereto, connected with rack operating mechanism hereinafter described.

Safety clutches are introduced for the purpose of permitting the dropping of the lading quickly without danger to the operator. Each of the clutch members in clutch 13, is provided with projecting lugs, such lugs being in the same rotary plane so that the lug in one clutch member when rotating will strike the lug on the other clutch and transmit motion to the other clutch member and, conversely, either clutch member is capable of a limited non-transmitting movement relative to the other. These clutches are of the same general character as described in my United States Letters Patent Nos. 865,714, 865,920 and 865,921. It will

be noted that crank frame 10, in dropping the doors 5, will make about one-half revolution, and this being the case, because of the interposition of the clutches 13, such movement will not be transmitted to the crank shaft 11, and hence will be independent of shaft 11 and the balance of the operating mechanism.

It is necessary or advisable that the two crank frames 10 operate simultaneously to prevent undue strain on either side of a door due to one crank frame operating before the other, also that the two crank frames move away from the sloping floors when the doors are being opened and toward the floors when the doors are being closed, which enables the placing of the crank frames closer to the floors and secure straight connections to the beams 7; further, as the load on the doors is naturally great, on account of the size of the doors as well as the nature of the lading, a power increasing device is necessary. For this purpose the two shafts 11 are operatively connected to a common operating shaft 14, preferably extending transversely of the car and journaled in bearings 15, 16, 17. Shaft 14 is connected to one of the shafts 11 through the medium of a pinion wheel 18, secured on shaft 14, meshing with a segment gear 19 on shaft 11 such segment gear projecting upwardly through a slot in side sill 2, and shaft 14 being located above the horizontal plane of the upper surfaces of the side and draft sills. The operating shaft 14 is connected to the other shaft 11, by means of a segment gear 19^a on shaft 11, a pinion 18^a on shaft 14 and toothed racks 20 meshing with and operatively connecting said segment gear 19^a and pinion 18^a. The toothed racks 20, are shown in the drawings as being formed of two castings adjustably connected together endwise to form in effect one continuous rack member in which the distance between the toothed racks may be varied, but it is to be understood that such rack members may be formed integral with each other; and further that these members may be built up of toothed rack segments secured to one or more lengths or any suitable cast, rolled or pressed section. The rack members are shown in the drawings, Figs. 1 and 2, as being composed of 2 lengths connected together endwise, for the reason that short members of this type are more easily manufactured than long ones, and also for the reason that such construction provides a means of adjustment of the effective length of the racks, which is sometimes found necessary in the initial adjustment of the complete door gear, and also for adjustment of the door gear during the life of the car, due to wear of the component parts of the door gear. The racks 20 are supported in operative position by means of

brackets 21, 22, and 17, projections being provided on the inner sides of the vertical portion of the sides of the brackets, on which slide the side extensions of the racks, extending beyond the ends of the teeth. The racks 20 are also retained in such a position that the teeth shall be in mesh with the teeth of the pinion 18^a, and segment gear 19^a, by means of rollers, 23, which contact with the upper sides of the rack members, and are held in position by pins passed through upward extensions of the brackets 21, 22, and 17.

For the purpose of holding the shaft 14 against movement when the mechanism is not being operated, a ratchet wheel 24 is provided which is mounted on shaft 14 adjacent the casting 16 and adapted to be engaged by a pawl 25 pivotally mounted on the casting 16 and weighted and balanced so that it engages the under side of the ratchet wheel 24. Pawl 25 is adapted to be engaged by the cranked portion of a cranked rod 26. The rod 26 extends to both sides of the car, and may be operated from either side of the car by means of the cranked ends which are provided.

All of the parts of the mechanism having been described, the operation of same may be briefly described as follows: Assuming the doors to be closed and the car loaded with ore with the parts in position shown in Figs. 1, 2, 3, and 4, the operator grasps the rod 26, by one of its cranked handles and through its operation throws the pawl 25 out of engagement with the ratchet wheel 24. A crank is then applied to the end of shaft 14, which is then operated in the direction of the arrow, Figs. 1 and 4. This results in turning one of the shafts 11 in the same direction, and the other of the shafts 11, i. e. the shaft geared directly to shaft 14, in an opposite direction to the direction of rotation of shaft 14. As shafts 11 rotate the lugs on their clutch members strike the lugs on the clutch members which turn with the crank frame 10, whereupon crank frames 10 are turned and the links 8, yokes 9, and crank frames 10 immediately run away from shafts 11 for about half a revolution as already described. To close the doors these movements are reversed.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a dump car, the combination with a pair of drop doors, of a pair of cranks having opening movement in opposite directions and each connected to each door, and a rack and gear means for operating said cranks.

2. In a dump car, a pair of drop doors, having meeting edges at the longitudinal center line of the car, a pair of cranks also located at the longitudinal center line of the

- car and having opening movement in opposite directions, links extending from the sides of said doors near their meeting edges to said cranks, and a rack and gear mechanism for operating said cranks.
3. In a dump car, the combination with a pair of drop doors, of a pair of cranks having opening movement in opposite directions and each connected to each drop door, rack and gear mechanism for operating said cranks, and lost-motion devices connecting each crank with said operating means.
4. In a dump car, the combination with a pair of drop doors, of a pair of cranks having opening movement in opposite directions and each connected to each door, shafts for operating said cranks, lost-motion devices interposed in each of said shafts, and rack and gear mechanism operatively connecting said shafts to each other.
5. In a dump car, the combination with a pair of drop doors, of a pair of cranks having opening movement in opposite directions and each connected to each door, shafts for operating said cranks, lost-motion devices interposed in each of said shafts, a rack and gear mechanism for operatively connecting said shafts, to each other, and a common means for operating said shafts.
6. In a dump car, the combination with a pair of drop doors, a pair of cranks having opening movement in opposite directions, a link extending from each drop door to each crank, shafts for operating said cranks and a main operating shaft operatively connected to each of said crank shafts by rack and gear mechanism.
7. In a dump car, the combination with a pair of drop doors, of a pair of cranks having opening movement in opposite directions, a link extending from each drop door to each crank, shafts for operating said cranks, a main operating shaft operatively connected to each of said crank shafts by rack and gear mechanism, and means for locking said main operating shaft.
8. In a dump car, the combination with a pair of drop doors, of a pair of cranks having opening movement in opposite directions, a link extending from each drop door to each crank, shafts for operating said cranks, a main operating shaft extending entirely across the car, a rack and gear mechanism for operatively connecting said main operating shaft and said crank shafts.
9. In a dump car, the combination of a drop door, with a pair of shafts for operating said drop door suitably connected thereto, lost-motion devices in each of said operating shafts, and a rack and gear mechanism operatively connecting said door operating shafts.
10. In a dump car, the combination of a drop door with a pair of shafts for operating thereto, lost-motion devices interposed in each of said operating shafts, and a rack and gear mechanism for operating said cranks, clutch members formed integral with said trunnions, and rack and gear mechanism for operating said clutch members simultaneously.
11. In a dump car, the combination with a drop door, of cranks connected thereto for operating said door, trunnions for said cranks, clutch members formed integral with said trunnions, and rack and gear mechanism for operating said clutch members simultaneously.
12. In a dump car, the combination with a drop door, a pair of oppositely facing cranks and links connecting said cranks and drop door, of a rack and gear mechanism so connected to said cranks as to operate same in opposite directions.
13. In a dump car, the combination with a drop door, a pair of oppositely facing cranks, links connecting said cranks and said door, and a pair of shafts for operating said cranks, of a rack and gear mechanism operatively connected directly to one of said shafts, and a third shaft operatively connected directly to said rack and gear mechanism and the other of said crank operating shafts.
14. In a dump car, the combination with a drop door, a pair of oppositely facing cranks, links connecting said cranks and said door, and a pair of shafts for operating said cranks, of a rack and gear mechanism operatively connected directly to one of said shafts and a third shaft operatively connected to said rack and gear mechanism and the other of said crank operating shafts, said third shaft being adapted at its ends to receive an operating member.
15. In a dump car, the combination with a pair of drop doors, a pair of cranks each connected to each door and a pair of shafts for operating said cranks, of a third operating shaft directly connected to one of said shafts, and a rack and gear mechanism connecting said third operating shaft to the other of said crank operating shafts.
16. In a dump car, the combination with a pair of drop doors, cranks for operating said drop doors and suitably connected thereto, of rack and gear means for producing an opening movement of the cranks in opposite directions, and to multiply the power applied to the operating shaft.
17. In a dump car, the combination with a pair of drop doors, of a pair of cranks for operating said drop doors and suitably connected thereto, of rack and gear means for producing a simultaneous opening movement of each crank in opposite directions and to multiply the power applied to the operating shaft.
18. In a dump car, the combination with a pair of drop doors, a pair of cranks having opening movement in opposite directions, and each connected to each door, shafts for

operating said cranks, lost-motion devices interposed in each of said shafts, of a rack and gear means operatively connecting said shafts to each other to produce said opening
5 movement of the cranks in opposite directions, and to multiply the power applied to the operating shaft.

19. In a dump car, the combination with a pair of drop doors, of an operating shaft, a
10 pair of cranks each connected to each door, shafts for operating said cranks, gear wheels connecting the operating shaft with one of

said crank shafts, and rack and gear means connecting the operating shaft with the other of said crank shafts, to produce a
15 rotation of the cranks in opposite directions, and to multiply the power applied to the operating shaft.

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

CHARLES A. LINDSTRÖM.

Witnesses:

FRANK E. MILLER,
LELA M. GRUNDER.