D. S. BARROWS.

OPERATING DEVICE FOR DUMPING DOORS.

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1,066,571. Patented July 8, 1913.

Fig. 2

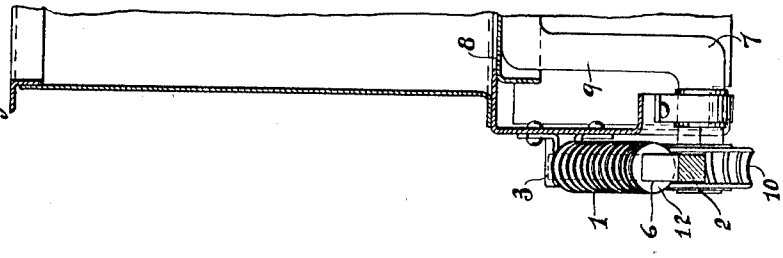

Fig. 1

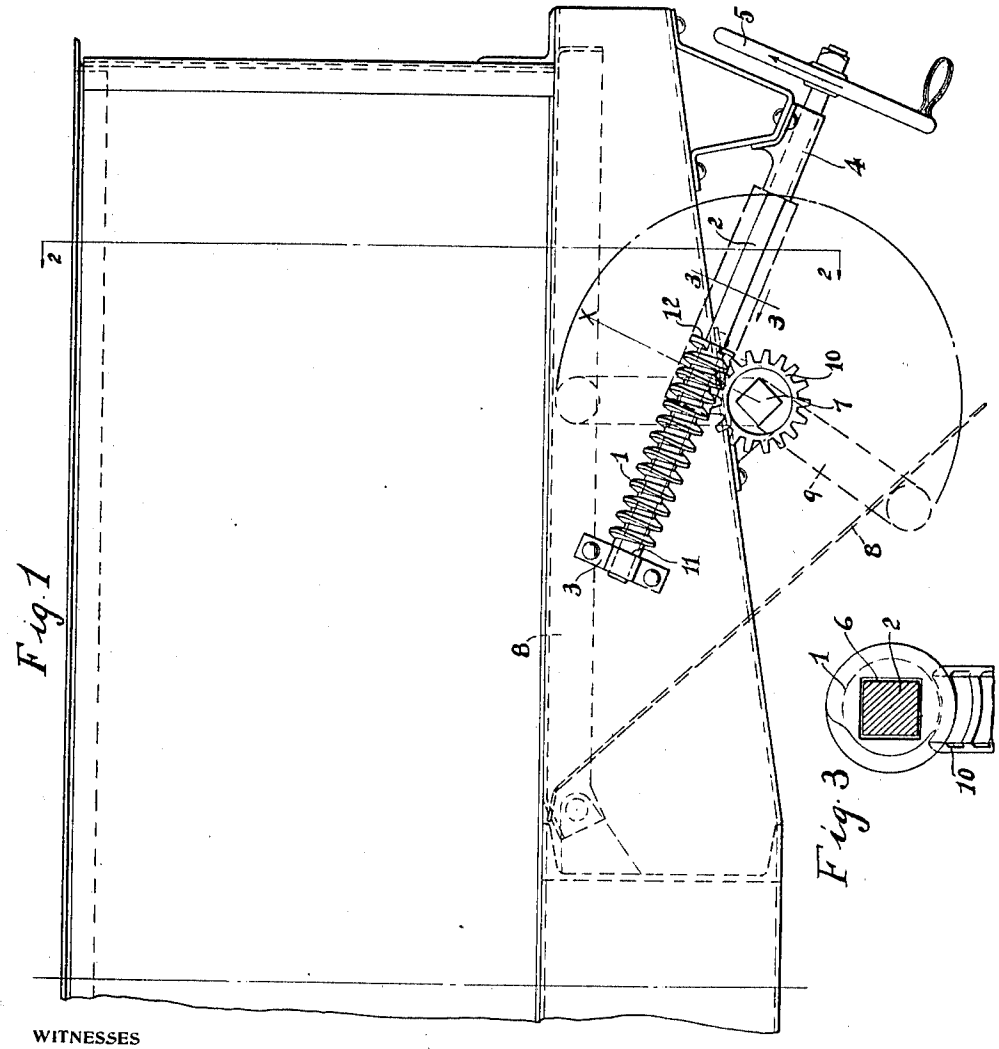

Fig. 3

WITNESSES

K. H. Martin

L. Crawford Handy

INVENTOR

Donald S. Barrows

BY

F. H. Gibbs

ATTORNEY

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C

UNITED STATES PATENT OFFICE.

DONALD S. BARROWS, OF PATERSON, NEW JERSEY, ASSIGNOR TO AMERICAN CAR AND FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

OPERATING DEVICE FOR DUMPING-DOORS.

1,066,571. Specification of Letters Patent. Patented July 8, 1913.

Application filed July 6, 1911. Serial No. 637,202.

To all whom it may concern:

Be it known that I, DONALD S. BARROWS, residing at Paterson, Passaic county, New Jersey, and being a citizen of the United States, have invented certain new and useful Improvements in Operating Devices for Dumping-Doors, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a view of approximately one-half of the end of a dumping car, showing the invention applied thereto. Fig. 2 is a transverse vertical sectional view taken on the plane of line 2—2 Fig. 1, and Fig. 3 is a detail sectional view taken on the plane of line 3—3 of Fig. 1.

In the operation of drop doors for dumping cars, it is desirable in opening the doors, that said doors be free to drop by gravity to their fully opened position as soon as the locking mechanism is released without the necessity for continuous manual operation.

The object of this invention is to provide, in combination with any form of door operating device wherein is employed a rotating shaft provided with door operating and door locking elements, means for positively rotating said shaft and thereby actuating said operating and locking means, and for positively releasing said locking means and leaving the door or doors free to fall when the locking device or devices have been moved into unlocked position.

With these and other objects in view the invention comprises a worm 1, slidably mounted upon a worm shaft 2, which is journaled in suitable supports 3 and 4 fixed to the end of the car body. An operating hand wheel 5 is fitted upon the worm shaft 2 for rotating said shaft. The worm 1 is connected to the shaft 2 in such manner as to be non-rotatable thereon as by having said shaft squared between the supports 3 and 4 and fitting into a squared axial opening 6 through the worm.

The space between the supports 3 and 4 is considerably greater than the length of the worm 1 and said worm is of such length that its teeth will remain in mesh with the teeth of the gear 10 whether its end 11 is in engagement with the support 3, as shown by full lines in Fig. 1, or its end 12 is in engagement with the support 4 as shown by dotted lines in said figure and the sliding movement of the worm along the shaft 2 is sufficient to accommodate unobstructed rotation of the gear 10 through slightly more than one-half a complete revolution.

While I have illustrated the operating shaft 7 for the doors 8 as comprising radially projecting arms 9 adapted to engage under surfaces of said doors, it will be understood that said operating shaft may be formed or positioned in any manner within the terms of the description hereinbefore set forth. Fitted to the end of the operating shaft 7 is a gear 10, the teeth of which are in constant engagement with the teeth of the worm 1.

The operation of the device is as follows: Assuming the door to be closed, and the worm 1 to be in the position indicated by dotted lines in Fig. 1 and it is desired to open the door: Rotation of the end hand wheel 5, in the direction indicated by the arrow on said wheel, will cause the worm to move along the shaft 2 into the position shown by full lines through its engagement with the gear 10, whereupon continued rotation of the hand wheel will cause rotation of the gear wheel 10 and will rock the operating shaft 7 in a clockwise direction, the end 11 of the worm 1 standing in engagement with the inner surface of the bearing support 3. The support 3 will sustain a thrust from the worm 1 until the operating shaft has been turned sufficiently to release the door locking means, which in the construction illustrated, will be until the outer

end of the radial arm 9 is moved along the under surface of the door, to a point where the weight of the door, with its lading, is great enough to overcome the friction and other elements tending to prevent rotation of the operating shaft, which point will be reached when the end of the operating shaft has assumed approximately the position marked X on Fig. 1 of the drawing, whereupon the weight of the door with its lading will force the end of the arm 9 downwardly, rotating the shaft 7 and gear 10 without rotation of the worm shaft 2, the worm 1 during this movement of the door sliding longitudinally along the shaft 2 until said door is fully opened or until the lower end of the worm contacts with the support 4. To close the door the operation is as follows: The end 12 of the worm 1 being in engagement with the stop 4, rotation of the hand wheel 5 in the direction opposite to that indicated by the arrow on said wheel will cause the gear 10, and thereby the operating shaft 7, with the crank arm 9, to rotate in a contra-clockwise direction and lift and lock the door positively in its closed position. Tendency to unlock is resisted by continued engagement of the end of the worm with the support 4 until the hand wheel is rotated as described for opening the door.

It is evident that the worm may be connected with any transverse member of the car underframe and operate in the manner described, and in cases where the drop doors do not extend substantially throughout the length of the floor such arrangement would probably be preferred as thereby shorter shafts 7 may be used.

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

1. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, and independently mounted slidable and rotatable means for unlocking said doors, said unlocking means being adapted to permit movement of said doors from unlocked position to opened position and not to be rotated during such movement of the doors.

2. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, and independently mounted rotatable means for unlocking said doors, said unlocking means being adapted to be moved bodily by said doors after said doors are unlocked and without rotation of said unlocking means.

3. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, fixed bearings, a shaft journaled in said bearings and rotatable means mounted on said shaft for unlocking said doors, said doors being adapted to move from unlocked position to open position by a sliding movement of said unlocking means.

4. A mechanism for operating dumping doors, comprising a crank shaft rotatable in fixed bearings for actuating said doors, a pinion on said shaft, and a slidable worm coöperating with said pinion.

5. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, a rotatable shaft, means slidably mounted on said shaft for unlocking said doors, said doors being adapted to move from unlocked position to open position without rotation of said shaft.

6. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, a rotatable shaft, means slidably mounted upon said shaft adapted for unlocking said doors, said doors being adapted to move from unlocked position to opened position and to slide said unlocking means along said shaft without rotating said shaft.

7. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, an operating shaft for said supporting means, a worm gear on said operating shaft, means engaging said worm gear adapted to operate said shaft to unlock said doors and adapted to be moved freely by said worm gear after said doors are unlocked.

8. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, an operating shaft for said supporting means, a gear fixedly secured to said shaft and means rotatable permanently in mesh with said gear and adapted to unlock said doors, said unlocking means being adapted to permit movement of said doors from unlocked position to opened position and not to be rotated during such movement of the doors.

9. A mechanism for operating dumping doors comprising, means for supporting said doors in locked position, a rotatable shaft for said supporting means, and independently supported means operatively connected with the shaft for rotating said shaft to unlock said doors, said last mentioned means being adapted to be moved freely bodily by said shaft after the doors are unlocked.

10. In an operating mechanism for dumping doors, the combination comprising a support, a rotatable operating shaft fixed relative to the support, and means adapted to rotate said shaft in one direction, said means being adapted to be moved longitudinally of said shaft when said shaft is rotated in the opposite direction.

11. In an operating mechanism for dumping doors, the combination comprising a

door, a rotatable door supporting shaft journaled in fixed position, a gear fixed to said shaft, a rotatable longitudinally slidable worm engaging said gear for rotating said shaft to raise said door and to permit rotation of said shaft in a reverse direction when the door is dropping into an open position without rotating said worm.

12. In an operating mechanism for dumping doors, the combination comprising a freely falling door, a door supporting crank including a rotatable operating shaft, a gear fixed to said shaft, a slidably supported rotatable worm engaging said gear for rotating said shaft in one direction to raise said door, a support for said worm, said gear being adapted to slide said worm along its support when said shaft is rotated in a reverse direction by the door in its opening movement without rotating said worm.

13. In an operating mechanism for dumping doors, the combination comprising a door, a door actuating swinging crank shaft journaled in fixed bearings, a gear fixed to said shaft, and a slidable worm in constant engagement with said gear.

14. The combination with a carbody and a door pivoted thereto, of a dumping mechanism for the door, including a longitudinally slidable worm having a fixed axis of rotation relative to the carbody, and co-acting means operatively connected therewith adapted to lock the door in closed position.

15. A mechanism for operating dumping doors comprising a crank shaft for supporting said doors in locked position, and independently mounted rotatable means comprising a worm for actuating said shaft, said means being adapted to permit movement of said doors from unlocked position to open position without rotation of said worm during such movement of the doors.

16. A mechanism for operating dumping doors and comprising, means for supporting said doors in locked position, and independently mounted rotatable means for unlocking said doors, said unlocking means being adapted to be moved bodily by said doors after said doors are unlocked without rotation of said unlocking means.

17. A mechanism for operating dumping doors comprising a crank shaft for supporting said doors in locked position, a pinion on said shaft, a worm in engagement therewith adapted to unlock said doors, said worm being adapted to permit movement of said doors from unlocked position to opened position without rotation of the worm during such movement.

18. A mechanism for operating dumping doors, comprising a door, a crank shaft supporting a door, means positively engaging said shaft to rotate the same into a position to close said door, said means including permanently engaging worm and pinion permitting said shaft to rotate freely from said locking position without rotation of said worm.

19. In a device of the character described the combination of a door, free to drop from an unlocked position two rotatably mounted shafts one of said shafts having a door locking part extending therefrom, a worm and gear connection between said shafts, said worm being slidably mounted on one of said shafts to permit the free rotation of the other shaft when the door is dropping.

20. In a door closing device, the combination of a door, a crank shaft, a worm shaft, a worm slidably mounted on said worm shaft, and a gear mounted on said crank shaft in fixed position continuously engaging said worm.

21. In a car, an underframe, a fixed bracket carried by said underframe, a transverse shaft mounted in said bracket, a worm slidably mounted on and rotated by said shaft, a door supporting mechanism having a gear fixed thereto and permanently in mesh with said worm.

22. In a hoisting device, a shaft freely rotatable in fixed bearing, means rotatably mounted in fixed position permanently and continuously engaging said shaft for rotating the same in either direction, said means including mechanisms permitting the free rotary movement of said shaft without rotating said means.

23. In a door lifting device the combination of a door, a shaft non-circular in cross section, a worm slidably mounted on said shaft, a door lifting mechanism including a gear rotatably mounted in fixed position and engaging said worm, whereby rotating said shaft will actuate said gear and the rotation of said gear will slide said worm along said shaft.

24. In a device of the character described, a fixed bearing, a rotating shaft mounted in said bearing, door raising mechanism actuated by said shaft, and means disposed transversely of said shaft for rotating the same, said means slidably mounted relative to said rotating shaft, whereby said shaft may be actuated by a rotary movement of said means.

25. In a device of the character described, a door actuating mechanism including a rotatably mounted member, fixed bearings carrying said member a rotating member adapted to move said first mentioned member, and a permanent connection between said members, said connection including a sliding mechanism adapted to transform rotary movement of said first mentioned member into a longitudinal movement.

26. In a door operating device, a shaft rotatable in fixed bearing, and a worm on

said shaft capable of rotary and longitudinal movement with movement of the door.

27. In a door actuating device, the combination of a door, a crank shaft rotatable in fixed supports bearing on said door, a pinion on said shaft, a worm shaft, a worm slidable on said shaft and in constant engagement with said pinion.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

DONALD S. BARROWS.

Witnesses:
G. V. WASHINGTON,
A. KASSLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."