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PATENTED MAR. 27, 1906.

S. OTIS.
DUMP CAR.

APPLICATION FILED NOV. 23, 1904.

3 SHEETS—SHEET 2.

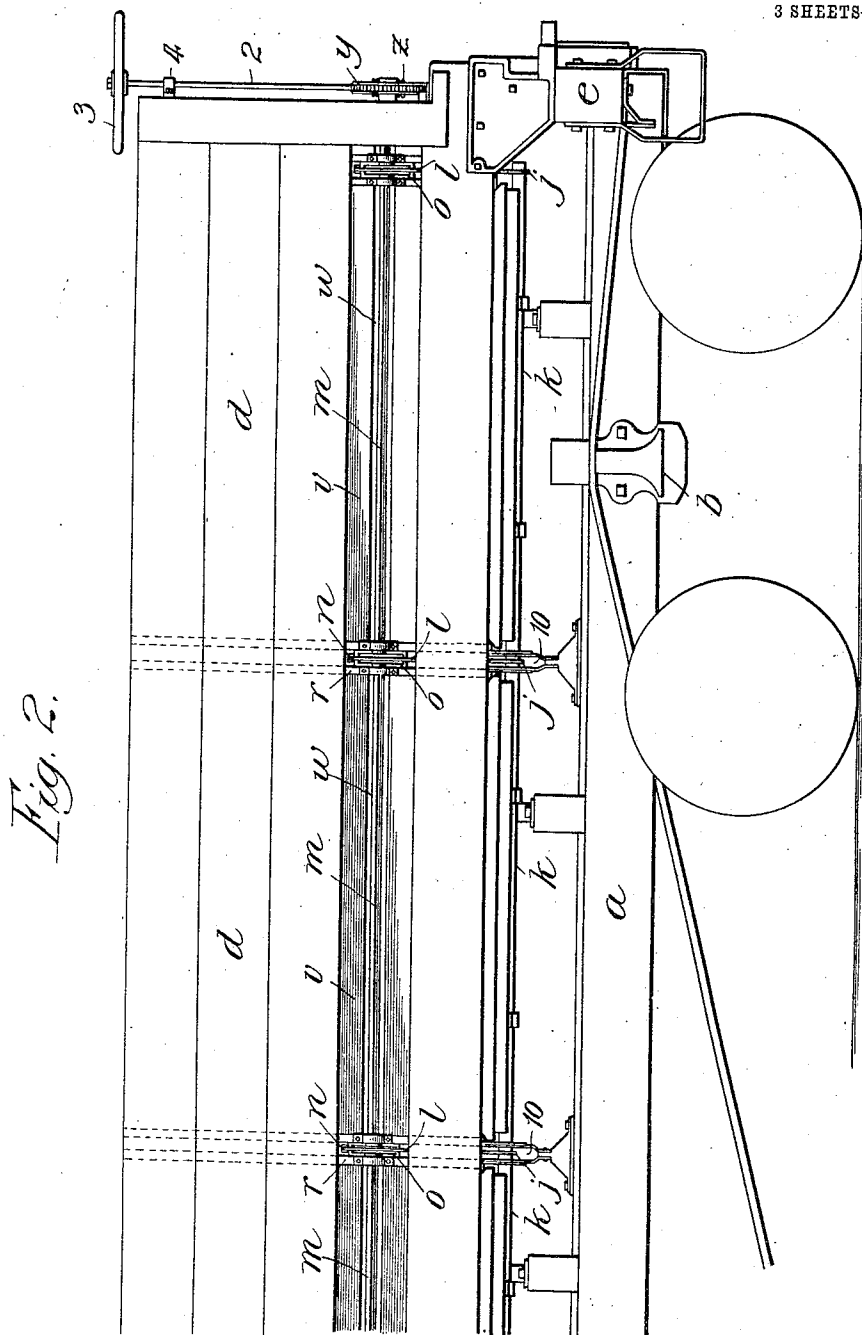


Fig. 2.

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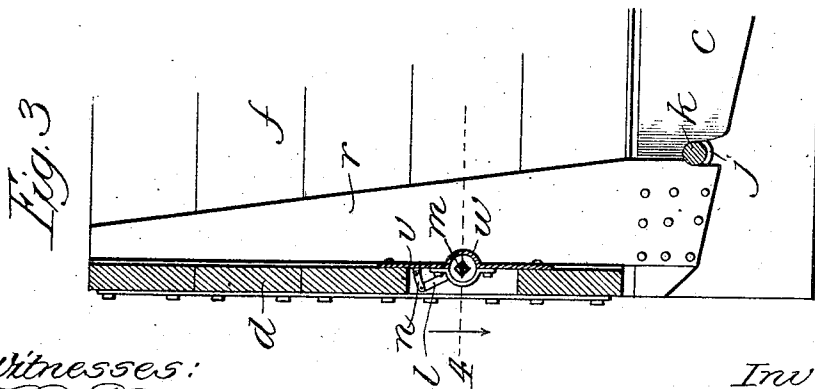
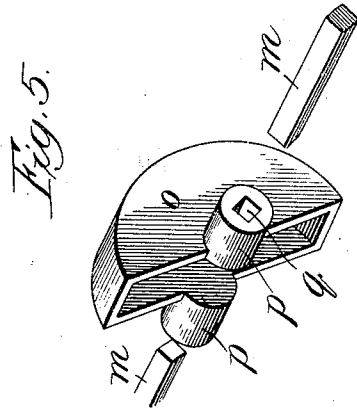
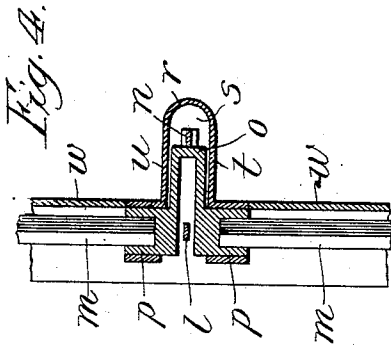
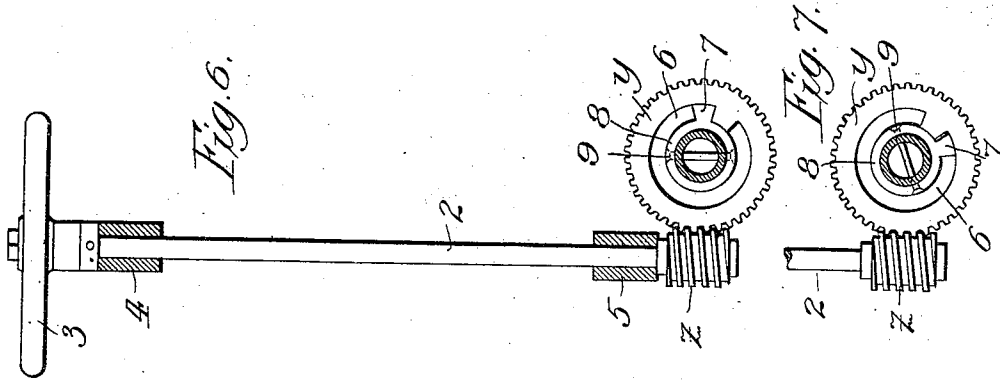
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

SPENCER OTIS, OF CHICAGO, ILLINOIS.

DUMP-CAR.

No. 816,498.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed November 23, 1904. Serial No. 234,043.

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 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 and provided with main operating-shafts having suitable mechanisms connected therewith for operating the doors.

It relates particularly to the means for operating the doors and supporting them in their open and closed positions.

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

A further object is to provide in a car having main operating-shafts and dumping-doors suitable means adapted to be operated by such shafts for opening and closing the doors and supporting them in open or closed position.

A further object is to provide suitable means for operating the main operating-shafts adapted to release such shafts and permit the doors to swing open and the shafts to rotate without subjecting the mechanism for operating the shafts to unnecessary stress and strains.

A further object is to provide door-operating mechanisms properly housed so as to prevent the contents of the car from coming in contact therewith.

A further object is to provide in a car having dumping-doors and swinging supporting-shafts extending beneath such doors suitable means for operating the doors adapted to suspend such supporting-shafts so as to permit them to swing with the doors and serving to support the swinging shafts and thereby the doors in open and closed position.

A further object is to provide side stakes with hollow spaces therein for housing the door-operating mechanism arranged to operate in or extend into such spaces and to provide suitable side frame portions adapted to permit the main operating-shafts to be embedded or housed therein.

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 hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a transverse sectional elevation of a car provided with my improvements, showing one of the doors in open position and the other in closed position and the respective door-operating door mechanisms in corresponding positions; Fig. 2, a side elevation of a portion of a car provided with my improvements; Fig. 3, a cross-sectional elevation of a portion of a car, showing the manner of attaching the side stakes to the transverse beams and showing the main operating-shaft embedded or housed in the side frame; Fig. 4, a detail showing a sectional view of one of the stakes and the manner of housing the segmental or eccentric semicircular drum therein and also showing the bearings for the main operating-shaft and the manner of connecting the sections of the main operating-shafts; Fig. 5, a detail perspective view of one of the segmental or eccentric semicircular drums, showing the studs for forming the bearings of the main operating-shaft and the manner of connecting the separate sections of the shaft, the ends of the shaft-sections being removed from the sockets for the purpose of illustration; Fig. 6, a detail view in elevation of the worm, worm-wheel, and clutch mechanism for operating the main operating-shafts; and Fig. 7, a similar view of the mechanism shown in Fig. 6, showing the worm-wheel in releasing position with relation to the stud of the main operating-shaft, so as to permit the doors to swing open, the hand-wheel being broken away.

In constructing a dump-car and mechanism for operating and supporting the dumping-doors thereof in accordance with my improvements I provide suitable longitudinal sills *a*, mounted in and supported by suitable body-bolsters *b* and having transverse beams *c* mounted thereon and supporting side frames *d*. Suitable end sills *e* and end frames *f* are also provided, which may be of any ordinary and well-known construction, and the framework thus formed is mounted upon running-gears in any ordinary and well-known manner.

Dumping-doors *g* are pivotally mounted in the framework of the car upon shafts *h* by means of hinges *i*, which are formed of metallic straps extending across the under side of the doors and forming socket portions *j*, in which are mounted suitable swinging door-supporting bars or shafts *k*, which extend longitudinally of the car beneath the doors

and swing with such doors. They support the swinging sides of the dumping-doors in both open and closed position. These swinging supporting-shafts *k* are suspended upon links *l*, and these links are in turn connected with and suspended from main operating-shafts *m* by means of chains *n* and substantially semicircular or eccentric segmental drums *o*, to which the ends of the chains are attached. The rotation of these drums in one direction (the direction of the arrows shown in Fig. 1) will wind up the chain, and thereby close the doors, and their rotation in the opposite direction will permit the doors to open. In order to accomplish this, the chains which support the doors are attached to the drums near, but slightly removed from, the end of the circular portion thereof, so that the turning of the drums in the direction to close the doors will wind the chains around the circular portions of the drums and cause the links to be raised, so that their upper ends extend above the attached ends of the chains, as shown at the left of Fig. 1. The circular portions of the eccentrics or semicircular drums are made to extend less than half-way around the pivotal center of the drum and main operating-shaft, so that the drum is entirely on one side of the axial center of the shaft and eccentric. By this arrangement the links *l* when in their raised position are slightly off center with relation to the axial center of the main operating-shafts in the direction of the chains and circular portions of the drums, so that the weight of the door and the load thereon tends to prevent the unwinding of the shafts and the consequent opening of the doors. The end of the drum swings into engagement with the link *l* when the door is closed and is thus prevented from rotating farther than is desirable. The movement of the drums a slight distance in the direction to release the doors will cause the links to pass to the opposite side of the axial center of the main operating-shafts, so that the weight of the load upon the doors or the weight of the doors will cause them to swing to open position.

In order to permit the supporting-links to thus pass the axial center of the main operating-shafts, the drums are made substantially in the form above indicated and mounted eccentric to the shaft proper, as illustrated in Fig. 5, and are provided with cylindrical studs *p*, which form bearings for the drums and shafts. These studs have square axial perforations *q*, forming sockets for admitting the ends of the sections of the main operating-shafts, which are also made preferably square, so that the drums and shafts upon which they are mounted are in fixed relation to each other. In order to use one-piece main operating-shafts, it would be necessary to indent or bend them out at the points corresponding to the position of the drums in order to allow

the door-supporting links *l* to pass the center of such shafts.

Side stakes *r* are made hollow, as shown in Fig. 4, so as to provide an inner space *s* between the side walls *t* and *u* of such stakes for admitting the drums, with their chain and link mechanism, as shown in Figs. 1 and 4. The side walls of these stakes extend downward beyond the floor-level, or the level of the dumping-doors when in closed position, in the form of flanges and are riveted to or firmly connected in any desired manner with the transverse beams, so as to form together with such beams a rigid portion of the supporting-framework. The side flanges of the transverse beams are spread apart at each end of such beams, so as to provide a space *10*, through which the door-operating chain and link mechanisms extend. The side frames of the car are each provided with panels *v*, which may be in the form of metallic plates extending between the side stakes throughout the entire length of the car and forming a part of the side frames, such panels or plates being curved inward, as at *w*, for the purpose of permitting the main operating-shafts to be embedded in or housed within the side frames, as illustrated in Fig. 3. This effectually separates the main operating-shafts from the contents of the car and at the same time enables them to be so mounted that they do not extend outward beyond the outside surface of the side frames or side boards. By this arrangement the drums and chain and link mechanisms are housed within the hollow side stakes, side frames, and transverse beams, and the main operating-shafts are also housed within the side frames, and all are separated effectually from the contents of the car when in use.

In order to provide suitable means for operating the main operating-shafts, and thereby the dumping-doors, I provide for each operating-shaft a worm-wheel *y*, which meshes with the teeth of a worm *z*, mounted upon a vertical worm-shaft *2*, having a hand-wheel *3*, such worm-shaft being mounted at the end of the car in suitable bearings *4* and *5*. The worm-wheel *y* is mounted in movable relation to the main operating-shaft and is provided with a segmental circular slot *6*, into which a stud *7* extends, such stud being mounted upon the end of the main operating-shaft in fixed relation thereto and connected to such shaft by means of a ring portion *8* and a suitable pin *9*. By this arrangement a sufficient amount of play is permitted between the worm-wheel and the stud *7*, or, in other words, between the worm-wheel and the main operating-shaft, so that the worm-wheel may be rotated in one direction to wind the chain upon the circular portion of the drum and raise the link, and thereby the door to closed position, and such worm-wheel afterward turned in the direction necessary to release the door until

the opposite end of the slot engages the stud 7 before the door will be released. A further movement of the worm-wheel in releasing direction after it engages the stud will cause the link *l* to pass to the opposite side of the axial center of the main operating-shaft, thus releasing the door and permitting it to swing to open position. The swinging of the door to open position is thus accomplished after the worm-wheel has first been turned as far as possible in the direction to release the door and permit the stud 7 to rotate freely in the slot and is accomplished in such a manner as to relieve the worm-wheel and worm mechanism of all unnecessary stress and strains which might otherwise result from the weight of the load and door being upon the worm and worm-wheel during the opening of the door.

It should be noted that the door-supporting shafts *k* swing with the door and are both suspended from the main operating-shafts *m* without other support and that the doors in both their open and closed positions are supported upon such swinging shafts and upon such main operating-shafts by means of the links *l* and the chains *n*, which operate the doors, thus dispensing with the use of any other means or elements for supporting the swinging sides of the doors.

I claim—

1. In a dump-car, the combination of a car-frame, side frames provided with hollow side stakes, dumping-doors mounted in the car-frame, door-operating shafts mounted on opposite sides of the car parallel with the side frames each having eccentric drums mounted thereon in the hollow side stakes, and a flexible element attached to each of such eccentric drums and connected with the doors for operating and supporting such doors, substantially as described.

2. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a door-operating shaft mounted in the car-frame extending longitudinally along the side thereof and having an eccentric drum substantially circular upon the side farthest from the axial center of the shaft and relatively flat upon the side nearest the axial center thereof, chain mechanism attached to such eccentric member adapted to be mounted thereon and connected with the door, and means for operating such shaft, substantially as described.

3. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a door-supporting shaft extending beneath such door and movable therewith, a flexible element upon which such shaft is suspended, and means for operating and supporting such flexible element and thereby the door-supporting shaft and door, substantially as described.

4. In a dump-car, the combination of a car-frame, a dumping-door mounted therein,

a door-supporting shaft extending beneath such door and movable therewith, a flexible element upon which such shaft is suspended, and main-operating-shaft mechanism to which such flexible element is connected for operating and supporting such flexible element and thereby the door-supporting shaft and door, substantially as described.

5. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a shaft extending beneath such door and movable therewith, a flexible element upon which such shaft is suspended, a main operating-shaft with which such flexible element is connected for operating and supporting such flexible element and thereby the door, and means for operating such main operating-shaft and thereby raising and lowering the swinging shaft and door, substantially as described.

6. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a shaft extending beneath such door and movable therewith, a flexible element upon which such shaft is suspended, a main operating-shaft mounted in the car-frame and having an eccentric member, a flexible element attached to such eccentric member and connected with the swinging shaft and thereby with the door, and means for operating such main operating-shaft and thereby the door, substantially as described.

7. In a dump-car, the combination of a car-frame provided with transverse beams having a space between the sides thereof for admitting mechanism for operating the dumping-doors, side stakes connected with such transverse beams provided with a space therein for admitting mechanism for operating the dumping-doors, a plurality of dumping-doors pivotally mounted in such car-frame, main operating-shafts mounted upon the side frames, and mechanism mounted in the hollow portion of the side stakes connected with such main operating-shaft and dumping-doors and extending through the space formed between the side portions of the transverse beams for operating and supporting the doors, substantially as described.

8. In a dump-car, the combination of a plurality of dumping-doors, a supporting-framework in which such doors are pivotally mounted provided with side frames and hollow side stakes, main operating-shafts rotatably mounted in such side frames, and mechanism connected with such shafts and dumping-doors and arranged inside the hollow side stakes for operating and supporting such doors, substantially as described.

9. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a door-supporting shaft extending beneath such door and movable therewith, a flexible element upon which such shaft is suspended, main-operating-shaft mechanism to which

- such flexible element is connected for operating and supporting such flexible element and thereby the door-supporting shaft and door, gear mechanism for operating such main operating-shaft, and means for connecting such gear mechanism operatively with the operating-shaft and releasing it therefrom to permit the doors to swing to open position, substantially as described.
- 10 10. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a door-operating shaft mounted in the car-frame and having an eccentric member rotatable therewith, a flexible element attached to such eccentric member and connected with the door for operating such door, a worm-wheel mounted upon such main operating-shaft in movable relation thereto, clutch mechanism for operatively connecting such worm-wheel with the main operating-shaft and disconnecting it therefrom to permit the rotation of the shaft while the worm-wheel is stationary, and means for operating such worm-wheel, substantially as described.
- 15 11. In a dump-car, the combination of a car-frame, a dumping-door mounted therein, a door-supporting shaft extending beneath such door and movable therewith, a flexible element upon which such shaft is suspended, main-operating-shaft mechanism to which such flexible element is connected for operating and supporting such flexible element and thereby the door-supporting shaft and door, a worm-wheel mounted upon such main operating-shaft in movable relation thereto, clutch mechanism for operatively connecting such worm-wheel with the main operating-shaft and disconnecting it therefrom to permit the rotation of the shaft while the worm-wheel is stationary, and means for operating such worm-wheel, substantially as described.
- 20 12. In a dump-car, the combination of a car-frame provided with hollow side stakes, dumping-door mechanism pivotally mounted in such frame, main-operating-shaft mechanism for operating the dumping-door mechanism, and door-operating mechanism mounted inside the hollow side stakes and connected with the main-operating-shaft mechanism and dumping-door mechanism, substantially as described.
- 25 13. In a dump-car, the combination of a supporting-framework, dumping-doors pivotally mounted therein, side frames provided with panels hollowed out for admitting door-operating shafts between the outside and inside surfaces of such side frames, door-operating shafts mounted between the outside and inside surfaces of the side frames, and means for connecting such door-operating shafts with the doors, substantially as described.

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