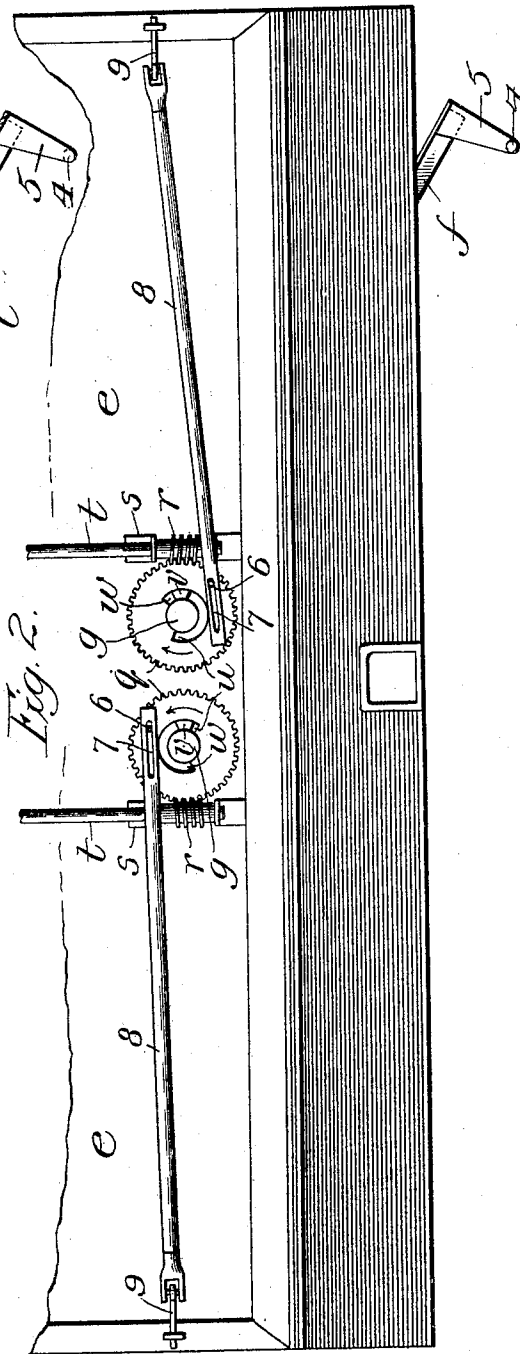
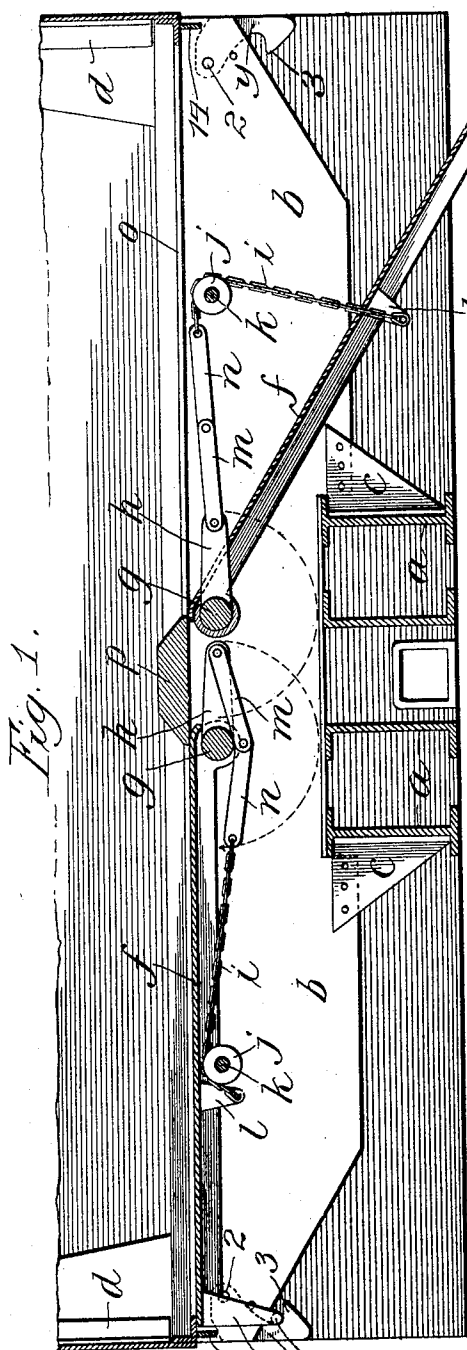


S. OTIS.
DUMP CAR.

APPLICATION FILED SEPT. 3, 1904.

2 SHEETS—SHEET 1.



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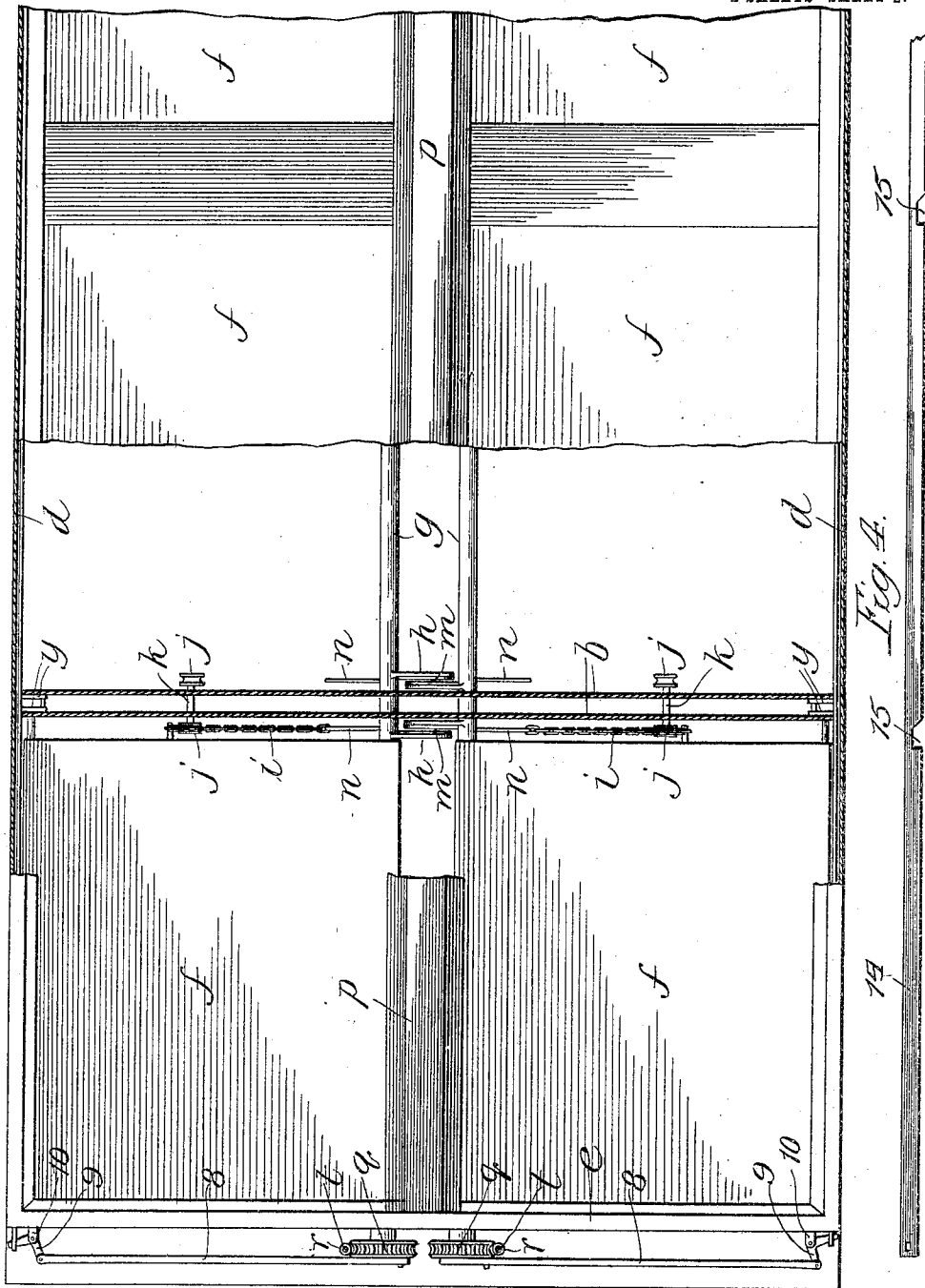
No. 804,970.

PATENTED NOV. 21, 1905.

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2 SHEETS—SHEET 2.



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Fig. 3.

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UNITED STATES PATENT OFFICE.

SPENCER OTIS, OF CHICAGO, ILLINOIS.

DUMP-CAR.

No. 804,970

Specification of Letters Patent.

Patented Nov. 21, 1905.

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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 means for operating them.

It relates particularly to the means for operating and supporting the dumping-doors.

The principal object of the invention is to provide a dump-car with simple, economical,
15 and efficient mechanism for operating and supporting the dumping-doors thereof.

A further object of the invention is to provide means whereby the dumping-doors may be raised by means of worm and worm-wheel
20 mechanism supported in closed position independently of such worm mechanism and permitted to open without subjecting the worm and worm-wheel mechanism to the strains accompanying the releasing of the door with the
25 weight of the load thereon.

A further object of the invention is to provide a dumping door or doors having worm and connecting mechanism for operating the same with suitable means for throwing the
30 worm mechanism out of connection with the door, so as to permit the door or doors to be opened independently of the worm and without subjecting the same to the strains of the weight of the load upon the door when released.
35

A further object of the invention is to provide suitable means for locking or latching the door in closed position and releasing it substantially automatically or by means of the
40 door-operating mechanism.

A further object of the invention is to provide suitable means for supporting the door independently of the mechanism for closing it and means for releasing and locking such
45 supporting mechanism.

Other and further objects of the invention 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-
50 after described and claimed.

In the accompanying drawings, Figure 1 is a transverse sectional view in elevation of a car provided with my improvements, showing one
55 of the dumping-doors in open position and the other in closed position and the mechanisms for

operating such doors in corresponding positions; Fig. 2, an end view of a car provided with my improvements, showing the worm and worm-wheel mechanism and the manner
60 of connecting the worm-wheels with the shafts and disconnecting them for operating the door and the means for locking and unlocking the door-supporting members or keepers; Fig. 3, a plan view showing the arrangement of the
65 shafts and cranks with their connections, a portion of the car-floor being broken away so as to expose the operating parts; and Fig. 4, a plan view of one of the locking-rods for securing and releasing the keepers which sup-
70 port the doors.

In constructing a car and door operating and supporting mechanism in accordance with my improvements I provide a car-frame having longitudinal sills *a* and transverse beams
75 *b*, connected and braced by means of braces *c*. These transverse beams I prefer to make hollow or of two side portions provided with a space therebetween. These beams are arranged at suitable intervals to permit the
80 dumping-doors to swing between them and support the door-operating mechanism adjacent to the ends or short sides of the dumping-doors, as hereinafter more particularly described. Suitable side frames *d* are sup-
85 ported upon the transverse beams, and end boards or frames *e* are provided at each end of the car. Dumping-doors *f* extend preferably longitudinally of the car and are pivotally mounted upon main operating-shafts *g*
90 and between the transverse beams, so as to swing between such beams into closed position to form a part of the bottom of the car in one position and into inclined open position to dump the load, the doors being preferably
95 pivoted at or near their inner edges and swinging outward and downward from such pivotal point to the desired incline.

In order to provide suitable means for operating the doors, the main operating-shafts,
100 which are employed as a means for supporting the inner edges of the doors, are also employed for the purpose of operating such doors. These shafts are therefore each provided with suitable cranks *h*, arranged pre-
105 ferably adjacent to the transverse beams and the ends or short sides of the doors. Chains *i* or similar flexible elements are rove over suitable idler-pulleys *j*, rotatably supported upon transverse beams by means of shafts or
110 rods *k*, each shaft serving to support two of such pulleys, one on each side of a beam. The

chains are each connected at one end to the door by means of a depending supporting-arm l and at the other end to the crank h by means of suitable links m and n , which may be considered as forming a part of such chains or flexible elements. These flat links are employed as a part of the chain for the purpose of providing a more desirable connection between the chain and crank and to minimize the chances of the chain becoming entangled or kinked in such a manner as to impede or interfere with the operation of the working parts. The supporting arm or stud l of the dumping-door extends downward from the lower face of the door, and the idler-pulley j is mounted, preferably, below the level of the door when in its closed position. By this arrangement it will be seen that the working parts are enabled to be all placed beneath the level of the door, so that when it is in closed position none of the working parts is exposed above the floor. They therefore in no way obstruct the floor-space of the car and are protected from the material to be handled by projecting flanges o on the transverse beams or by any ordinary and well-known means for covering such parts—such, for instance, as a portion of the floor of the car. The space between the inner edges of the dumping-doors is covered by a central car-floor portion p , and there is a crank and chain of this description at each end of each of the dumping-doors.

A worm-wheel q is mounted upon each of the main operating or crank shafts g , preferably outside of the end frame of the car, and a worm r , meshing with such worm-wheel, is journaled in suitable supports s upon the end frame of the car and provided with a shaft t , having a hand-wheel, (not shown,) by means of which such worm and worm-wheel may be operated. This worm and shaft mechanism is for the purpose of operating the main operating crank-shafts, and thereby the dumping-doors. It is very desirable, however, that they should be connected with the main operating-shaft and dumping-doors in such a manner that they may be readily disconnected while the dumping-doors are in closed position to the extent of permitting the doors to swing open freely independently of and without moving the worm or worm-wheel during the swinging of the doors to open position. This is very desirable for the purpose of preventing the worm-wheel and worm mechanism from being subjected to the strains which would otherwise result from the swinging of the doors to open position with a load thereon. In order to accomplish this, each of the worm-wheels is mounted, as already suggested, loosely upon the main operating-shaft and is provided with a substantially semicircular or segmental slot u , opening upon the shaft, and a feather or stud v , one for each worm-wheel, is mounted upon the main operating-shaft in fixed relation thereto and in rotatable relation

to the worm-wheel, as shown in Fig. 2. This permits the rotation of the worm-wheel in one direction independently of the shaft when the door is in closed position and also permits the rotation of the shaft freely within and independently of the worm-wheel while the door is swinging into open position. The shoulder w , which forms the end of the segmental slot, engages the stud on the shaft when the worm-wheel is moved in the direction to close the door. The stud and slot thus serve to connect the worm-wheel with the shaft and to rotate the shaft with its cranks in the direction to close the door. In closing the doors the worm-wheels and shafts are rotated in the directions indicated by the arrows in Fig. 2. By this arrangement the rotation of the worm-wheel away from the position shown at the right in Fig. 2 or in the direction of the arrow will produce a corresponding rotation of the main operating-shaft with its cranks and will close the door or doors connected with such shaft and cranks, leaving the worm-wheel when in its closed position with its slot above the shafts. The rotation of the worm-wheel in the opposite direction while the door is held in closed position by means of keepers y , as hereinafter described, will turn the segmental slot back to the position below the shafts shown at the right of Fig. 2, so as to permit the rotation of the main operating-shaft, with its stud or feather, freely within and independently of the worm-wheel during the swinging of the door or doors to open position. The mechanism on the left of Fig. 2 operates in a similar manner.

It is desirable to provide suitable means for supporting the doors independently of the crank and worm mechanisms and independently of the flexible mechanisms which connect them with the doors. In order to accomplish this, keepers y , already mentioned, are pivotally mounted in the car-frame, preferably upon the transverse beams, by means of pivots 2, the lower end of such keepers being provided with a hook portion 3, adapted to engage the horizontal portion 4 of a depending arm 5, mounted upon the swinging dumping-door near its outer edge and preferably at the end of such door. These depending supporting-arms of the dumping-doors extend downward, so as to permit the keeper to be mounted entirely beneath the level of the door when in closed position. These keepers have their pivotal points inside the point of engagement between the hook portion and the door or its depending arm, so that the center of gravity of the load upon the door tends to throw the keeper outward and out of operative engagement with the depending arm. Locking-rods 14 extend longitudinally of the car and are slidably mounted in the car-frame, each being provided with slots 15, one for each keeper. When these rods are in normal po-

sition, the body portions are directly over and in engagement with the keeper, as shown in Fig. 1; but when it is desirable to release the keeper, and thereby the dumping-doors, the rods are moved into releasing position—that is, with the slots directly over the keepers—so as to permit such keepers to be thrown outward and out of engagement with the dumping-doors and their depending supporting-arms. This serves to release the doors and permit them to swing open and the crank-shafts to rotate independently of the worm mechanism. In order to provide suitable means for operating these locking-rods substantially automatically, and thereby for locking and releasing the keepers and dumping-doors, as desired, by means of the door-operating mechanism, each of the worm-wheels *g*, already described, is provided with a crank-pin 6, which extends into an elongated slot 7 in a connecting-arm 8, such connecting-arm being operatively connected with the sliding locking-rod 4 by means of a bell-crank 9, which is pivotally mounted in a suitable bracket 10.

In Fig. 2 the worm-wheel at the right is shown with its segmental slot below the main operating-shaft in position to permit the free rotation of such shaft with its stud, the shaft and stud being there shown in the position they occupy after such rotation has taken place during the swinging of the door to open position. The crank-pin upon this wheel is also shown in the position to which it has been moved for the purpose of pressing the connecting-rod 8 to the right, so as to release the keepers, and thereby the doors, on that side of the car. The action of the mechanisms will be perhaps most readily understood by following the movements of this same wheel during the operation of moving the door to closed position. To accomplish this, the worm-wheel is turned in the direction of the arrow from the position in which such wheel is shown at the right of Fig. 2, causing the shoulder *w*, which forms the end of the segmental slot, to engage the stud or feather *v* upon the main operating-shaft and turn it, with its crank-arms, into position to close the door. The length of the crank-arms and the movements thereof with relation to the movement of the door are so proportioned that they make substantially half a revolution in closing the door and are capable of being moved in the closing direction after the doors are substantially closed. In order to turn the crank-arms and main operating-shaft into position to close the doors, the worm-wheel is rotated about half a revolution, so that the pin 6 engages the inner end of the elongated slot 7, and the rotation of the worm-wheel is continued in the same direction after the pin engages the end of such slot until the connecting-arm 8 is moved toward the longitudinal center of the car a sufficient distance to throw the locking-rod 14 into locking engagement with the keepers. This is

accomplished, as already suggested, when the slots 15 of the locking-rods are thrown to one side or the other of the keepers, so that the body portion of the locking-rod engages the keepers. The worm-wheel and shaft mechanism at the right of Fig. 2 show the position of these parts and also the position of the pin 6 when the doors on that side of the car are in open position and the locking-rod in position to release the keepers. The worm-wheel at the left of this figure shows these parts in the position which they occupy when the door has been moved to closed position and the locking-rod into locking engagement with the keepers, so as to hold such keepers in locked position, as the latter are shown to the left of Fig. 1. The operation of both the main operating-shafts is of course substantially the same, the direction of their rotation being reversed to correspond with the side of the car upon which they are placed. It is desirable that the hand-wheels which operate the worm-wheels be both turned in the same direction during the performance of the same operations, respectively. I also prefer to mount them upon the outside of the worm-wheels. One of the worms therefore has a right-hand pitch and the other a left hand, as shown in Fig. 2.

It will be noted that the idler rolls or pulleys *j* are mounted at a point intermediate the longitudinal centers of the doors and their outer edges and that the chains are attached to such doors at a point intermediate their longitudinal centers and outer edges. This enables the door when in its open position to be held firmly against the great strain to which it is subjected by the weight of the load and prevents unnecessary strains and injury to the doors, which would result from such bearing-points being between the longitudinal centers of the doors and the inner edges thereof or inside the longitudinal centers.

By the above arrangement it will be seen that the doors may be readily closed by means of worms and worm-wheel mechanism operatively connected therewith in the manner described and that the worm-wheel mechanism may be readily disconnected from the door to the extent of permitting it to swing open without strain or injury to the worm or worm-wheel mechanism and without subjecting such parts to the great strains to which they would otherwise be subjected during the swinging of the doors to open position with the weight of the load thereon. It will also be seen that the weight of the load rests upon the keepers and the main operating-shafts when the doors are in closed position and not upon the mechanisms connected with the operating-shafts for operating the doors, that the keepers are thrown out of engagement with the doors or the depending supporting-arms substantially automatically by the pressure of the load upon

the doors after the keepers have been released by throwing the locking-rods to releasing position, and also that the keepers are released by means of the mechanisms which operate the doors, such mechanisms serving to operate the locking-rods, and thereby locking or releasing the keepers and doors, as desired.

I claim—

1. In a dump-car, the combination of a dumping-door, means for closing the door, means for holding the door closed, and means for returning the door-closing means to initial position without operating the door, substantially as described.

2. In a dump-car, the combination of a door pivotally mounted in the car so as to open automatically when released, means for closing the door, means for holding the door closed, and means for returning the door-closing means to initial position without operating the door, substantially as described.

3. In a dump-car, the combination of a dumping-door, means for closing the door, means for holding the door closed, means for returning the door-closing means to initial position without operating the door, and means connected with the door-closing means for releasing the holding means, substantially as described.

4. In a dump-car, the combination of a dumping-door, gear mechanism for operating such door provided with means for releasing the door to permit it to swing open independently thereof, means for connecting such gear mechanism with the door, and means for supporting the swinging side of the door in closed position independently of the gear mechanism, substantially as described.

5. In a dump-car, the combination of a dumping-door, gear mechanism for operating such door movable into releasing position while the door is stationary in its closed position, means for supporting the swinging side of the door in closed position during the movement of such gear mechanism to releasing position, and means for releasing the swinging side of the door from such supporting mechanism, substantially as described.

6. In a dump-car, the combination of a dumping-door, worm-gear mechanism for operating such door movable in one direction to close the door and in the opposite direction to releasing position while the door is stationary in closed position, means for connecting such worm-gear mechanism with the door, and mechanism movable into and out of engagement with the door for supporting the swinging side thereof while the worm-gear mechanism is in releasing position, substantially as described.

7. In a dump-car, the combination of a plurality of dumping-doors, mechanism for operating such doors movable into releasing position while the doors are stationary in closed position, means for supporting the swinging

sides of the doors independently of such operating mechanism, and locking-rod mechanism for locking and releasing such supporting mechanism, substantially as described.

8. In a dump-car, the combination of a dumping-door, mechanism for operating such dumping-door provided with means for pivotally supporting one side of the door, keeper mechanism for supporting the opposite side of the door when in closed position movable automatically to releasing position, and means operated by the door-operating mechanism for locking such keeper mechanism when the door is in closed position, substantially as described.

9. In a dump-car, the combination of dumping-doors, main operating-shafts connected with such dumping-doors for operating them, studs mounted upon the shafts, gear mechanism mounted upon the shafts movable in one direction into engagement with the studs to close the doors and movable independently of the shafts in the opposite direction to releasing position while the doors are in closed position, and means for operating such gear mechanism and thereby the shafts and dumping-doors, substantially as described.

10. In a dump-car, the combination of dumping-doors, main operating-shafts connected with such dumping-doors for operating them, studs mounted upon the shafts, worm-wheel mechanism mounted upon such shafts movable therewith in one direction while in engagement with such studs to close the door and independently of the shaft and out of engagement with the studs to releasing position while the doors are in closed position, and worm mechanism in engagement with such worm-wheel mechanism, substantially as described.

11. In a dump-car, the combination of a car-frame having longitudinal sills and transverse beams mounted thereon, dumping-doors pivotally mounted in the car-frame, door-operating mechanism mounted in the car-frame over the longitudinal sills entirely below the level of the doors when in their closed position and connected with the doors at points intermediate their longitudinal centers and outer swinging edges, and means for operating such mechanism and thereby the doors, substantially as described.

12. In a dump-car, the combination of dumping-doors, main operating-shafts extending longitudinally of the car upon which such dumping-doors are pivotally mounted, chain mechanism supported in the framework of the car and connected with the dumping-doors and main operating-shafts, and means for operating such main operating-shafts and thereby the dumping-doors, substantially as described.

13. In a dump-car, the combination of dumping-doors, main operating-shafts extending longitudinally of the car upon which such dumping-doors are pivotally mounted, chain

mechanism supported in the framework of the car and connected with the dumping-doors and main operating-shafts, worm and worm-wheel mechanism for operating such main operating-shafts and thereby the dumping-doors, substantially as described.

14. In a dump-car, the combination of dumping-doors, main operating-shafts extending longitudinally of the car upon which such dumping-doors are pivotally mounted, chain mechanism supported in the framework of the car and connected with the dumping-doors and main operating-shafts, worm-wheel mechanism for operating such main operating-shafts and thereby the dumping-doors, and means for supporting the doors independently of such worm-wheel mechanism, substantially as described.

15. In a dump-car, the combination of dumping-doors, main operating-shafts extending longitudinally of the car upon which such dumping-doors are pivotally mounted, chain mechanism supported in the framework of the car and connected with the dumping-doors and main operating-shafts, worm-wheel mechanism mounted upon such shafts movable therewith in one direction to close the doors and independently thereof in the opposite direction, and means for supporting the outer swinging sides of such doors independently of such worm-wheel mechanism, substantially as described.

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