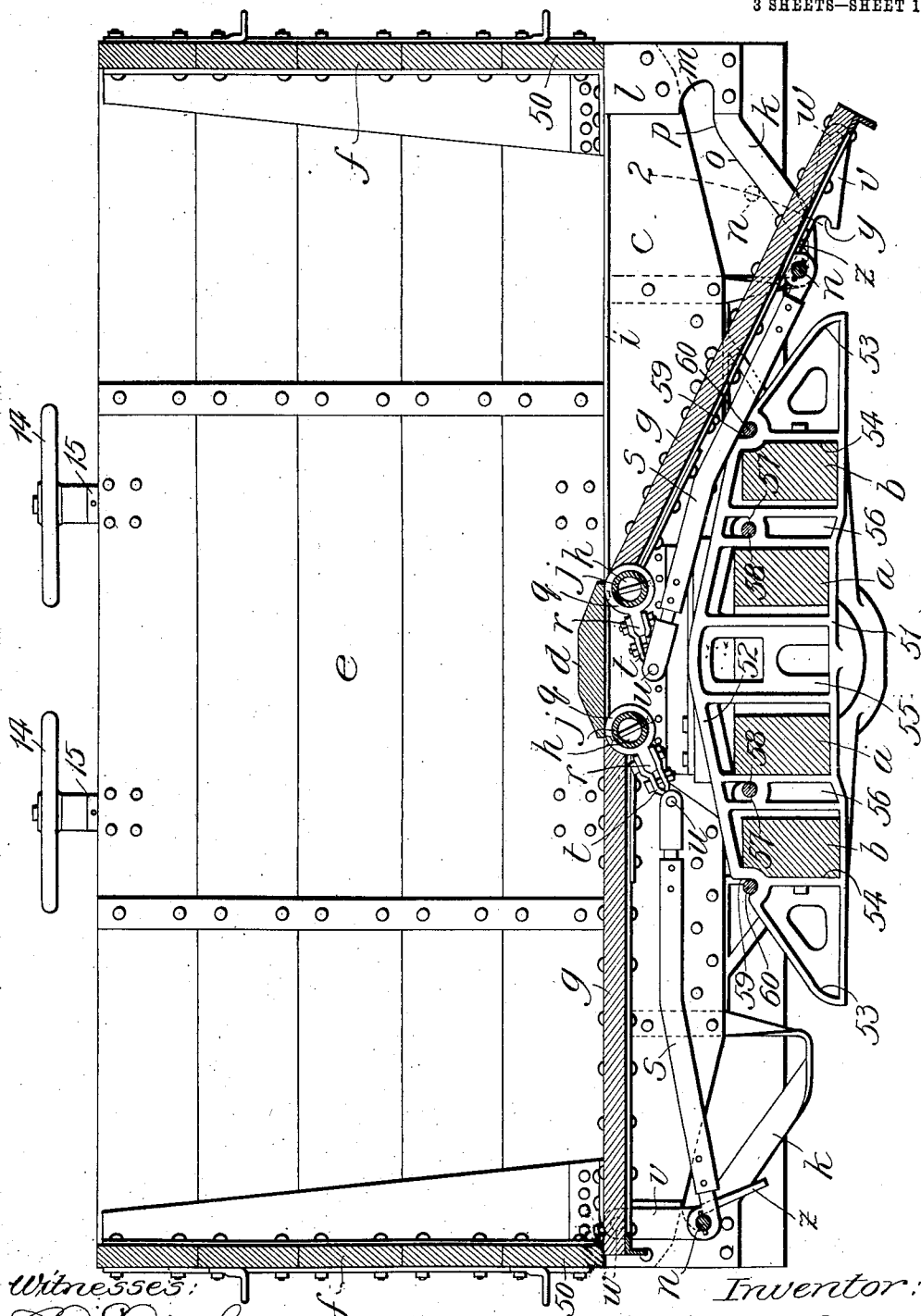


S. OTIS.  
DUMP CAR.

APPLICATION FILED OCT. 20, 1904.

3 SHEETS—SHEET 1.



Witnesses:  
E. S. Gaylord.  
John Enders.

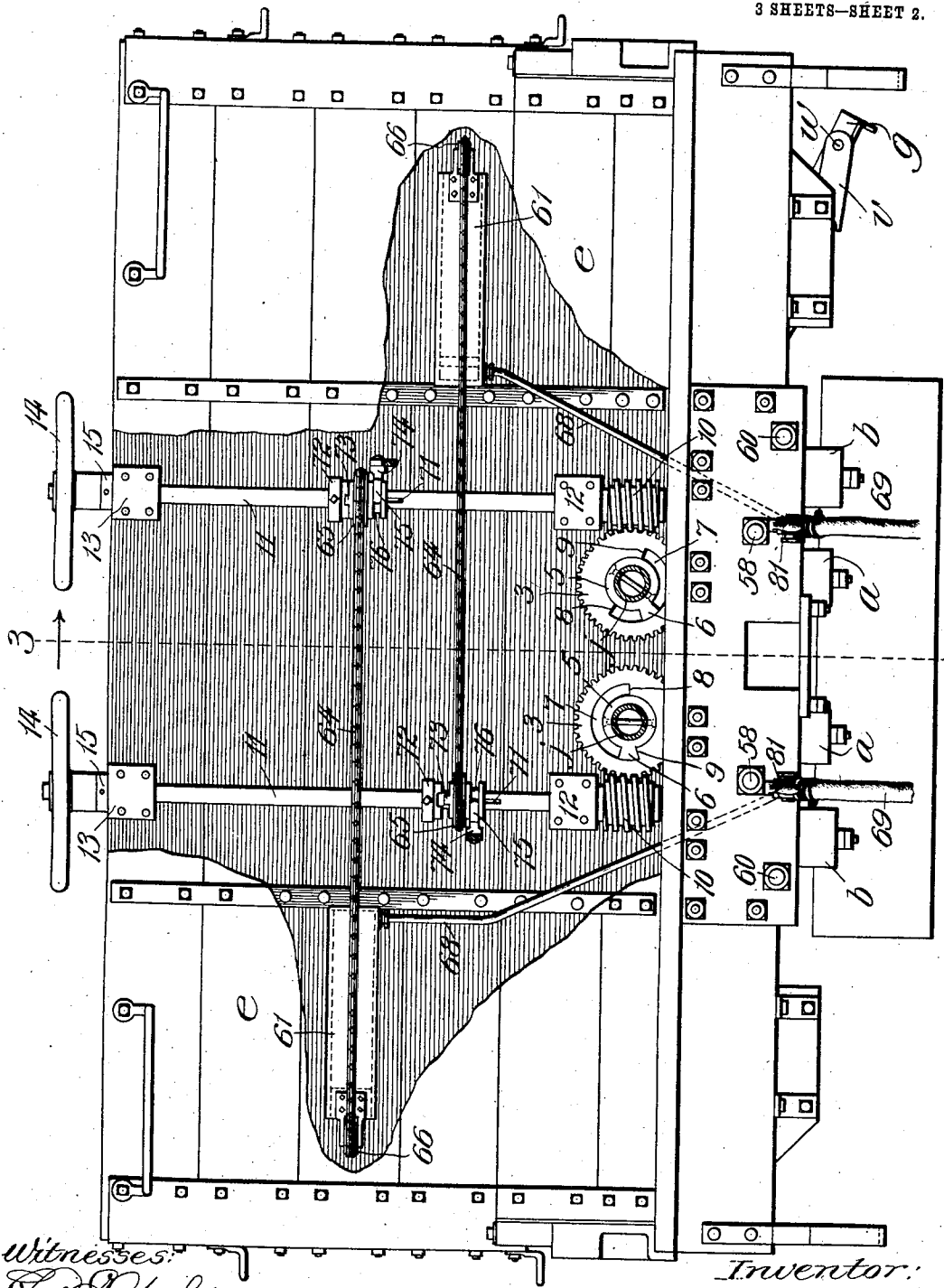
Fig. 1.

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3 SHEETS—SHEET 2.



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Fig. 2.

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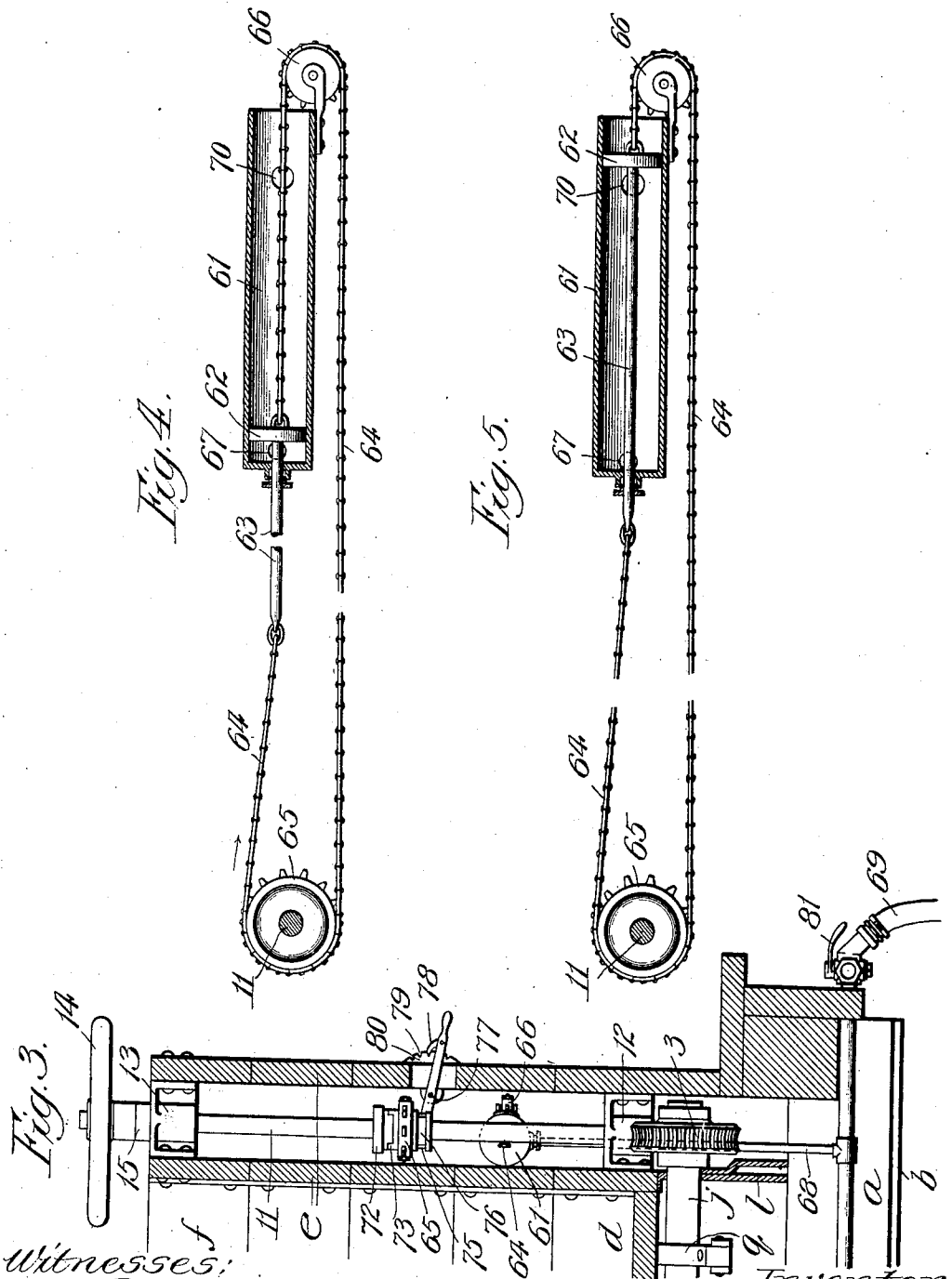
No. 813,733.

PATENTED FEB. 27, 1906.

S. OTIS.  
DUMP CAR.

APPLICATION FILED OCT. 20, 1904.

3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

SPENCER OTIS, OF CHICAGO, ILLINOIS.

## DUMP-CAR.

No. 813,733.

Specification of Letters Patent.

Patented Feb. 27, 1906.

Application filed October 20, 1904. Serial No. 229,357.

*To all whom it may concern:*

Be it known that I, SPENCER OTIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have  
5 invented certain new and useful Improvements in Dump-Cars, of which the following is a specification.

My invention relates to that class of dump-cars having dumping-doors provided with  
10 mechanism operated by means of fluid under pressure for releasing the doors and adapted to be operated manually in closing them.

The principal object of my invention is to provide a simple, economical, and efficient  
15 dump-car.

A further object is to provide a dump-car having dumping-doors with suitable means for enabling the doors to be operated manu-  
20 ally, in combination with mechanism for releasing the doors by means of fluid under pressure.

A further object is to provide suitable means for enabling the doors to be moved to closed position manually, supported in closed  
25 position, released by means of fluid under pressure, and permitted to be moved to open position by the weight of the load upon the doors.

A further object is to provide suitable  
30 means for closing the doors and for supporting them in both open and closed positions, in combination with fluid-pressure mechanism for releasing the doors and permitting them to be moved to open position by the weight  
35 of the load, and means for manually returning the piston mechanism to initial operative position during the movement of the doors to closed position.

Other and further objects of the invention  
40 will appear from an examination of the drawings and the following description and claims.

The invention consists in the features, combinations, and details of construction herein-  
45 after described and claimed.

In the accompanying drawings, Figure 1 is a transverse sectional elevation showing the mechanism for supporting the doors in open and closed positions and for pivotally sup-  
50 porting and operating the doors; Fig. 2, an end elevation of a car provided with my improvements, showing a portion of the end frame broken away so as to disclose the fluid-pressure mechanism for operating the dump-  
55 ing-doors; Fig. 3, a broken sectional elevation of a portion of the end of the car, taken on line 3 of Fig. 1 looking in the direction of the

arrow; Fig. 4, a detail sectional plan view of one of the fluid-pressure cylinders, the piston being shown in initial position and connected with a sprocket-wheel which is adapted to be  
60 connected with and disconnected from the door-operating mechanism; and Fig. 5, a similar view of the mechanism shown in Fig. 4 with the piston at the end of the stroke.

In constructing a dump-car in accordance  
65 with my improvements I provide longitudinal center sills *a* and parallel longitudinal sills *b*, arranged on each side of such center sills, transverse beams *c*, supported by such longitudinal sills, extending transversely  
70 across the car at suitable intervals and having a central car-bottom portion *d* mounted thereon, end frames *e*, and side frames *f*. Dumping-doors *g* extend longitudinally of the car throughout its entire length between  
75 the transverse beams and are pivotally mounted upon main operating-shafts *h*, so as to swing upward transversely of the car to closed position between the transverse beams and in contact with flanges *i*, which project  
80 outwardly beyond the sides of the transverse beams. These dumping-doors are provided with hinges *j*, by means of which they are pivotally connected with the main support-  
85 ing and operating shafts *h*, already described, so as to swing outward laterally of the car from their pivotal points to closed position and to inclined open position. The main operating-shafts are rotatable independently  
90 of the doors mounted thereon and extend, preferably, the entire length of the car, so that each supports one side of all the doors on its side of the car and serves to operate  
95 such doors by means of the mechanisms hereinafter described. There is of course a main operating-shaft for each side of the car, and the entire mechanisms for operating the  
100 doors on one side of the car are identical with those for operating those on the opposite side. It is therefore deemed necessary to  
105 describe only one set of such mechanisms and in connection with one or more doors on one side of the car in order to enable the invention to be understood by those skilled in the art.

The transverse beams *c* comprise two side members provided with a space therebe-  
110 tween, and between the side members of each transverse beam is mounted a rigid loop *k*, formed of metal, which is riveted between the side portions of the transverse beam. Plates *l* are mounted on the outside of these

loops or straps and riveted to both the transverse beams and straps, such plates being provided with a recess *m* for receiving a shaft *n*, which extends beneath all of the doors on one side of the car and is movable backward and forward or reciprocatingly inside of the loops through which it extends. Each of these loops is provided with an inclined portion *o*, which extends upwardly and outwardly at an incline from the lower portion of the loop to a point *p*, the supporting upper face of the loop being substantially horizontal from such point outward to the extreme limit of the loop, as shown in Fig. 1. The lower end of the loop limits the movement of the shaft *n* in the releasing direction and supports it, and thereby the door, in open dumping position.

A plurality of collars *q* are mounted upon each of the main operating-shafts in fixed relation thereto, each provided with a stud or crank-arm *r*, and lever-arms *s* are pivotally connected at one end to such crank-arms by means of clips *t* and pins *u* and at the other end to one of the shafts *n*, already described. These levers *s* and loops *k* are arranged at suitable intervals throughout the entire length of the dumping-doors and are all alike.

A plurality of levers or depending supporting-arms *y* are pivotally mounted upon the doors, near the outer swinging edges thereof, by means of suitable pivots *w* and are provided at or near their swinging ends with a hook or loop portion *y*, which forms the base upon which they rest. A projecting guard portion *z* extends beyond such hook, loop, or base portion, so as to beat all times above the shaft *n* and serve as a guide to cause the arms and shaft to be properly connected in operation. The hook or base portions of the levers or supporting-arms engage the shaft *n* when such shaft is moved from the point at which it is shown in full lines in Fig. 1 to the point where it is shown in dotted lines in said figure, such point being indicated by the intersection of the dotted line 2 with the upper edge of the inclined loop *k*. A further movement raises the door upon the arm, which is moved to upright position beneath it. By this arrangement it will be readily seen that the rotation of the main operating-shaft with its crank mechanism from the position shown at the left of Fig. 1 to that shown at the right of said figure will release the door and permit it to swing open. The door being in open position, as shown at the right of Fig. 1, the movement of the main operating-shaft with its crank mechanism in the direction necessary to close the door will cause the shaft *n* to pass upward along the inclined portion of the loops, raising the door and coming in contact with the hook or base portion of the levers *y* when such shaft reaches the point shown in dotted lines at the right of Fig. 1. The continuation of the rotation of the main

operating-shaft will cause the shaft *n* to swing the levers *y* upon their pivots until said shaft reaches the top of the inclined portion of the loops and until the levers *y* have at that point reached almost a vertical position. After the shaft upon which the arms *y* rest has reached the top of the inclined portion of the loops a further movement will throw the levers *y* to a substantially vertical position, as shown at the left of Fig. 1, so as to support the doors firmly in closed position. When the parts are in this position, the shaft *n* rests upon the horizontal portion of the loops. In order to release it, and thereby the supporting-levers *y* and the dumping-doors, so as to permit such doors to swing open, it is only necessary to swing this reciprocating shaft *n* toward the center of the car past the horizontal portion of the loops and onto the inclined portions thereof, from which point the weight of the load upon the door will cause it to swing to open position.

In order to provide suitable means for rotating the main operating-shafts, so as to operate the lever mechanisms above described, and thereby the dumping-doors, and to enable the main operating-shafts to be released, so as to swing freely with the doors independently of the mechanism for operating such main operating-shafts, I provide each main operating-shaft with a suitable gear, preferably comprising a worm-wheel 3, mounted loosely upon such main shaft, so as to rotate independently thereof. This wheel is held in position so as to prevent its play longitudinally of the shaft by means of a collar 5, secured to the shaft on one side of such worm wheel or gear, and by means of an ordinary collar (not shown) rigidly secured to such main operating-shaft upon the opposite side thereof in any ordinary manner. This collar 5 is provided with a stud 6, and the collar and stud enter a suitable recess 7 in the wheel. The recess in the worm-wheel has a central annular portion which extends entirely around the shaft, so as to receive the collar 5 in engagement with its inner surface, and also an outer portion in the form of a segmental slot, into which the stud 6 extends, as shown in Fig. 2. Shoulders 8 and 9 form the ends of the segmental or outer portion of this slot or recess and are adapted to engage the stud, so as to move it, and thereby the main operating-shaft, to which it is connected in either direction.

In Fig. 2 the gear-wheel at the right is shown in the position in which it would appear after being turned to the right in the figure, with the shoulder 9 in engagement with the stud 6 until the shaft *n* had moved toward the center of the car or in releasing direction to the bottom of the inclined portion of the loop. This would permit the door to swing to open position without further movement of the worm-wheel. The

swinging of the door to open position would bring the stud to the position shown in said figure, to which position it is free to turn independently of the gear-wheel. The rotation of the gear-wheel to the left from the position shown at the right of Fig. 2 will cause the shoulder 8 to engage the stud when it reaches the point where such stud is shown, and the rotation being continued will cause the main operating-shaft with its stud to be turned to the position corresponding to that shown at the left of the figure, at which point the door will be in closed position.

I provide a worm 10; the threads of which mesh with the teeth of the worm-wheel already described, such worm being mounted upon and in fixed relation to a rotatable shaft 11, which is in turn rotatably mounted in suitable bearings 12 and 13 upon the car-frame. A hand-wheel 14 is mounted, preferably, at the upper end of this shaft in fixed relation thereto, and a collar 15 is mounted intermediate such hand-wheel and the bearing 13, so as to prevent the downward movement of the shaft, the collar being in engagement with the bearing. The upward movement of the shaft is prevented by the lower bearing, which is in engagement with the worm.

Side sills 50 or bottom portions of the side frames are mounted entirely above the transverse beams, so that they do not extend below the floor-level or bottom of the floor. In other words, the space between the ends of the transverse beams is left open in the direction of the side of the car entirely up to the floor-level. A short body-bolster is provided, made, preferably, of one integral piece of cast-steel and consisting of a lower suspension portion or member 51; an upper compression portion or member 52, inclined end portions 53, forming shoulders 54, (the faces of which engage the outer surfaces of the outer pair of longitudinal sills,) a central strut portion or member 55, and intermediate strut portions or members 56. These strut portions or members are arranged at suitable distances from each other and extend from the lower suspension member to the upper compression member, forming pockets therebetween for receiving the longitudinal sills. Each of the intermediate strut portions is provided with a bearing portion or pocket 57 for receiving the truss-rods 58, and suitable bearings or pockets 59 are provided in the upper compression member outside of the intermediate strut portions for supporting the truss-rods 60. A plurality of these bolsters are arranged between the transverse beams and the end sills of the car and extend beneath the doors and at a distance from the ends thereof, so that material which may fall from the ends of the doors in dumping the load will not come in contact with or interfere with the bolsters in any way. These bolsters are of less length than the dis-

tance between the side frames and have the upper portions of each end inclined downwardly and outwardly, as shown, so as to not only provide a suitable form for resisting the stress and strains to which the bolsters are subjected, but also for the purpose of providing a sufficient space between the ends of the bolsters and the side sills or side frames for dumping the load. By making these bolsters of less length than the distance from side frame to side frame space is provided between the ends of the bolsters and side frames, which permits the dumping-doors to extend over such bolsters between the ends thereof and the side sills or side frames, as shown, and the doors have ample space between the ends of the bolsters and side frames in which to move to open or closed position. The side frames are, as already suggested, arranged upon the transverse beams, so that they and the side sills, if any, are entirely above the level of the pivotal point of the doors and do not extend below the bottom of the floor or central floor portion. Combined with the short bolsters this arrangement of the side sills or side frames affords a very large discharge-opening.

By the above arrangement the doors may be moved to closed position manually when desired and, in fact, may be readily opened or closed without much effort when there is no load upon the doors. When the car is heavily loaded, however, it becomes more difficult to release the doors manually. It is therefore very desirable that some simple means be provided whereby the doors may be released by means of fluid under pressure, such as air or steam. In order to enable this to be accomplished and still permit the doors to be operated manually when desired—as, for instance, when fluid-pressure is not conveniently available—I find it advantageous to connect the fluid-pressure mechanism with the manually-operated devices, so as to operate them, and thereby the doors. The means employed for manually operating the doors comprises hand-wheel and worm-wheel mechanism or similar gearing, as above described, movable to releasing position while the doors remain closed. The fluid-pressure mechanism and manually-operated mechanism are connected in such a way that the latter can be employed to return the pistons of the fluid-pressure mechanism to initial operative position while the doors are being moved to closed position.

I provide a pair of fluid-pressure cylinders 61, extending, preferably, at right angles to the longitudinal center of the car and arranged between the double walls of the end frames in such a manner as to economize space to as great an extent as possible. They are here shown mounted horizontally and extending transversely of the car, so that their pistons can be readily connected with the

vertical worm-shafts in the manner herein-after described. Each of these cylinders is provided with a piston 62, reciprocatingly mounted therein and connected with one of the worm-shafts 11, preferably that on the opposite side of the car, by means of a piston-rod 63 and sprocket-chain 64. The sprocket-chain is in engagement with a sprocket-wheel 65 upon the worm-shaft and extends from such sprocket-wheel to an idler-pulley 66 at the opposite end of the fluid-pressure cylinder, being connected to the rear side of the piston, so that the movement of the piston in either direction will move the sprocket-chain, and thereby the sprocket-wheel and worm-shaft, correspondingly. Each of the cylinders is provided with an inlet-port 76, which communicates with a suitable source of fluid under pressure through branch pipe 68 and pipes 69, which form a connection between such cylinders and the air or steam chamber of the engine. An outlet-port is provided near the end of each cylinder, so that the fluid under pressure may be exhausted therefrom when the piston has reached the end of its stroke. The piston is returned to initial position by means of the manually-operated mechanisms during the operation of closing the doors. The sprocket-wheels 65 are each attached to one of the worm-shafts 11 by means of a spline 71, which permits the movement of the sprocket-wheels longitudinally of such shafts into and out of engagement with suitable clutch members 72, which are mounted in fixed relation to the worm-shafts, each of the sprocket-wheels being provided with a clutch member 73, adapted to engage the relatively fixed clutch member in the manner in which ordinary clutches commonly operate.

In order to provide suitable means for operating the movable clutch members so as to throw the sprocket-wheels into and out of engagement with the worm-shafts or into and out of operative engagement with the doors, a hand-lever 74 is provided, having a forked end portion 75, which enters a suitable annular slot 76 in the hub of the sprocket-wheel, such lever being pivotally mounted upon a suitable supporting-bracket 174 by means of a pivot-pin 77. The opposite end of this hand-lever is provided with a ratchet 78, adapted to enter notches 79 in a curved or segmental rack 80, so as to hold the clutch members in engagement with each other when moved into engaging position and permit the movement of the hand-lever in the opposite direction to release the clutch. By this arrangement it will be readily seen that the feed-pipes of the piston-cylinders being connected to the compressed-air chamber of an engine and the dumping-doors being in closed position, such doors may be readily released by means of air under pressure communicated to the cylinders from the engine.

It is only necessary to turn the desired cock 81 to open position, so as to admit fluid under pressure to the corresponding piston-cylinder. These cocks 81 are ordinary two-way cocks for opening and closing the passages for the admission of fluid under pressure to the fluid-pressure cylinders. They may be of any ordinary type, and therefore it is not deemed necessary to describe them in detail in this application.

In operation, the doors being in closed position, the worm-wheels are first moved back to initial position manually before the air is applied for the purpose of releasing the doors and permitting them to be swung open by the weight of the load. In order to accomplish this so as to leave the piston 62 in initial operative position, it becomes necessary to throw the clutch of the sprocket 65 out of engagement with the worm-shaft before turning the worm-wheel to released position. The clutch is then thrown into operative position, so that the continuation of the movement of the worm-shaft in the releasing direction can be accomplished by means of the fluid under pressure and the doors thereby released. The doors being released and the load dumped, the pistons are returned to initial position by the rotation of the worm-shafts and the sprockets 65 in the operation of closing the doors manually.

I claim—

1. In a dump-car, the combination of dumping-doors, manually-operated mechanism connected with such doors for operating them, and fluid-pressure cylinder and piston mechanism operatively connected with the doors for releasing them, substantially as described.

2. In a dump-car, the combination of dumping-doors movable to open and closed positions, manually-operated mechanism for closing the doors and supporting them in closed position, and fluid-pressure cylinder and piston mechanism connected with the manually-operated mechanism for operating it in one direction to release the doors, substantially as described.

3. In a dump-car, the combination of dumping-doors movable to open and closed positions, fluid-pressure mechanism for releasing the doors, and means operated independently of the fluid-pressure mechanism for moving the doors from open to closed position, substantially as described.

4. In a dump-car, the combination of dumping-doors movable to open and closed positions, fluid-pressure cylinder and piston mechanism for releasing the doors, and mechanism operated independently of the fluid-pressure mechanism for moving the doors to closed position and provided with means for moving the fluid-pressure-piston mechanism to initial position during the operation of closing the doors, substantially as described.

5 5. In a dump-car, the combination of dump-  
ing-doors movable to open and closed posi-  
tions, means for supporting the doors in closed  
position, fluid-pressure-cylinder mechanism  
provided with piston mechanism connected  
10 with the doors for releasing them, and manu-  
ally-operated mechanism connected with the  
doors and with such piston mechanism for  
closing the doors and automatically moving  
the piston mechanism to initial position dur-  
15 ing the operation of closing the doors, sub-  
stantially as described.

6. In a dump-car, the combination of dump-  
ing-doors, gear and lever mechanism connect-

ed with such doors for operating them, fluid- 15  
pressure cylinder and piston mechanism op-  
eratively connected with such gear and lever  
mechanism for operating it in one direction  
to release the doors, and means for moving  
the gear mechanism in releasing direction 20  
while the doors are stationary in closed posi-  
tion to permit the free movement of the doors  
to open position independently of such gear  
mechanism, substantially as described.

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