Jan. 27, 1931. M. C. BLEST 1,790,402

DUMP CAR

Filed June 28, 1930 4 Sheets-Sheet 1

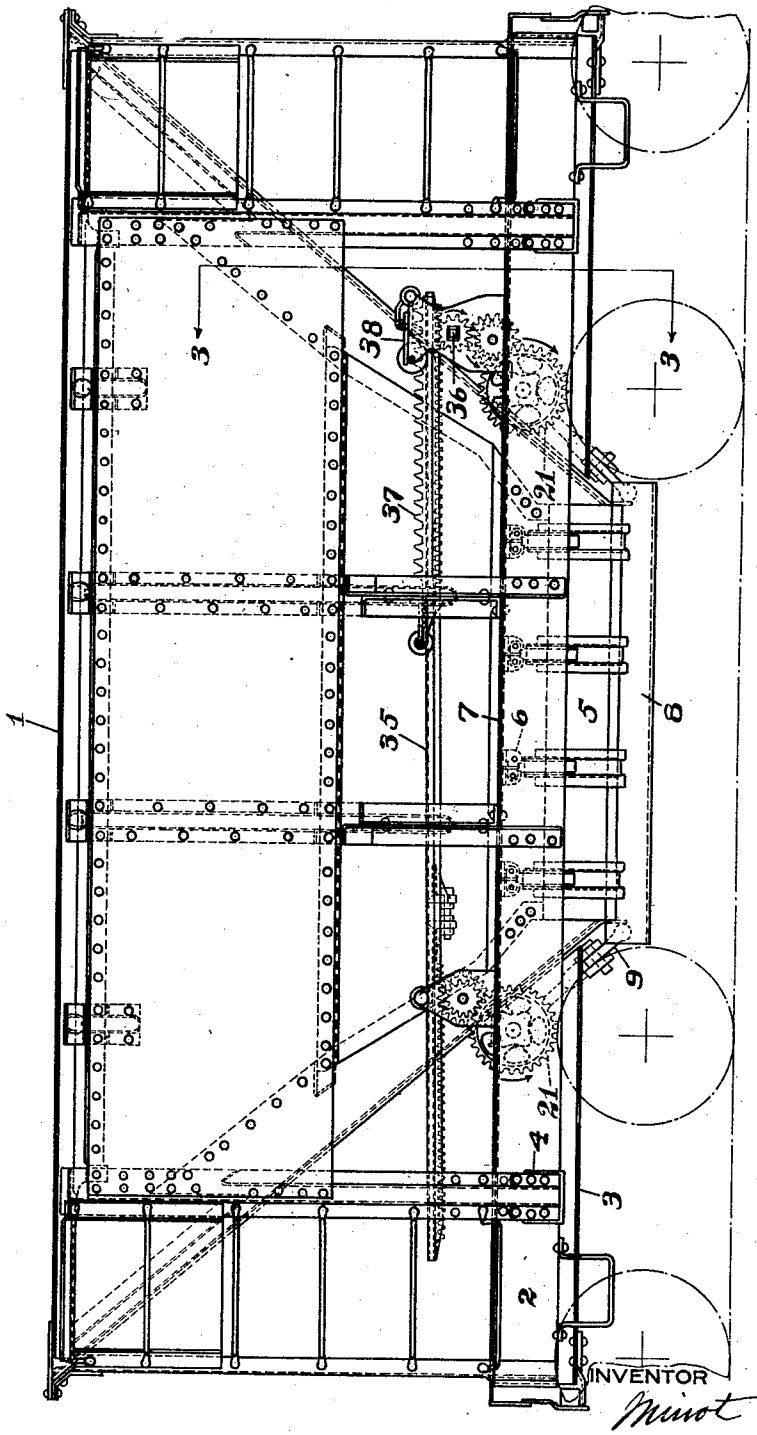


Fig. 1.

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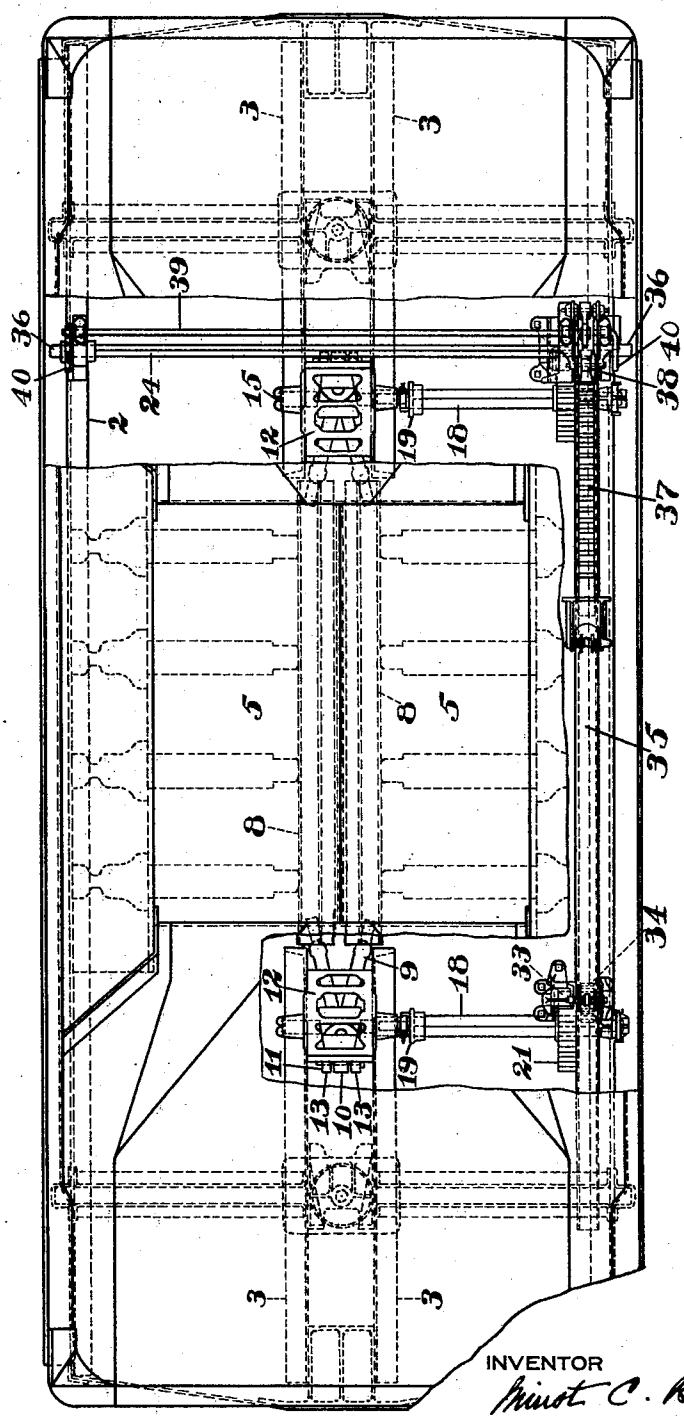


Fig. 2.

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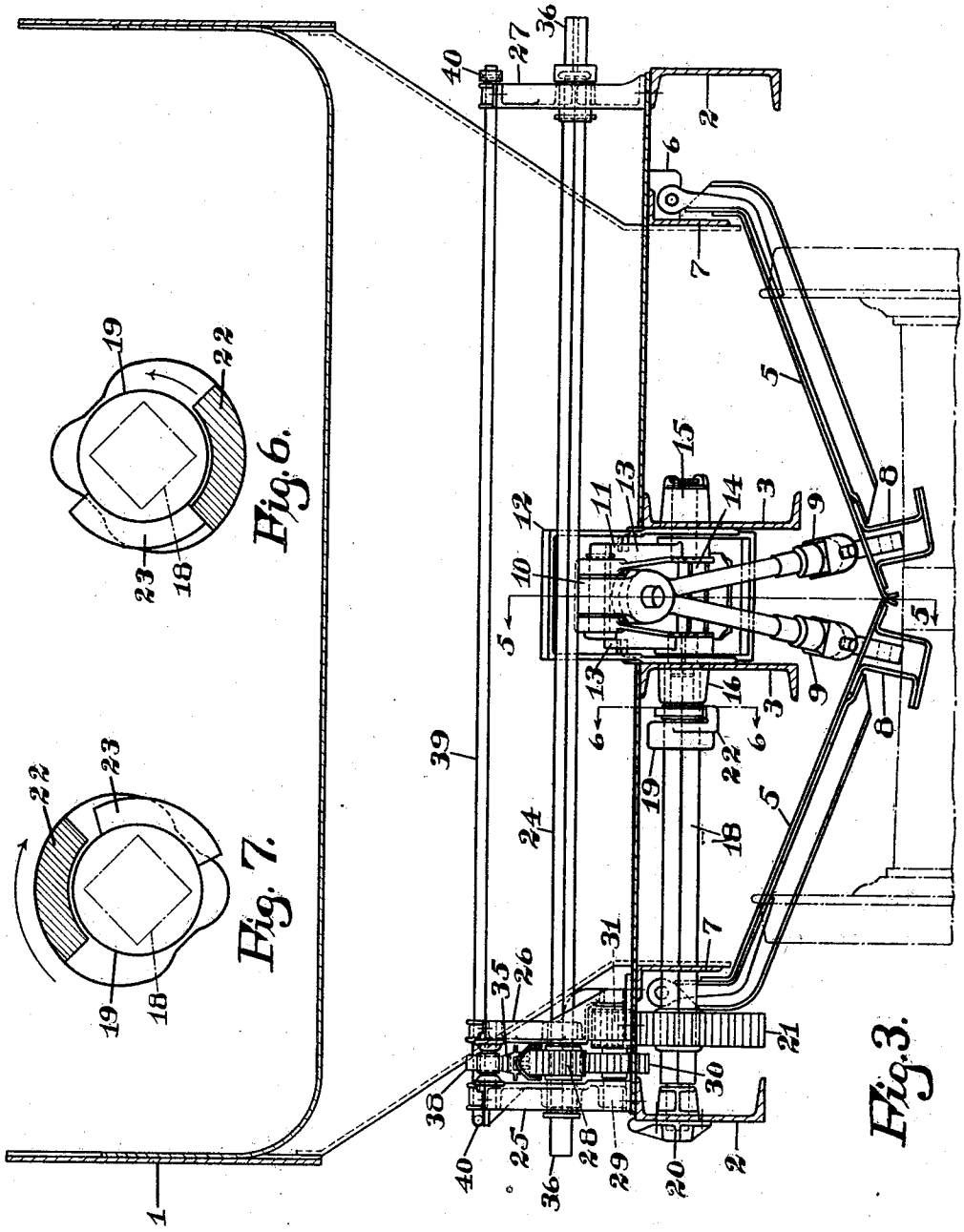


Fig. 3.

Fig. 6.

Fig. 7.

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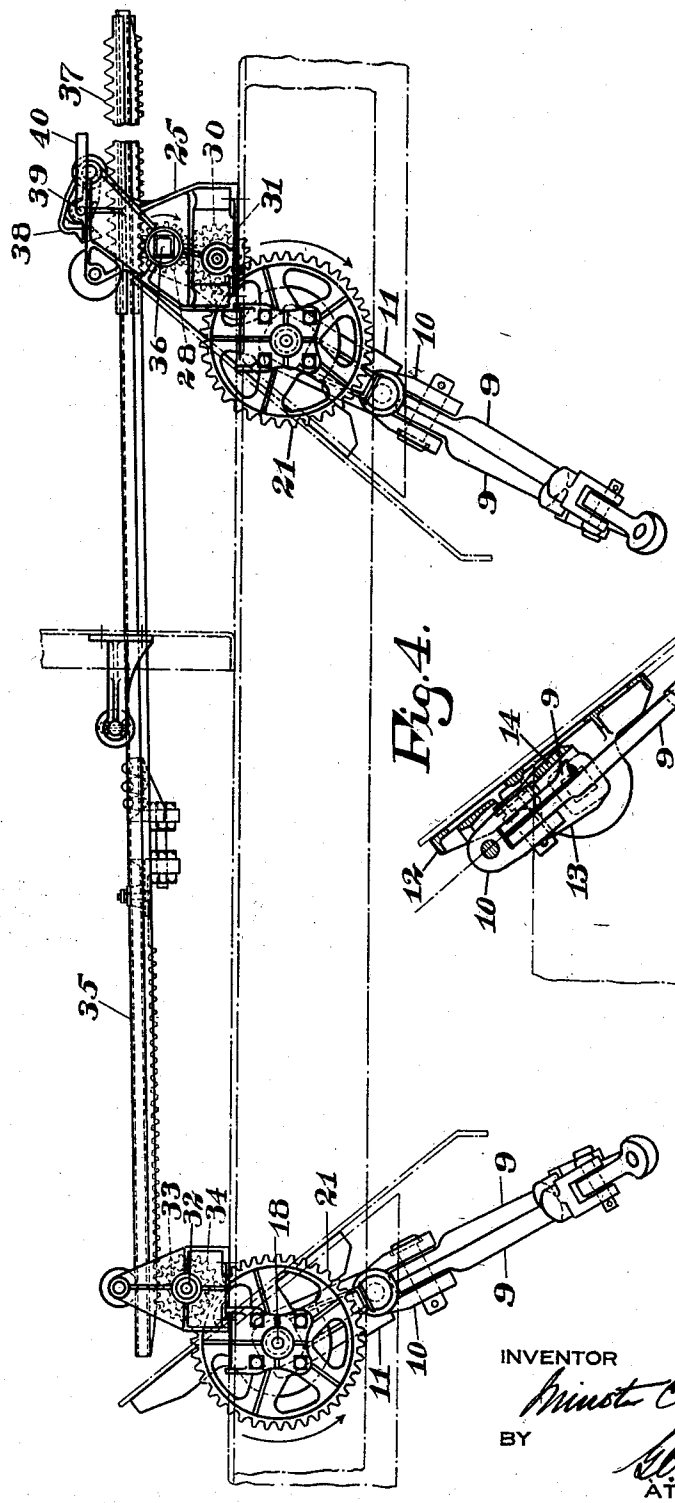


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

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DUMP CAR

Application filed June 28, 1930. Serial No. 464,646.

An object of my invention is to provide a door operating mechanism for a dump car which is safe, efficient, and easily operated.

With the increased allowable loadings permitted by the increase in axle capacity of modern cars it has been found desirable to increase the carrying capacity of the ore cars and yet remain within the allowable limits set up by the ore docks already constructed and in use and further limited by the established practice later referred to, which object is attained by the very compact character of the door operating gear, enabling the sloping side sheets to be spaced further apart from each other with a consequent increase in the load capacity of the car body.

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 bracing be dispensed with in order to gain such large unobstructed opening.

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 smaller 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 sheet 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.

In addition to being limited in length by the spacing of the openings in the ore docks these cars are also limited in all over width by the spacing of the car tracks and are limited in height by the desire of the car loaders to limit the distance the ore must be raised to place it in the cars.

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 by either hand alone or by hand and air power when such combination is required.

Referring now to the drawings, Fig. 1 shows in elevation an ore car embodying my invention; Fig. 2 is a plan view of the car; Fig. 3 is a section through the car taken along the lines 3—3 of Fig. 1 showing the location of the door mechanism and assembled parts when the doors are in closed position; Fig. 4 is a side elevation of the door operating mechanism showing the position of the mechanism and assembled parts when the doors are in fully opened position; Fig. 5 is a section taken along the lines 5—5 of Fig. 3 showing the position of the door operating arms when the doors are in fully closed position; Fig. 6 is a section taken along the lines 6—6 of Fig. 3 showing the position of the safety clutch mechanism when the doors are in fully closed position; Fig. 7 shows the safety clutch mechanism with the doors in fully opened position.

Referring now in detail to the drawings, reference character 1 indicates 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 center discharge opening in the car bottom. The two lower edges of the sloping floor sheets are angular in form with their apexes at the transverse center of the car and projecting towards 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 openings of such shape that they will not, in their operation, come into 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 center discharge opening is closed by doors 5 which are hinged at 6 to the lower portion of the member 7 which supports the sloping portion of the side sheets, the free edges of the doors meeting in a line extending longitudinally of 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 center discharge opening of the car. As shown in the drawings draft sills 3 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 center discharge opening. The inner ends of the draft sills 3 are connected to a crank frame 12 which has open ends and a sloping top portion conforming to the slope of the end sheets and to which the end sheets are fastened to insure additional strength. The underframe further comprises, as side sills, channels 2 with their flanges projecting inwardly 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 8 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. The beams 8 are connected through the medium of universally jointed turn-buckle links 9 at each end, to a yoke 10 provided in a crank 11, the crank 11 being located within the crank frame 12 between the draft sills 3. That is to say, there is a pair of turn-buckle links 9 at each side of the drop doors, each of said links 9 being connected at one end to the end of its respective beam 8 and at its other end being brought together with the corresponding end of the adjacent link and pivotally mounted in the yoke 10. There are, therefore, a pair of cranks 11, a pair of yokes 10 and four links 9.

Cranks 11 face opposite or are oppositely disposed, each of the cranks 11 comprising a pair of crank arms 13 connected through the medium of webs 14, of the crank 11, which are angular in shape for the purpose of strength and to provide for clearance of the crank frame 12. Each of the cranks 11 is journaled in the crank frame 12 in such a position that when the drop doors 5 are closed the turn-buckle links 9 and the yoke 10 are at the dead center of the crank 11 or slightly beyond the same toward the sloping floor sheet, so that the load strain on the doors 5 tends to force the crank 11 in the closing direction and thus the doors 5 are automatically locked against the opening from jars or shocks during transit. It will be noted from Fig. 2 that crank frames 12 are oppositely disposed so that the cranks 11, through the medium of the yokes 10 and links 9, oppose each other which arrangement is a further safeguard against accidental opening of the doors during transit.

Cranks 11 are journaled on trunnions 15 and 16, each of the trunnions 16 being also one of the members of the safety clutch hereinafter referred to. Each of the trunnions 15 form a bearing for one of the crank arms 13 and are provided with an angular enlargement to form a bearing against the crank arm 13.

For operating the cranks 11 shafts 18 are provided which are secured in the outer halves of the clutches 19 by means of cotters. The shafts 18 extend transversely of the car from the clutches to the sides of the car and are supported at their outer ends by suitable bearings 20. Near to the outer ends of the shafts 18 are secured gears 21 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 19 is provided with projecting lugs, such lugs being in the same rotary plane so that the lug in one clutch member when rotated will strike the lug on the other clutch member and transmit motion to the other clutch member. Either clutch member is capable of a limited non-transmitting movement relative to the other. It will be noted that crank 11 in dropping the doors 5 will make about one half revolution and this being the case, because of the interposition of the clutches 19, such movement will not be transmitted to the crank shaft 18 and hence will be independent of the shaft 18 and the balance of the operating mechanism.

By referring to Figs. 5 and 6 of the drawings showing a section through the crank 11 and the clutch 19 respectively, with the doors in closed position, it will be noted that the load resting on the doors tends to rotate the crank in door closing and that the lug 22 on the outer half of the clutch 19 is in engagement with the lug 23 on the inner half of the clutch 19. When it is desired to open the doors the operating mechanism is rotated in opening direction so as to rotate the lug 22 in the direction of the arrow on Fig. 6, and into engagement with the lug 23, moving it beyond the position of dead center so that the load on the door will cause the crank 11

to move into opening position independent of the lug 22 as shown by Fig. 7. When the doors are being closed the lug 22 is rotated in the direction indicated by the arrow on Fig. 7 bringing the lug 22 into engagement with the lug 23 and upon continued rotation moves the lug 23 into the position shown on Fig. 6.

It is necessary or advisable that the two cranks 11 operate simultaneously to prevent undue strain on either side of a door due to one crank operating before the other, also the two cranks move away from the sloping floors when the doors are being opened and towards the floors when the doors are being closed which enables the placing of the cranks closer to the floors and secures straight connection to the beams 8. As the load on the door 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 crank shafts 18 are operatively connected to a common operating shaft 24 preferably extending transversely of the car and journaled in bearings 25, 26 and 27. Intermediate the operating shaft 24 and the adjacent crank shafts 18 is a shaft 29 on which are mounted pinions 30 and 31, the pinion 30 engaging with the gear 28 mounted on the operating shaft 24 and the pinion 31 engaging with the gear 21 mounted on the crank shaft 18. On the opposite end of the car adjacent the other crank shaft 18 is mounted a similar shaft 32 having pinions 33 and 34 mounted thereon, with the pinion 33 in engagement with the gear 21 mounted on the crank shaft 18. Extending longitudinally of the car is a rack member 35 connecting the gear 28 of the operating shaft 24 to the pinion 34 operatively connected to the gear 21 on the other end of the car. This rack is preferably made in two pieces in order to facilitate the assembling of the mechanism and to provide any adjustment which may be necessary due to wear or other causes in order to have both crank shafts 18 and their assembled mechanism operating simultaneously.

As will be seen from Fig. 3 the operating shaft 24 has crank handle bearings 36 at each end thereof in order that the mechanism may be operated from either side of the car. The end of the rack adjacent the operating shaft 24 has teeth on both sides so that the upper side 37 of the rack can be engaged by a pawl member 38 mounted on a shaft 39, extending transversely of the car, to lock the door mechanism in closed position. This shaft 39 has handle members 40 at each end thereof so that the pawl can be operated from either side of the car body.

Assuming the doors to be closed and the car loaded with ore, with the parts in position shown in Figs. 1, 2 and 3 and it is desired to open the doors the door operating movements are as follows: The operator grasps the handle 40 at either side of the car and throws the pawl 38 out of engagement with the rack 37 so as to permit the door mechanism to be operated. A crank is then applied to the operating shaft 24 at either of the bearings 36 and is turned in the direction of the arrow in Fig. 1. This results in the turning of the adjacent shaft 18 in the same direction and the other of the shafts 18, i. e. the shaft geared to the rack on the opposite end of the car, in an opposite direction to the direction of the rotating shaft 24. As the shafts 18 rotate the lugs on their clutch members rotate in a direction as shown by the arrow in Fig. 6 and strike the lugs on the clutch members which turn with the cranks 11, whereupon the cranks 11 are turned and the links 9, yokes 10 and crank 11 immediately run away from the shafts 18 for about half a revolution as already described. To close the doors these movements are reversed.

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

1. In a dump car the combination with a pair of drop doors, of an operating shaft, a pair of cranks, each connected to each door, shafts for operating said cranks, a train of gears connecting said operating shaft with one of said crank shafts, said train comprising a driving gear on said operating shaft and a driven gear on said crank shaft, said gears being in different parallel planes.

2. In a dump car the combination with a pair of drop doors, of an operating shaft, a pair of cranks, each connected to each door, shafts for operating said cranks, a train of gears connecting said operating shaft with one of said crank shafts, said train of gears comprising a driving gear on said operating shaft and a driven gear on said crank shaft, each of said gears being in different parallel planes, a gear mounted on the other of said crank shafts and a driving gear mounted on the car and a rack connecting said driving gears.

3. In a dump car a pair of drop doors, a pair of cranks, each operatively connected to each of said doors, shafts for operating said cranks, lost motion devices between said cranks and said shafts, a rack and gear means connecting said cranks and causing them to have opposite opening movements, an operating shaft connected to said rack and gear means, the driving gear on said operating shaft being in a different parallel plane to the plane of the gear mounted on the adjacent crank shaft.

4. In a dump car, a pair of drop doors, a pair of cranks operatively connected to each of said doors, and an operating mechanism for controlling the movements of said cranks, said mechanism comprising a rack member disposed in a direction transversely of said cranks, gears operatively connected to said

cranks and a pair of concentrically mounted gears connecting each crank gear to said rack.

5. In a dump car a pair of drop doors, a pair of cranks each operatively connected to each of said doors, shafts for operating said cranks, rack means operatively connecting said crank shafts through gears pivotally mounted on said crank shafts and in a different parallel plane to the plane of said rack.

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