J. T. GEOGHEGAN.

CAR DOOR OPERATING MECHANISM.

APPLICATION FILED MAR. 7, 1922.

1,432,240.

Patented Oct. 17, 1922.

2 SHEETS—SHEET 1.

Fig. 2.

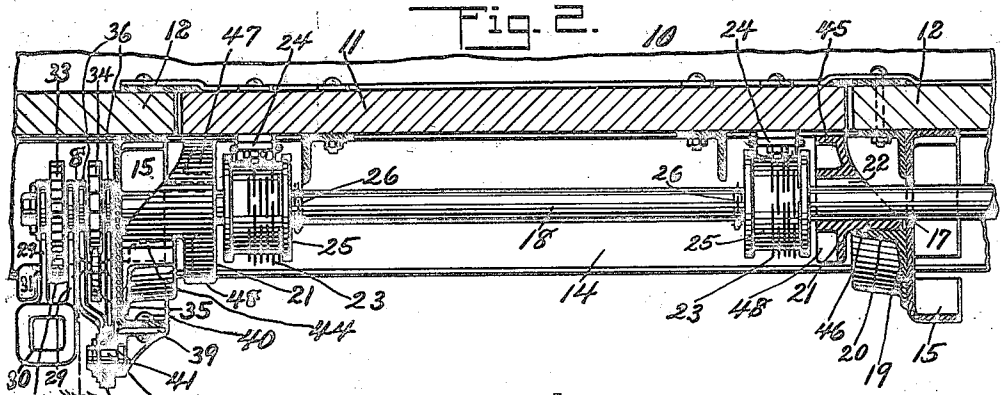
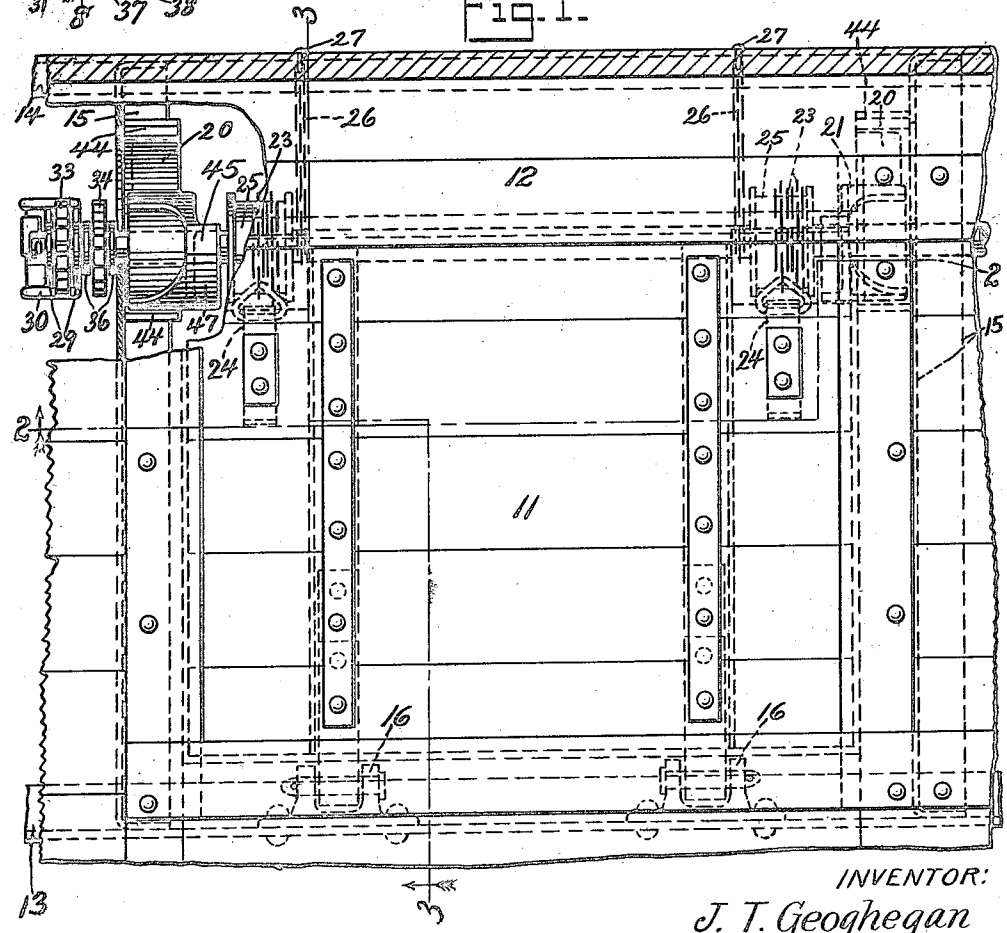


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

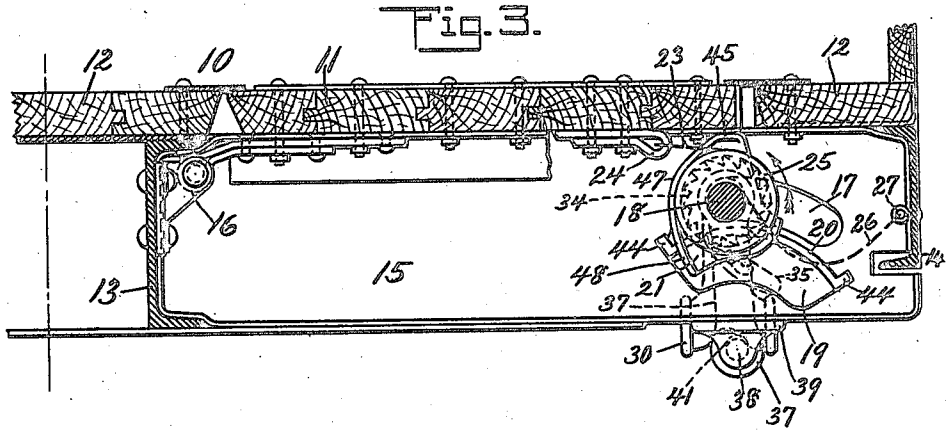


Fig. 4.

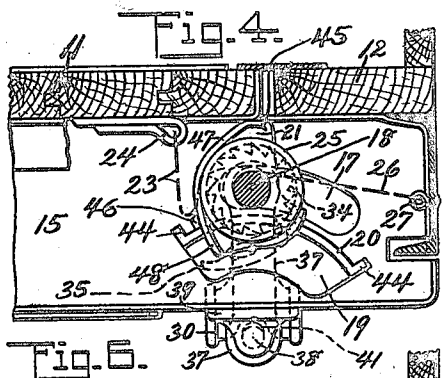


Fig. 5.

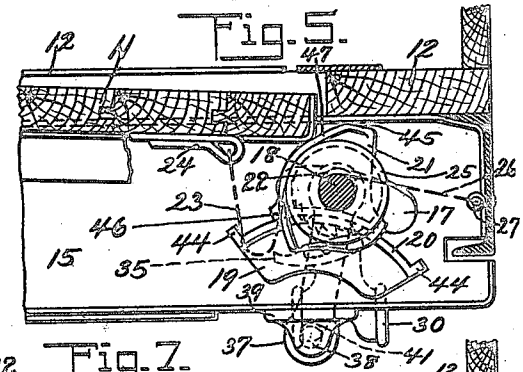


Fig. 6.

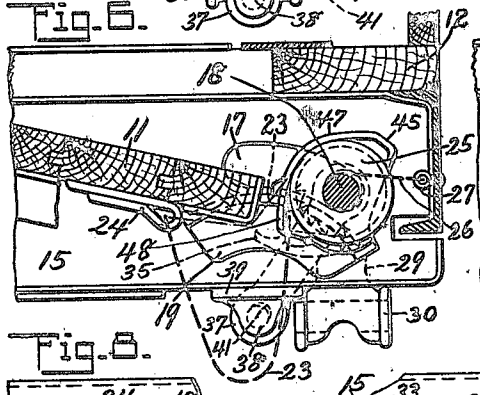


Fig. 7.

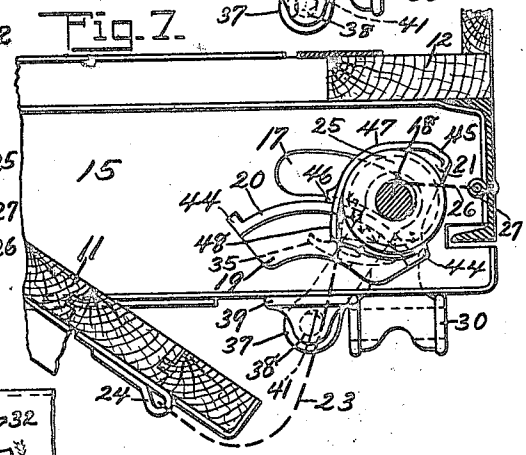
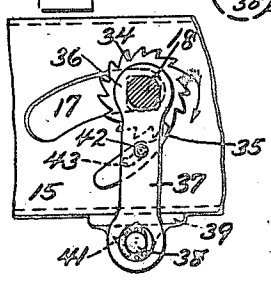


Fig. 8.



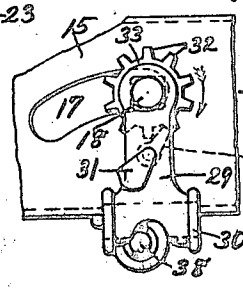


Fig. 9.

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UNITED STATES PATENT OFFICE.

JOHN TREVOR GEOGHEGAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN CAR AND FOUNDRY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CAR-DOOR-OPERATING MECHANISM.

Application filed March 7, 1922. Serial No. 541,816.

To all whom it may concern:

Be it known that I, JOHN TREVOR GEOGHEGAN, residing at Chicago, county of Cook, State of Illinois, and being a citizen of the United States, have invented certain new and useful Improvements in a Car-Door-Operating Mechanism, 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 within the scope of the claims will occur to persons skilled in the art.

In said drawings:

Fig. 1 is a plan view of a portion of a dumping car showing one of a series of doors equipped with a novel door operating and supporting device;

Fig. 2 is a vertical section through the car taken on line 2—2 of Fig. 1 looking in the direction indicated by the arrow;

Fig. 3 is a similar view taken on line 3—3 of Fig. 1 looking in the direction indicated by the arrow;

Figs. 4, 5, 6 and 7, illustrate the various positions assumed by the drop door and operating mechanism at different stages of door opening movement;

Fig. 8 is a vertical section through the door operating mechanism taken on line 8—8 of Fig. 2 showing ratchet and pawl mechanism for locking the door raising shaft against rotation in the opposite direction; and

Fig. 9 is an end elevational view showing the shaft operating mechanism at the end of the shaft.

My invention relates to dumping cars having a series of drop doors forming part of the car floor and arranged for operation in groups, the doors of each group being operable simultaneously.

The principal object of my invention is to provide a mechanism for raising, releasing, and supporting the drop doors in the floors of railway dumping cars.

A further object is to provide an operating mechanism for drop doors of a railway car designed to transmit the weight of the lading on the doors from said doors directly to the car underframe.

In the drawings, 10 represents a railway dumping car of the general service type having a plurality of drop doors 11 forming part of the floor 12. The car floor is supported upon an underframe comprising longitudinally arranged central and side members 13 and 14, respectively, and transversely arranged framing members 15.

The drop doors 11 are arranged in the openings between the underframe members and hinged at 16 to the central longitudinal members 13 with their free edges supported at the car sides 14 by mechanism to be hereinafter described. The doors drop downwardly and discharge their lading outwardly.

The door operating mechanism is supported in the ends of the transverse framing members 15 provided with extended openings or slots 17 preferably curved as shown and designed to receive an operating shaft 18 extending through a number of such openings adjacent the free edges of a plurality of doors. Secured to the ends of the framing members 15 below the slots 17 and underlying operating shafts 18 are brackets 19 having shelf portions 20 to provide a support and track for the movable door-supporting-and-shaft-carrying blocks 21. The blocks 21 are adapted to slide upon said brackets 19 under the influence of shafts 18 rotatably mounted within the blocks.

As shown at the right of Fig. 2, the shaft openings 22 in the blocks 21 are elongated vertically above the shaft 18 to provide sufficient clearance to avoid binding and possible distortion of the shaft on account of the variations in alinement of the ends of the transverse members 15 of the underframe when under load. The blocks are positioned at the free corners of the several doors and are held from movement longitudinally of the operating shaft in any suitable manner. The brackets 19 are shown with their shelf portions curved for a purpose to be hereinafter described but it is quite conceivable that in certain applications of the invention plane faced or straight shelved brackets

could be employed without disturbing the functions of the related parts.

The doors are raised and lowered by means of chains 23 attached at their ends respectively to the brackets 24 on the underside of the doors and to winding drums 25 of suitable diameter fixed to the operating shafts 18. The chains 23 also function to draw the door supporting blocks 21 towards the doors upon rotation of chain winding drums 25. To move the blocks 21 away from the doors to release them, other chains 26 are employed. These chains 26 are attached at their ends respectively to operating shaft 18 and to a fixed part of the car body as at 27 to the side longitudinal member 14. During the various stages of door lowering and releasing movements, chains 26 are taut and chains 23 are slack, so conversely, during the door raising and locking movements the chains 26 are slack while chains 23 become taut.

The shaft is rotated and bodily moved and locked against such movement and rotation by means of the mechanism illustrated in Figs. 1, 2, 8, and 9. The mechanism includes the vibrating operating lever 29 idly mounted upon the shaft 18 and provided with a socket 30 to receive a temporary operating bar. The operating lever 29 carries a reversible gravity pawl 31 mounted to engage one side or the other of the teeth 32 on a two-way ratchet wheel 33 fixed to the shaft 18 for initiating movement of the shaft in either direction. For locking the shaft against movement in a direction designed to effect the release of the doors, the shaft is also provided with a fixed one-way ratchet wheel 34 adapted to engage a releasable locking pawl 35 pivotally mounted between jaws 36 of an arm 37 hung upon the shaft.

The arm 37 is fulcrumed on an adjacent transverse framing member of the car and held from vibration by pin 38 formed preferably with a bracket portion 39 for securing same to the car frame by rivets 40, or in other ways. The opening 41 in arm 37 is elongated in a vertical direction to permit slight variations in the relative distance between centers of operating shaft 18 and fulcrum pin 38. The releasable locking pawl 35 is designed to permit the shifting of the center of gravity thereof from one side of pin 42 supporting the pawl to the opposite side. The shape and length of the pawl are so proportioned to the position and length of slot 43 in the pawl that the pawl will be held by gravity in engagement with the one-way ratchet wheel 34 when the pawl is in the position shown in Fig. 8 and become inoperative when shifted towards the opposite side of its supporting pin 42, whereupon the pawl will assume the unlocked position indicated in dotted lines in Figs. 4 to 7 inclusive.

In the present and preferred embodiment of the invention, the movable door supporting blocks 21 are shaped to travel on brackets 19 having curved shelf portions 20 terminating in block stop lugs 44. The blocks are formed with truncated upper portions providing door supporting seats 45 and curved base portions 46 to conform to the curvature of the bracket shelves 20 to insure proper balance of the blocks upon the bracket shelves 20 throughout their range of movement. The upper and base portions of the blocks are connected by door-engaging cam faces 47 designed to support the doors in raised and relatively closed positions and to wedge the doors to a final closed position as shown in Fig. 3.

The magnitude and direction of the forces on door raising chains 23 are utilized during the initial door raising movement to cause the door supporting blocks 21 to bear upon the curved shelves of brackets 19 with a pressure corresponding substantially to the weight of the door on the chains and delay or retard movement of blocks 21 on the brackets until the free edge of the door is raised to a point above the lower edge of cam faces 47 on the blocks. Thus arranged, the parts will prevent obstruction to upward movement of the door by a premature shifting of the blocks 21 in the path of the door before it reaches a position with its free edge above the lower edge of cam faces 47 on the blocks. To further insure the passage of the door beyond the lower edge of cam faces 47, said faces are extended downwardly below the curved shelves 20 of the brackets 19 as indicated at 48. To avoid possible interference between the free edge of the door and the chain winding drums 25, the cam faces 47 on the blocks 21 are positioned a greater distance from the center of operating shaft 18 than are the peripheries of the drums 25 whereby sufficient clearance between the drums and door edges is maintained.

In operation, assuming the doors to be in their locked closed position as shown in Fig. 3, and it is desired to release them, the shaft 18 with chain drums 25 is rotated in the direction indicated by the arrow until the door-raising-and-locking chains 23 are slack and the releasing chains 26 have become taut. Further rotation of the shaft 18 will cause chains 26 to wind thereon and draw said shaft away from the doors, carrying with it the blocks 21 supporting the shaft and the drums 25 mounted upon the shaft. Continued rotation of the shaft in the same direction will cause further movement of blocks 21 until their door seats 45 are withdrawn from their position under the door when the door will be lowered and ride upon cam faces 47 on the blocks as indicated in Fig. 5 until the blocks have moved

out of the path of the door as shown in Fig. 6 when the door will drop to the full open position indicated in Fig. 7.

During such opening movement the door releasing chains 26 will wind about shaft 18 but the door chains 23 will unwind from the chain drums 25 as the rotating shaft recedes from its door supporting position under the influence of the chains 26 winding on the shaft. By reason of the larger diameter of the chain drums 25 the door chains 23 will unwind from the drums at greater speed than the releasing chains 26 will wind about shaft 18 thus permitting the door to drop relatively faster than the movement laterally of shaft 18. When the blocks 21 have moved out of the path of the door, further manipulation of the shaft by the operator will not be required since the weight of the dropping doors with their lading will be sufficient to cause further rotation and resultant outward movement of the shaft and blocks until said blocks engage the stop lugs 44 on brackets 19 on the underframe whereupon further movement and rotation of the shaft will cease. It will be noted that in their raised positions the doors are supported upon blocks 21 resting upon brackets 19 on the underframe thereby transmitting the weight thereof and that of the lading directly to the car framing until deprived of their support by the outward movement of blocks 21 when the weight of the doors and lading is transferred to the shaft through the medium of the door chains 23 secured to the chain drums 25 on the shaft. The sudden application of the load to the shaft is absorbed by the yielding movement of the shaft controlled by the weight of the load on unwinding door-chains 23 balanced by the pull on door releasing-chains 26.

To raise the doors, a reverse movement in the operation of the mechanism takes place. The gravity pawl 31 is reversed to engage the opposite side of teeth 32 on the two-way ratchet wheel 33 on shaft 18 and the locking pawl 35 shifted to engage the one-way ratchet wheel 34 as shown in Fig. 8. The shaft is rotated in a direction opposite to that indicated by the arrows in Figs. 8 and 9. At the beginning of door raising movement the shaft 18 is at the outermost end of slots 17 as shown in Figs. 6 and 7 and chains 23 are slack. Rotation of shaft 18 will cause no shifting of shaft 18 from its position at the outermost end of slots 17 until the slack in chains 23 is taken up and the door raised to a point opposite cam face extension 48 on blocks 21 as indicated in Fig. 6. With the door raised to this point, the chains 23 will assume the position indicated in light broken lines in Fig. 6. In this position of the door and chains 23, the load stresses in said chains and the direction of pull on the shaft will overcome the inertia of the shaft-carrying mechanism and cause the blocks 21 through the medium of shaft 18 to move upon bracket shelves 20 towards the door until said blocks engage the free edge of the door. As the blocks progress in their movement under the influence of the rotating shaft carried in said blocks, the door will ride upon cam face 47 of the blocks, and its weight transferred from the shaft to the blocks directly to the car underframe and support the door in the relatively closed position shown in Fig. 5, whereupon continued rotation of the shaft will carry the blocks to their final position under the door, wedging the door to its full closed position as shown in Fig. 3.

It will be noted that in the raised position of the doors they are supported by the blocks 21 independently of the shafts 18. As soon as the doors are raised sufficiently to permit the blocks to move into supporting position under the doors, the shafts are relieved of the weight of the doors which at this stage rest upon the blocks, the shafts thereafter functioning only to control the movements of the door supporting blocks as required. By dispensing with the shaft as a load carrying medium, objectionable binding and distortion of the shaft and ensuing operating difficulties are avoided.

What I claim is:

1. In a dumping car having longitudinal and transverse framing members and drop doors between said members, movable door supporting means on said transverse framing members, and door operating shafts supported in and movable with said door supporting means.

2. In a drop door actuating mechanism for cars having drop doors opening towards the car side, door operating shafts extending longitudinally of the car adjacent the free edges of said doors, and movable door supporting means carrying said door operating shafts.

3. In a drop door actuating mechanism for cars having drop doors opening towards the car side, door operating shafts extending longitudinally of the car adjacent the free edges of said doors, movable door supporting means carrying said door operating shafts, and connections between said doors and respective shafts.

4. In a dumping car having longitudinal and transverse framing members, outwardly dumping drop doors closing the openings between said members, door operating shafts adjacent the free edges of said doors, and shaft-and-door-supporting means movably mounted on said transverse framing members.

5. In a car of the class described having a plurality of transverse floor framing members, outwardly dumping drop doors between

said members, door operating shafts adjacent the free edges of said doors, movable shaft-and-door-supporting devices on said members, and means fixed to said members for guiding and supporting said movable shaft-and-door-supporting devices.

6. In a drop door operating mechanism for cars having drop doors opening towards the car side, door operating shafts adjacent the free edges of said doors, and movable door supporting devices for carrying said shafts, said devices being adapted to permit relative vertical movement of said shaft.

7. In a dumping car having a plurality of transverse framing members, drop doors between said members opening towards the car side, door operating mechanism mounted in the ends of said framing members and comprising actuating shafts adjacent the car sides and doors and connected to both, movable shaft-carrying and door-supporting blocks, and fixed brackets on the framing members for guiding and supporting said blocks.

8. In a dumping car of the class described, a plurality of outwardly dumping drop doors mounted between the car framing members, door operating mechanism mounted on the car framing and including a door operating shaft adjacent the free edges of the doors, flexible connections between said doors and shaft and the car framing, and shaft-carrying means on said framing movable by said shaft to support and release said doors.

9. In a dumping car having a plurality of transverse framing members and outwardly dumping drop doors between said members, door actuating mechanism at the ends of said framing members and including a door operating shaft adjacent the free edges of the doors, and shaft-carrying devices on said framing movable by said shaft to support and release said doors.

10. In a dumping car having a plurality of transverse framing members and outwardly dumping drop doors between said members, door operating shafts adjacent the free edges of said doors, and movable door-supporting-and-shaft-carrying devices at the ends of said transverse framing members for supporting the doors independently of said shafts.

11. In a drop door actuating mechanism for cars having drop doors opening towards the car side and including a door operating shaft movably mounted adjacent the free edges of said doors, means movable by the shaft for supporting the doors independently of said shaft, said means being adapted to support said shaft throughout its range of movement.

12. In a dumping car having transverse framing members and drop doors between said members, movable blocks on said framing members adapted to support said doors when raised, and door raising shafts adjacent the free edges of said doors and supported in said blocks, said doors being supported on said blocks indepenently of the shafts.

13. A dumping car having transverse and longitudinal framing members and outwardly dumping drop doors hinged to certain of said longitudinal members and between the transverse members, movable door supporting blocks on the transverse framing members, a door operating shaft adjacent the free edges of the doors and supported in said blocks, and connections between said doors and the shaft and between said shaft and car frame, said connections being adapted to move the blocks upon rotation of said shaft.

14. In a dumping car of the class described having floor framing members and outwardly dumping drop doors between said members, a movable door raising shaft adjacent the free edges of said doors, connections between said shaft and doors and floor framing members, and door supporting blocks on the framing adapted to carry said door raising shaft, said blocks being movable by said connections into and out of door supporting position.

15. In a dumping car having floor framing members and drop doors opening outwardly between said members, door supporting blocks slidably mounted on said framing and adapted for movement into and out of door supporting position when the doors are raised, a door raising shaft rotatably mounted in said blocks, and connections between said door and shaft and floor framing members, said shaft being movable by said connections to and from said doors.

16. In a dumping car having a plurality of transverse framing members, drop doors between said members opening towards the car side, door raising shafts movably mounted adjacent the free edges of the doors and adapted to raise the doors to relatively closed positions, and door supporting blocks slidably mounted on said framing and adapted to carry said door raising shafts, said blocks being movable by said shafts to completely close said doors.

17. In a dumping car having a plurality of transverse framing members, drop doors between said members opening towards the car side, movable shafts adapted to raise the doors to relatively closed positions, and door supporting blocks slidably mounted on said framing and adapted to carry said door raising shafts, said blocks being movable by said shafts to wedge said doors to their final closed position.

18. In a dumping car having a plurality of drop doors supported at their free edges when raised, movable door raising shafts ad-

jacent the car side, shaft carrying blocks slidably mounted on the car framing and movable by the shafts, said blocks being adapted to support the doors independently of said shafts.

19. In a dumping car having a series of drop doors supported at their free edges when raised, a movable door raising shaft adjacent the free edges of said doors, a vibrating shaft-operating arm suspended from one end of said shaft, and a shaft-locking arm supported at one end thereof on said shaft and held against vibration at its opposite end.

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

JOHN TREVOR GEOGHEGAN.

Witnesses:

A. G. Wood,

L. C. Sparks.