C. H. CLARK.

TILTING SIDE DUMP CAR.

APPLICATION FILED OCT. 15, 1915.

1,223,031.

Patented Apr. 17, 1917.

4 SHEETS—SHEET 1.

FIG. 1.

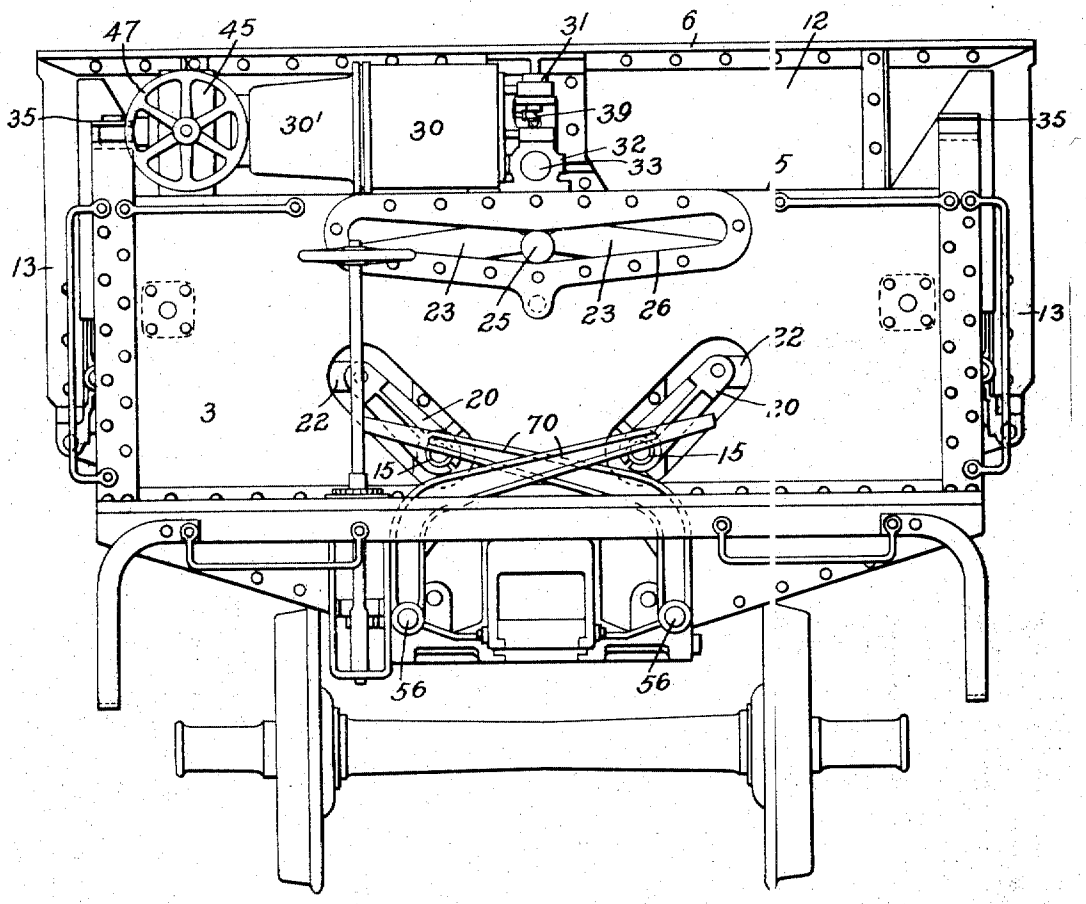
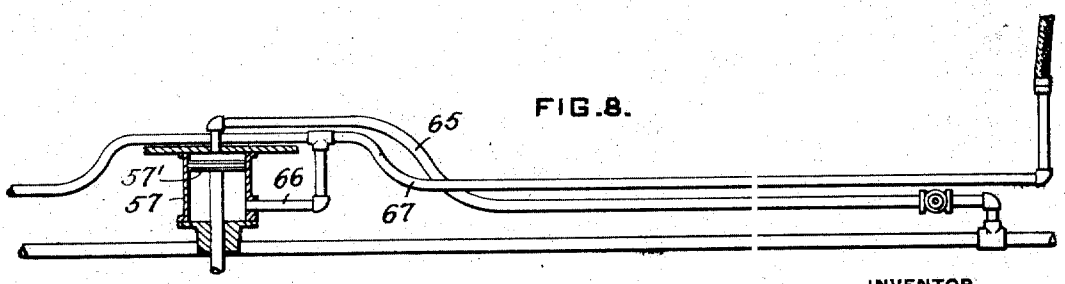


FIG. 8.



WITNESSES

J. Herbert Bradley.

Ella M. Connell

INVENTOR

Chas. H. Clark

By Jno. Koebel

Atty.

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4 SHEETS—SHEET 2.

FIG. 2.

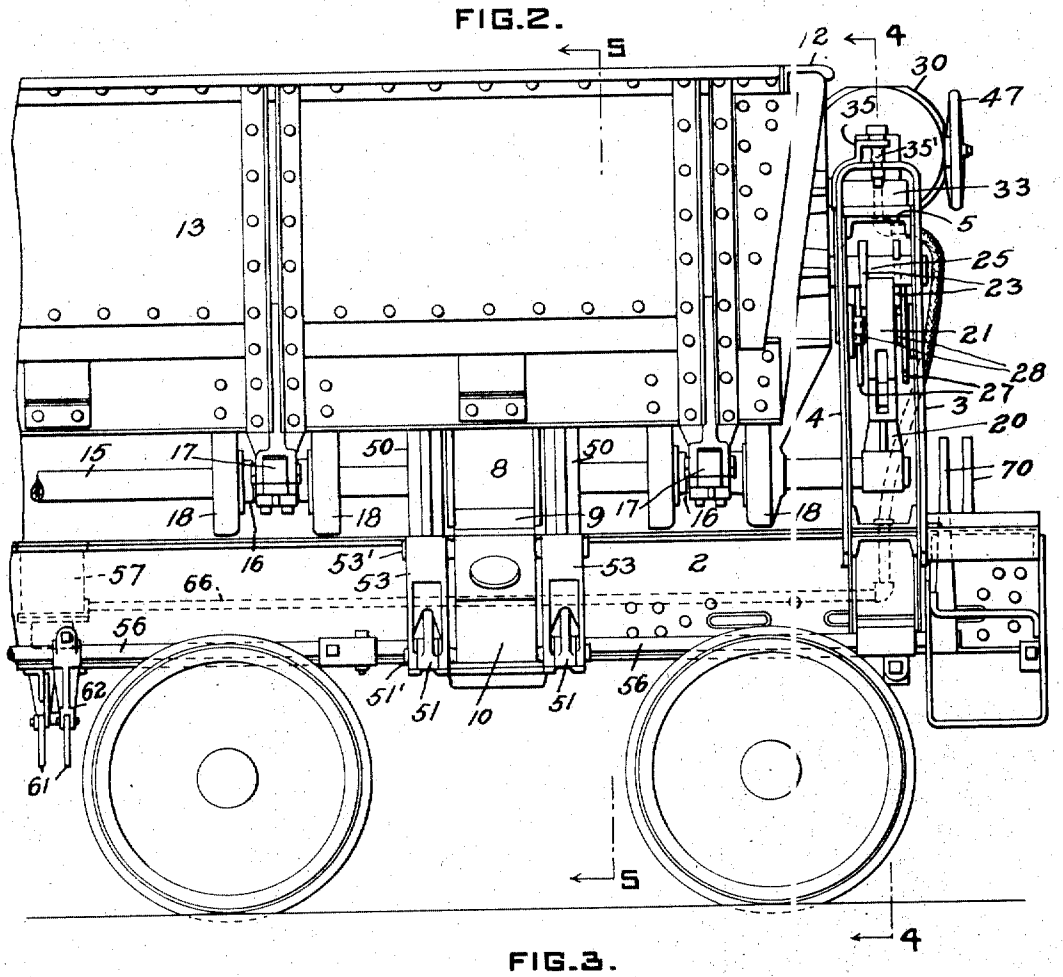
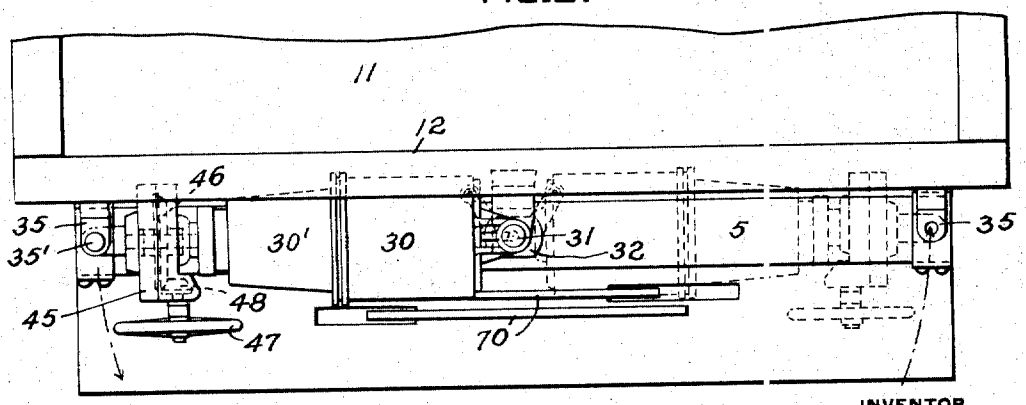


FIG. 3.



WITNESSES

J. Herbert Bradley.

Edward Connell

INVENTOR

Chas. H. Clark

By John Hobbit

Atty.

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4 SHEETS—SHEET 3.

FIG. 4.

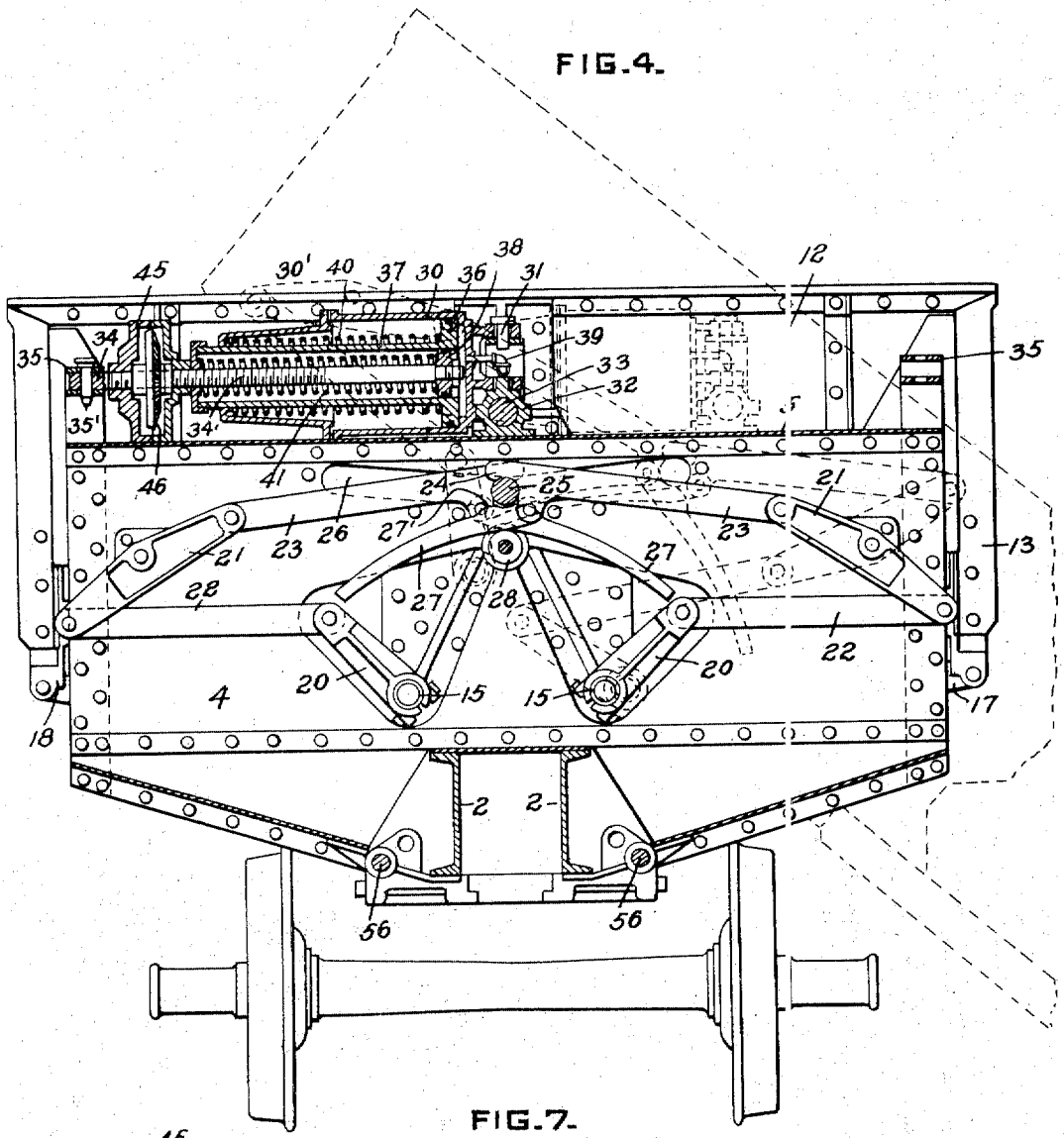
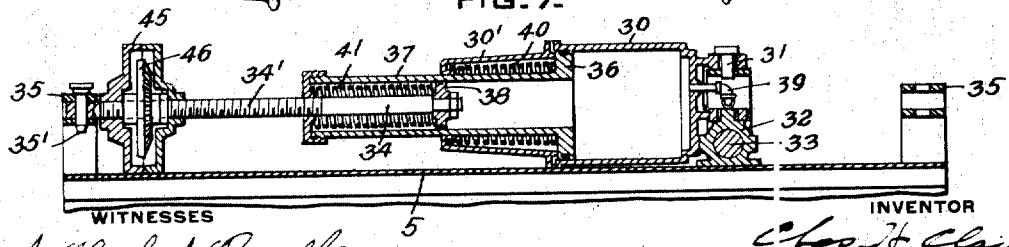


FIG. 7.



WITNESSES

J. Herbert Bradley.

Ella McConnell

INVENTOR

Chas H. Clark

by John Kobler

Atty.

C. H. CLARK.

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4 SHEETS—SHEET 4.

FIG. 5.

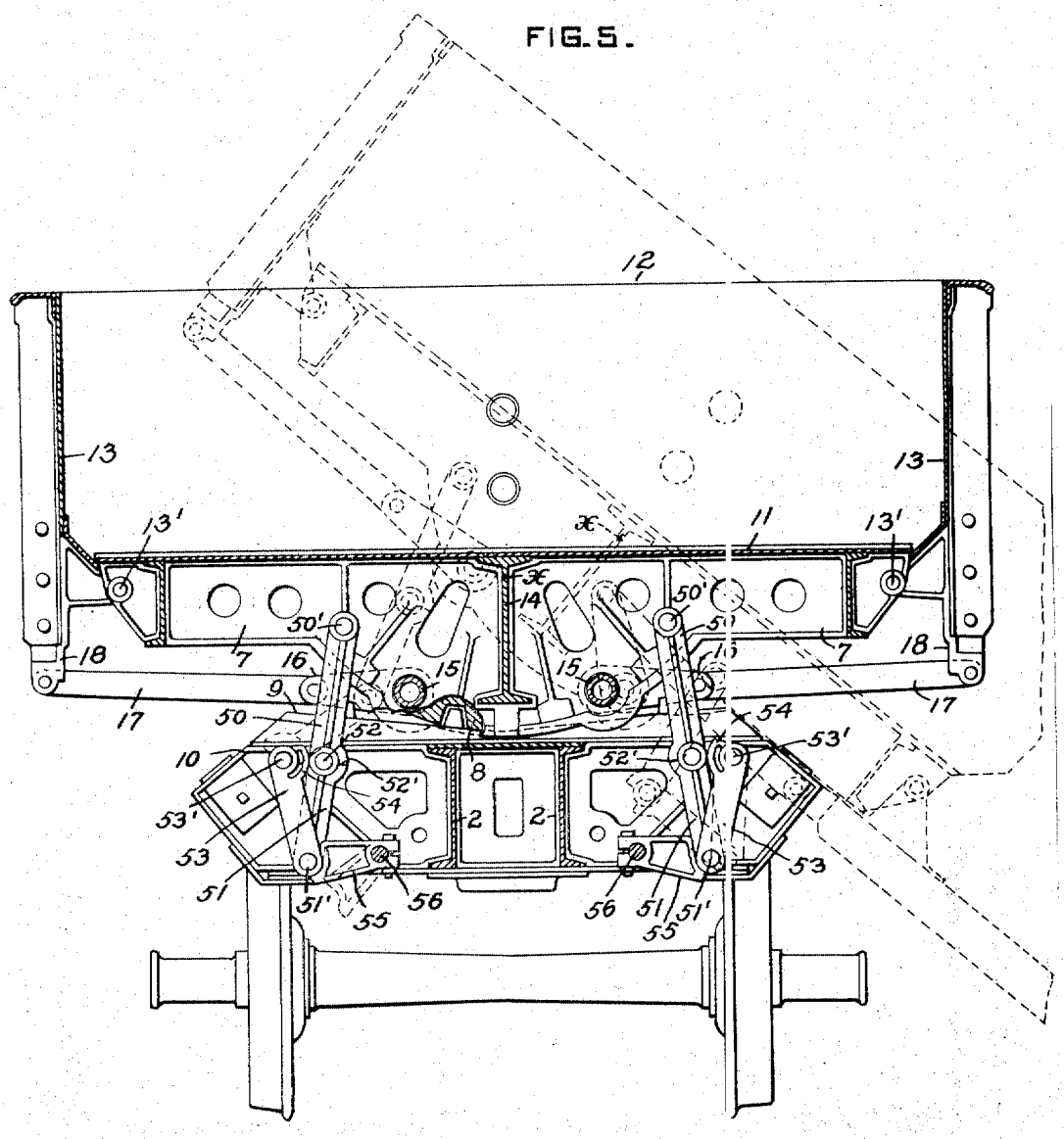
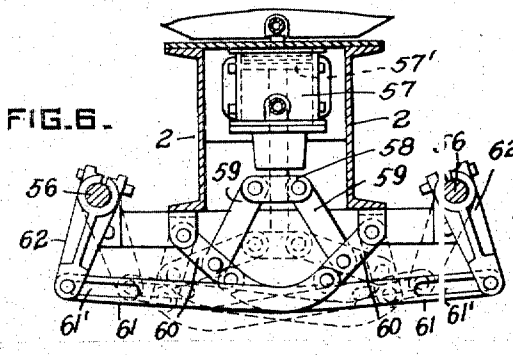


FIG. 6.



WITNESSES

J. Herbal Bradley

Ella M. Connell

INVENTOR

Chas. H. Clark

By Jno. Hobbit

Atty

UNITED STATES PATENT OFFICE.

CHARLES H. CLARK, OF CRAFTON, PENNSYLVANIA, ASSIGNOR TO CLARK CAR COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

TILTING SIDE-DUMP CAR.

1,223,031. Specification of Letters Patent. Patented Apr. 17, 1917.

Application filed October 15, 1915. Serial No. 55,974.

To all whom it may concern:

Be it known that I, CHARLES H. CLARK, a citizen of the United States, and resident of Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Tilting Side-Dump Cars, of which the following is a specification.

This invention relates to tilting side dump cars of the general type patented to me October 31, 1911, No. 1,007,533. One object is to provide improved mechanism for automatically opening the door as the car body tilts and for similarly closing the door as the body turns to upright position. The invention is preferably embodied in a car which may dump toward either side of the track, and a further object is to so arrange the door actuating mechanism that the door for the side which is elevated in the dumping operation is not disturbed, being held as securely locked during the dumping operation as when the body is in normal position.

Another object is to provide mechanism of improved construction for holding the body normally locked in horizontal position, also improved latch mechanism for controlling the holding means.

Still a further object is to provide a motor cylinder and piston of improved construction for rocking the car body in the operation of dumping, the improved mechanism being so arranged that the fluid pressure power applied for dumping automatically decreases as the body approaches its fully dumped position. As the improved constructions are preferably embodied in a car body wherein the center of gravity raises as it moves from normal position, the tendency of the body when free of its load is to return to such position. However, to facilitate this movement springs are provided within the improved motor device which are placed under compression by the dumping movement of the body and the expansive force of which aids materially in the return or righting movement.

In the accompanying drawings, Figure 1 is an end elevation of a dump car embodying the several features of the present invention. Fig. 2 is a side elevation of a portion of the length of the car, it being understood that the car is of like construction at each end. Fig. 3 is a view in top plan of one end of the car. Fig. 4 is a vertical cross-section of the car taken through the end frame on line 4—4 of Fig. 2, the body being shown rocked to dumping position in dotted lines. Fig. 5 is a view similar to Fig. 4 taken in front of the bolster on line 5—5 of Fig. 2. Fig. 6 is a detail view of the mechanism for operating the latch controlling shafts. Fig. 7 is a sectional elevation of the motor cylinder and piston showing the parts thereof in the expanded or body dumping position illustrated in dotted lines in Fig. 4. Fig. 8 is a diagram illustrating the air connections for the dumping and latch controlling cylinders.

Referring to the drawings, 2 designates the longitudinal center sills of the underframe which extend from end to end of the car. At each end of the underframe is an upright transversely disposed end frame which preferably consists of the separated outer and inner diaphragms 3 and 4 which provide a housing for the door actuating mechanism presently to be described. The top portion 5 of this frame comprises a horizontal support or trackway for the dumping cylinder and its connection with the car body.

The car body 6 is supported adjacent each end by a bolster 7 having the downwardly curved central portion forming rocker 8 which is adapted to roll on track 9 located on the upper side of the frame bolster 10.

The load-carrying portion of the body consists of floor 11, end walls 12, and the downwardly and outwardly opening longitudinal side walls or doors 13. A central I-beam 14 extends from end to end of the body beneath floor 11. The center of gravity of the empty body is located approximately at X, Fig. 5, and hence rises whenever the body moves from normal position, with the result that when free of load the tendency of the body is to rock back to normal position so that practically no effort is required to right it.

In the present embodiment, door 13 at the lowering side of the body is adapted to automatically open during the tilting movement and to automatically close during the righting movement. The mechanism whereby these movements are accomplished will now be described. Extending longitudinally through the under portion of the body are shafts 15 arranged at either side of beam

14 and provided with cranks 16, each crank being pivotally connected by a link 17 with a bracket 18 depending from the bottom edge of the door of the corresponding side of the car. Each door is hinged beneath floor 11, indicated at 13′, and the link connection is spaced sufficiently beneath the hinge to permit of the door being turned down in a plane parallel with the body floor when in dumping position, as shown at the right hand of Fig. 5. It will be understood that these crank and link connections are arranged at such intervals throughout the length of the car as to provide for positively operating the door.

The ends of shafts 15 extend into the housing formed by the end-frame diaphragms 3 and 4, and secured to each of said ends is a crank 20, Figs. 2 and 4. A lever 21—one for each side of the body—is fulcrumed between its ends within said housing with its lower end connected by link 22 to crank 20. An arm 23 is pivoted to and extends inwardly from the upper end of each lever 21. The free ends of these reversely disposed arms 23 overlap at the transverse center of the body and their forked socket-like extremities 24 normally releasably embrace the stub shaft 25 which projects from end 12 of the body through the end frame, said shaft being movable in slot 26 of the latter during the rocking movement of the body. When the body is rocked to dumping position, shaft 25 bears outwardly on the appropriate arm 23 and at the same time moves out of the embrace of the outer arm extremity 24. The endwise movement thus imparted to the engaged arm 23 rocks lever 21 connected thereto, and corresponding rocking movement is imparted to the appropriate shaft 15 through link 22 and crank 20, with the result that the several cranks 16 draw inwardly on the lower edge of the affected door through the medium of links 17, thereby positively turning down the door into horizontal position as in dotted lines in Figs. 4 and 5. In this position the door constitutes an offset extension of the car bottom and serves to deflect the lading away from the track.

In order to close the door on the return or righting movement of the body, the forked shaft embracing extremity of arm 23 is adapted to clutch said shaft, this being accomplished by means of the curved arm 27 which is pivoted to the under side of the forked extremity 24 of arm 23. Each of these arms 27 rides on a roller 28 mounted in the end frame, the position of the rollers being such that arm 27 is raised slightly during the dumping movement whereby the hump 27′ on the upper edge of arm 27 is adapted to clutch shaft 25 and thus secure arm 23 thereto, whereby a positive connection is had on the return movements of the body for reversing the lever motion above described and imparting positive closing movement to the door. When returned to normal position, the lowering of arm 27 disengages it from shaft 25 so that the body is free to rock in either direction for the next dumping operation.

The mechanism for rocking the body consists primarily of a cylinder 30 having one end pivotally secured at 31 to a head 32 which is slidable on the track-forming face 5 of the end frame, and entered in this head is trunnion 33 which projects from end 12 of the body at the center of rocking thereof and hence moves in a horizontal path during the body dumping operation. With the motion-imparting mechanism thus centrally connected to the body, said mechanism turns on its pivotal connection 31 for rocking the body toward either side for dumping. The free extremity of the mechanism, which consists of a piston rod 34, is adapted to be secured by pin 35′ in either bracket 35 raised from the end frame at opposite ends of its track-forming top edge 5.

The motor cylinder and piston are of double construction, the main piston 36 which fits cylinder 30 being provided with the tubular stem 37 which extends outwardly through the reduced portion 30′ of cylinder 30, the stem being open through piston 36, Figs. 4 and 7. A second and smaller piston 38 is fitted within stem 37 and secured thereto and projecting therefrom through the hollow stem is rod 34 above referred to. With the parts in the position shown in Fig. 4, when air is admitted through the central swivel inlet 39 into cylinder 30 between its hinged end and the pistons, the latter comprise a fixed abutment and the cylinder moves to the right as in dotted lines, Fig. 4. The greatest force is required during the first portion of the rocking movement and until the load reaches such an incline as to accelerate the dumping movement, and during this first or starting movement the effective pressure is on the larger piston 36, and this condition continues until the reduced portion 30′ of the cylinder is advanced into engagement with piston 36, whereupon movement of cylinder 30 relatively to said piston ceases, but the forward movement is continued by the movement of cylinder 30 and the tubular piston stem 37 over the smaller piston 38. The decreased force thus applied for the latter portion of the tilting movement is quite sufficient to complete the same. A coiled spring 40 within cylinder 30 and a similar spring 41 within stem 37 are placed under compression by the forward or body-tilting movement, and the expansive force of these springs aids the body in its return or righting movement. While, as heretofore noted, the center of gravity of the body lowers dur-

ing the return movement and hence creates a tendency on the part of the empty body to rock back to normal position, such movement may be sluggish due to friction and other retarding forces, hence the advantage of accelerating the same by means of the springs. It will be understood, however, that the springs are not essential and may be omitted.

Means is provided for operating the body-tilting mechanism by hand, and consists of a housing 45 which embraces piston rod 34 and incloses the gear wheel 46, the bore of the latter being threaded to mesh with threads 34′ of rod 34. A hand wheel 47 journaled in housing 45 carries a pinion 48 which meshes with gear 46 whereby the housing may be advanced by hand along rod 34 for forcing outwardly the tubular stem 37, piston 36, and cylinder 30. While this movement is necessarily limited to the travel of stem 37 on rod 34 (the relative movement of cylinder 30 and piston 36 not being available) it is quite sufficient for those operations wherein hand manipulation is utilized, this being generally for the purpose of moving the empty body as may be necessary when adjusting or repairing the same, although it will be understood that such hand manipulation is available and may be utilized for dumping a load. When operated by hand it will be understood that housing 45 must be retracted or returned to normal position before the body can be righted.

The mechanism for securing the body in upright position and for releasing it for dumping in the appropriate direction will now be described. At suitable intervals beneath the car body and at either side of its center are the links 50 and 51 which are jointed together at 52, shoulders 52′ preventing the joint from breaking outwardly as will be understood. In the present arrangement, at each side of the body a pair of these links 50 is provided at either side of bolster 7, the upper ends of links 50 being pivoted to the bolster at 50′ while the lower ends of links 51 are pivoted at 51′ to the depending free ends of arms 53, the latter pivoted at 53′ to the underframe bolster 10. Normally, the rounded or enlarged inner sides 54 of arms 53 engage links 50 and 51 opposite their joint 52 and at the side thereof opposite the stop shoulders 52′, so that when the parts are released links 50 and 51 may break joint over part 54 of arm 53, as shown in dotted lines in Fig. 5. This joint-breaking motion cannot ensue, however, so long as arms 53 are prevented from rising, and for locking them in lowered or depending position, the latch devices 55 carried by the longitudinal shafts 56 are held thereagainst.

The mechanism for oscillating shafts 56 and lowering latches 55 is shown in detail in Fig. 6, and consists of a cylinder 57 which may be supported between center sills 2. The piston within this cylinder has its rod secured to cross-head 58, and the pivoted links 59 extending from the cross-head are connected to links 60 which in turn are connected to the crossed arms 61. The outer ends of arms 61 are slotted at 61′ and embrace pins on the extremities of cranks 62 carried by shafts 56. Thus it will be seen that when the piston within cylinder 57 is lowered shafts 56 are oscillated in a direction to rock downwardly the latches at each side, thus releasing all of the body holding devices. There is, however, no substantial change in the position of arms 53 at the dumping side, links 50 and 51 on that side simply breaking joint as shown in dotted lines in Fig. 5. But on the opposite side, the released arms 53 move upwardly in response to the upward pull of links 50 and 51, the links and arms connected thereto simply following the upward movement of the body and returning therewith without breaking joint.

The arrangement is preferably such that the admission of compressed air to the dumping cylinder 30 is controlled by the movement of piston 57′ within cylinder 57, air being supplied from the train line to the top of cylinder 57 through pipe 65, Fig. 8, and after piston 57′ has been lowered sufficiently to release the latches, a pipe connection 66 is uncovered from the lower portion of cylinder 57 to pipe 67 leading to cylinder 30 at opposite ends of the car. By this means the rocking and dumping action is forestalled until the latches have been moved to body-releasing position.

For releasing the latches by hand, a hand lever 70 is secured to each end of shaft 56, the levers being conveniently accessible as they project upwardly through the platform of the car. Movement of the appropriate lever will oscillate the corresponding shaft 56 and thus turn down the latches 55 at the desired side of the car. The latch mechanism at the opposite side is not affected by this hand operation, crank 62 of the shaft being operated inwardly on arm 61 by means of slot 61′. As above noted, the mechanism at the dumping side of the car which is held by the latches does not materially change its position during the dumping operation, and hence it is only necessary to release the latches at the one side as is done by the hand manipulation. However, no harm results in releasing the latches at both sides, and in order to simplify the mechanism such double release is accomplished when the mechanism is operated by compressed air.

I claim:

1. In a dump car, the combination of an underframe, a body mounted to rock thereon, an outwardly and downwardly opening

door hinged to the lowering side of the body, a shaft having a crank, a lever, a link connecting the lever and the crank of said shaft, body rocking means operatively connected to the lever, and links jointed together with one link secured to said crank shaft and the other link pivotally secured to the door whereby opening movement is imparted to the latter when the body tilts for dumping and whereby the door is closed as the body returns to upright position.

2. In a dump car, the combination of an underframe, an upright end frame, a body mounted to rock on the underframe, a downwardly and outwardly opening door for the lowering side of the body, a crank shaft paralleling the axis of rocking of the body, a lever fulcrumed in the end frame, a link connecting the lever and the crank of said shaft, a jointed link connection between the crank shaft and door whereby the latter is opened and closed, respectively, with the tilting and righting movements of the body, body tilting means, and means for oscillating the lever in reverse directions, the lever moving in one direction when the body tilts and in a reverse direction when it returns toward normal position.

3. In a dump car, the combination of an underframe, a body mounted to rock thereon, body rocking means, a stub shaft movable with the body, a door for the lowering side of the body, an arm engaged and adapted to be moved longitudinally by the stub shaft when the body is in motion, and mechanism interposed between and operatively connecting said arm and the door whereby as the body tilts the door is automatically opened and as the body returns to upright position the door is automatically closed.

4. In a dump car, the combination of an underframe, an upright end frame, a body mounted to rock on the underframe, a door for the lowering side of the body, a crank shaft extending longitudinally of the axis of rocking, a lever fulcrumed between its ends in the end frame, a link connecting one end of the lever and a crank of said shaft, an arm pivotally connected to the opposite end of said lever, body tilting means operatively connected to said arm whereby as the body tilts the arm actuates said lever, and a jointed connection between the crank shaft and the door with said shaft operated by said lever in a direction to open the door as the body tilts and in a reverse direction for closing the door as the body is righted.

5. In a dump car, the combination of an underframe, a body mounted to rock thereon for dumping at either side, a downwardly and outwardly opening hinged door for each side of the body, a separate mechanism for opening and closing each door, means for tilting the body toward either side, and means actuated by the tilting mechanism for operatively engaging and actuating the appropriate door opening and closing means.

6. In a dump car, the combination of an underframe, an upright end frame, a body mounted to rock on the underframe for dumping at either side, a device projecting from the body into the end frame and movable in the latter in direction corresponding with the direction of movement of the body, reversely facing clutch devices in the end frame extending toward opposite sides of the body with one or the other of said devices adapted to be engaged by and grip the projecting device depending on the direction in which the body rocks, doors for opposite sides of the body, separate means connected to each door for opening and closing the same, an operative connection between each of said actuating means and a correspondingly located clutch device, whereby when the body is tilted for dumping the appropriate door is opened as the body tilts and is closed as the body is righted.

7. In a dump car, the combination of an underframe, an upright end frame, a body mounted to rock thereon for dumping at either side, a door for each side of the car, actuating mechanisms—one for each door—located in the end frame with each mechanism operatively connected to its door, a device projecting from the body and movable in the end frame, and reversely facing clutch devices—one for each door operating mechanism, each clutch device adapted to automatically engage said projecting device upon movement of the latter toward such clutch device for imparting opening movement to the appropriate door as the body tilts and for closing such door as the body is righted.

8. In a dump car, the combination of an underframe, an upright end frame, a body mounted to rock thereon for dumping at either side, body rocking mechanism, a stub shaft projecting from the body and movable in the end frame, clutch arms in the end frame and extending toward opposite sides of the car, each arm having an open socket-forming end adapted to embrace the stub shaft, tongues—one for each arm—pivoted thereto and adapted to engage and be oscillated by a fixed portion of the end frame for gripping the stub shaft when the arm is moved out of normal position by the stub shaft, a door for each side of the car, and actuating mechanism—one for each door—mounted in the end frame, each of said mechanisms operatively connected to its door and to the appropriate clutch arm and actuated by the latter for opening and closing the door, respectively, during the tilting and righting movements of the body.

9. In a dump car, the combination of an underframe, a body mounted to rock there-

on for dumping, a door for the lowering side of the car, door actuating means, a depending arm pivoted to the underframe, two links jointed together with the upper link pivoted to the body and the lower link pivoted to said depending arm, latch means for holding the jointed links from flexing, and latch actuating means.

10. In a dump car, the combination of an underframe, a body mounted to rock thereon for dumping, a door for the lowering side of the car, door actuating means, a depending arm pivoted to the underframe, two links jointed together with the upper end of the uppermost link pivoted to the body and the lower end of the lower link pivoted to said depending arm, and latch means for holding the jointed links from flexing, the joint between said links being at one side of the pivoted upper end of said depending arm whereby upon tilting the body the jointed links are moved toward said pivotal connection and are adapted to break joint about the upper end of said depending arm.

11. In a dump car, the combination of an underframe, a body mounted to rock thereon for dumping at either side, an outwardly and downwardly opening hinged door for each side of the car, door actuating shafts at opposite sides of the longitudinal center of the car, mechanism operatively connecting each shaft with the door at the corresponding side for opening and closing the door as the body moves, means for actuating said shafts, mechanisms at opposite sides of the center of the car for holding the body against rocking, latch actuating shafts at opposite sides of the center of the car, latch devices actuated by said shafts for maintaining the body-holding mechanisms in locked positions, and means for actuating the latch shafts.

12. In a dump car, the combination of an underframe, a body mounted to tilt thereon, a movable cylinder operatively connected to the body for tilting the latter, a piston within the cylinder and having a tubular stem which is open through the piston, a second piston movable in the tubular piston stem, a rod projecting from the second piston through said tubular stem, means on the frame to which the outer end of the rod is secured, and means for admitting fluid under pressure to the cylinder for moving the latter in direction away from the secured end of said rod.

13. In a dump car, the combination of a frame, a body mounted to tilt thereon, a cylinder operatively connected to the body, a piston within the cylinder and having a tubular stem projecting therefrom, the stem opening through the piston, the cylinder having an offset which is adapted to engage the piston for limiting the relative movement of the cylinder and piston, a second piston movable in said tubular stem and a rod projecting from the second piston through said stem, means for securing the outer end of the rod to the frame, and means for admitting fluid under pressure to the cylinder whereby the cylinder is moved in a direction away from the secured end of said rod.

14. In a dump car, the combination of a frame, a body mounted to tilt thereon, a movable cylinder operatively connected to the body, a piston within the cylinder and a screw-threaded rod projecting from the piston to the exterior of the cylinder, means for securing the outer end of the rod to the frame, a threaded part adapted to travel on the rod at the exterior of the cylinder for moving the latter in direction away from the secured end of the rod, and means for rotating said threaded part.

15. In a dump car, the combination of a frame, a body mounted to tilt thereon, a movable cylinder operatively connected to the body, a piston within the cylinder and a screw-threaded rod projecting from the piston to the exterior of the cylinder, means for securing the outer end of the rod to the frame, a head slidable on the rod and adapted to move the cylinder thereon in direction away from the secured end of the rod, and a gear wheel rotatable on the rod for actuating said head.

16. In a dump car, the combination of a frame, a body mounted to tilt thereon, a movable cylinder operatively connected to the body, a piston within the cylinder and a screw-threaded rod projecting from the piston to the exterior of the cylinder, means for securing the outer end of the rod to the frame, a head slidable on the rod and adapted to move the cylinder thereon in direction away from the secured end of the rod, a gear wheel within the head and having a threaded bore for traveling on said rod, and a wheel for driving said gear wheel with said driving wheel journaled in the head.

17. In a dump car, the combination of a frame, a body mounted to tilt thereon, a movable cylinder operatively connected to the body, a piston within the cylinder and having a tubular stem projecting therefrom, a second piston within the tubular stem and a rod for the second piston projecting through said stem with means for securing the outer end of the rod to the frame, means for admitting fluid under pressure to the cylinder for moving the cylinder in direction away from the secured end of the rod, and springs for opposing movement of the cylinder parts relatively to their pistons and for returning the cylinder parts to normal position.

18. In combination, an under frame, a body mounted to tilt thereon, a cylinder op-

eratively connected to the body for tilting the latter, a piston within the cylinder and having a tubular stem which is open through the piston, a second stem movable in the tubular piston stem, a rod projecting from the second piston through said tubular stem, means on the frame to which the rod is secured, and means for admitting fluid under pressure to the cylinder for moving the latter in direction away from the secured rod.

19. In a dump car, the combination with a frame, and a body mounted to tilt thereon, of longitudinally expansible body tilting mechanism connected at one end to the frame and at its opposite end to the body, said mechanism consisting of a cylinder, a piston within the cylinder and provided with a tubular stem which is open through the piston, a second piston movable in said tubular stem, a rod projecting from the second piston, and means for admitting fluid under pressure to said cylinder.

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

CHARLES H. CLARK.

Witnesses:
J. M. NESBIT,
ELLA MCCONNELL.