H. R. KEITHLEY & E. W. TEST.

DUMP CAR.

APPLICATION FILED JAN. 12, 1918.

1,290,572.

Patented Jan. 7, 1919.

2 SHEETS—SHEET 1.

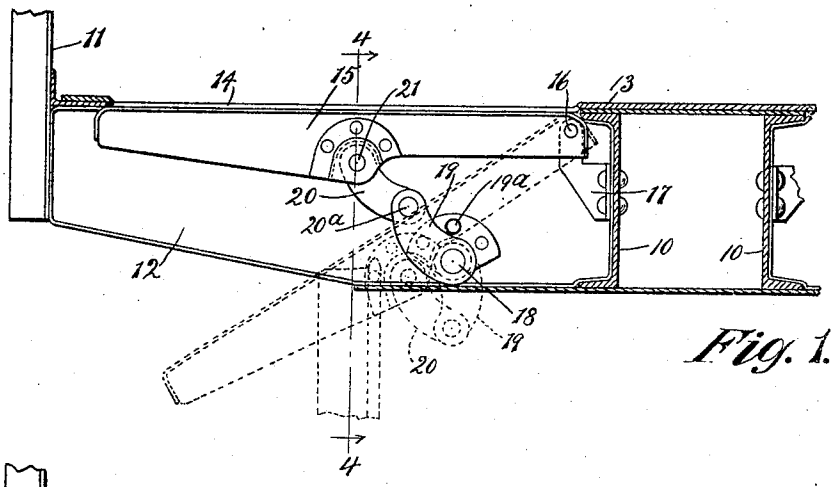


Fig. 1.

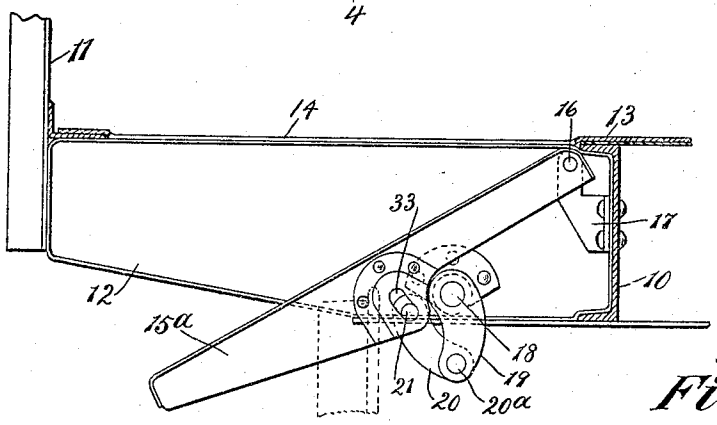


Fig. 2.

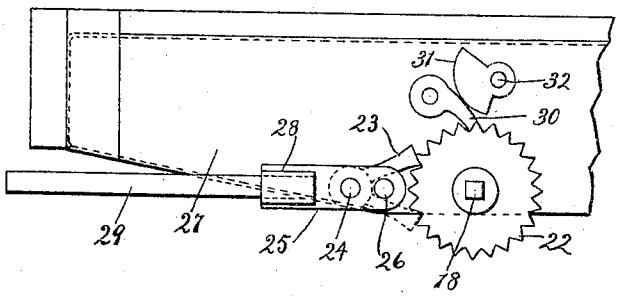


Fig. 3.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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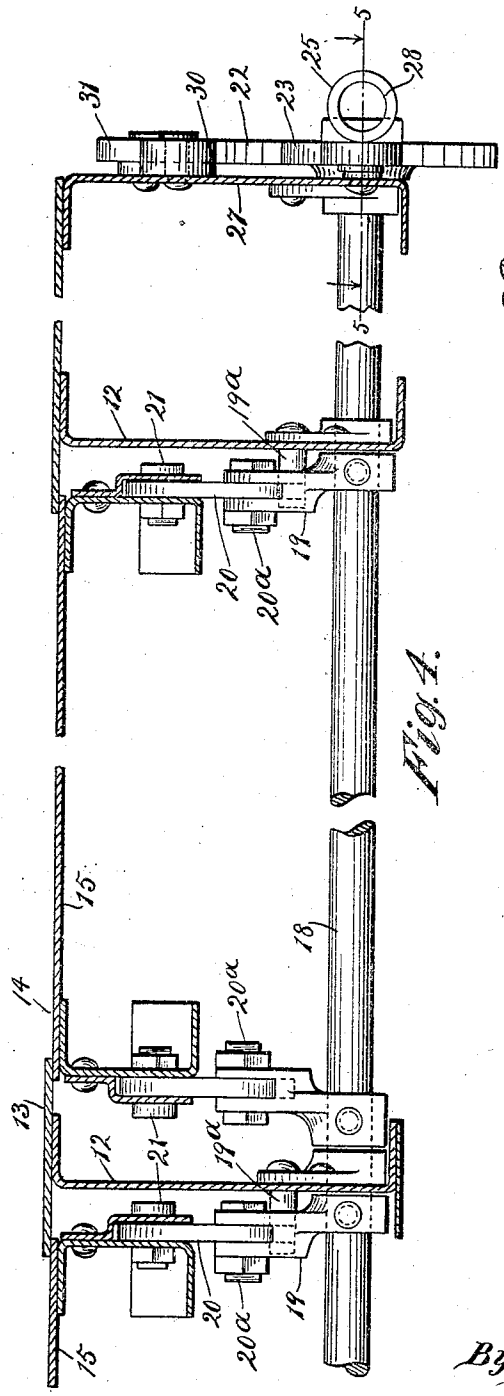


Fig. 4.

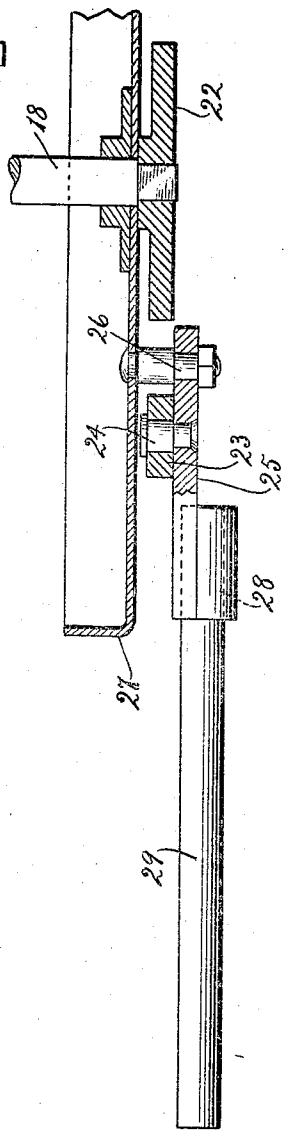


Fig. 5.

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UNITED STATES PATENT OFFICE.

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DUMP-CAR.

1,290,572. Specification of Letters Patent. Patented Jan. 7, 1919.

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To all whom it may concern:

Be it known that we, HERBERT R. KEITHLEY and ELLIS W. TEST, citizens of the United States, and residents of Michigan City, county of Laporte, and State of Indiana, have invented certain new and useful Improvements in Dump-Cars, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

This invention relates to dump cars and is shown and described as applied to a flat bottom car having a series of doors hinged adjacent the center line of the car and opening toward the sides thereof, though applicable to dump cars of other types.

The object of the invention is to provide improved means for controlling the doors, which are not only simple in construction, but at the same time provide a rigid support for the door.

One embodiment of the invention is illustrated in the accompanying drawings in which—

Figure 1 is a detail transverse sectional view of a car, one of the doors being shown in closed position in solid lines and in open position in dotted lines;

Fig. 2 is a view similar to Fig. 1 showing the construction of the doors adjacent the trucks;

Fig. 3 is an end view of the operating parts for opening and closing the doors;

Fig. 4 is a longitudinal vertical section through one of the doors on the plane 4—4 of Fig. 1; and in

Fig. 5 is a section on the line 5—5 of Fig. 4.

The car frame comprises a center sill 10, side wall 11, and cross bearer 12 extending therebetween. On this frame is carried the floor 13 of the car. In this floor 13 is formed an opening 14 adapted to be closed by a door 15, hinged at 16 to a bracket 17 mounted on the center sill.

For opening and closing this door a shaft 18 is provided, on which shaft is mounted an arm 19. To the outer end of this arm is connected, at 20^a, a link 20, pivotally attached by a pin 21 to the under side of the door. The arm 19 and the link 20 act as a toggle joint and therefore hold the door firmly closed against the weight of material in the car, and also against shocks and vibrations due to movement of the car, shunting operations, and so forth.

For the sake of strength and rigidity the arm 19 and the link 20 should be short, and the line joining the shaft 18 and the pin 21 should be as nearly vertical as convenient or possible. The shaft 18 is carried by the cross bearers, preferably being journaled directly therein, as shown. These various factors are, in certain respects, conflicting, although by the present construction they are advantageously combined without restricting the extent of opening of the doors or complicating either the construction or method of operating the doors.

As the shaft 18 is arranged under the doors and extends substantially the length of the car, the extent of opening of the doors is dependent on the position of this shaft. The lower the shaft is arranged below the door or the farther it is moved to the right (Fig. 1) the wider the door can open. As, however, it is desirable to journal the shaft in the cross-bearers the extent to which the shaft can be lowered is limited by the depth of the cross-bearers. The horizontal position of the shaft is determined by the position of the door when in its desired open position, since the shaft should be as far from the hinge as possible in order to give the maximum support to the free or movable end of the door.

The arm 19 and link 20 are arranged so that outward and downward movement opens the door and vice versa. To allow this movement to occur, and at the same time provide as nearly vertical a support for the door as possible, the distance between the hinge 16 and pin 21 should be greater than the distance between the hinge 16 and shaft 18 by an amount not substantially in excess of the width of the arm 19. The reason for this relationship will be clear from Fig. 1, which shows the parts in both open and closed position of the door.

In order to limit the extent to which arm 19 and link 20 can move inwardly, a stop 19^a is provided for engaging the arm 19, as shown in Fig. 1. Movement of the arm 19 and link 20 in the opposite direction when the door is closed is normally prevented by

means of a pawl or dog 30, which engages the teeth of a ratchet wheel 22 mounted on the end of the shaft 18. As the point 20^a is above the line joining the pin 21 and the shaft 18, any torsional strains due to the load on the door are almost wholly taken by the stop or pin 19^a instead of by the shaft 18.

For rotating the shaft 18 a second pawl 23 is provided. This pawl is pivotally attached, at 24, to a lever 25 which is in turn pivoted at 26 to the end sill 27 of the car. This lever 25 is provided with a socket 28, into which a hand bar 29 may be inserted when it is desired to operate the pawl. As the lever 25 is pivoted at a point adjacent the point of connection of the pawl with the lever, greater leverage is obtained than would be the case if the lever were arranged to turn about the shaft 18 as an axis.

The leverage is also increased by reason of the short length of the arm 19 and link 20. With the construction illustrated the shaft, in opening or closing the door, rotates through an angle over three times the amplitude of the angle through which the door turns.

When the doors are closed the ratchet wheel 22 is positively prevented from rotating in one direction by the stop 19^a, and in the other direction by means of the pawl or dog 30, which is held in engagement with the ratchet wheel by means of a cam 31. This cam 31 is mounted on a shaft 32, which may be rotated by manual means (not shown) for bringing its cam surface in and out of engagement with the dog 30. Hence, when it is desired to open the doors the cam 31 must first be moved out of engagement with the dog 30 so that the latter may be disengaged from the ratchet wheel 22. In this position the door will be held closed merely by reason of the fact that the point 20^a is above the line joining the pin 21 with the axis of the shaft 18. The pawl 23 is then moved into the position shown by dotted lines in Fig. 3, and the hand bar operated so as to move the ratchet wheel 22 in a counter-clockwise direction. A movement of a single tooth will be sufficient to bring the point of connection of the arm 19 with the link 20 onto the opposite side of the line joining the pin 21 to the shaft 18 when the weight of the door will complete the opening movement. While the door is opening under its own weight, the teeth of the wheel 22 will pass under the pawl 23 so that the sudden shock produced by the opening doors will not be transmitted to the hand bar 29.

In order to raise the door the dog or pawl 30 is brought into engagement with the ratchet wheel 22 and the pawl 23 is placed in the position shown in full lines in Fig. 3. Operations of the hand bar 29 will produce a step by step rotation of the ratchet wheel 22 until the door has been brought into the position shown in Fig. 1.

The car trucks interfere with the opening of the doors therebetween, and as it is not desirable to limit the extent of movement of all the doors to the same extent as that of the doors over the trucks provision is made for allowing the doors between the trucks to open to a greater extent. For this purpose slots 33 are provided in the sides of the doors 15^a which are arranged over the trucks to allow the pin 21 to move downwardly after the door itself has come to rest by reason of its engagement with the truck, thus allowing the shaft to rotate so as to open the other doors to the desired extent.

By the arrangement shown and described the door is supported wholly through the agency of the toggle members, and the latter being short may be made very rigid without undue weight. The controlling mechanism is very simple and compact and easy of operation.

We claim as our invention—

1. In a car, in combination, a hinged door, an operating shaft therefor, a ratchet wheel on said shaft, a pawl adapted to engage said wheel, and an operating lever therefor adapted to turn about a point intermediate the axis of said shaft and the point of connection of said pawl and said lever.

2. In a car, in combination, a frame, a door hinged to the frame, a rotatable operating shaft journaled in stationary bearings in the frame below said door, an operative connection between said shaft and said door, said shaft being arranged to be engaged by and thereby to act as a support for the door in its open position.

3. In a car, in combination, a frame, a door hinged to the frame, a rotatable operating shaft journaled in stationary bearings in the frame below said door, a toggle connection between said shaft and said door, a stop on said frame at a distance from said shaft adapted to limit the movement of said toggle after the latter has passed the position in which the three axes of rotation are in a straight line, the entire weight of the door in closed position being transferred through the toggle to the shaft and the stop.

4. In a car, in combination, a hinged door, an operating shaft below the door, a crank arm on said shaft, and a link connecting said arm with the door, the distance between the hinge of the door and the point of connection of the link to the door being greater than the distance between the hinge and said shaft by an amount not substantially in excess of the width of said arm.

5. In a car, in combination, a hinged door, an operating shaft vertically below said door, a crank arm on the shaft, and a link pivotally connecting the arm with the door

adapted to transfer the weight of the door to the shaft, the combined lengths of the arm and link being less than half the width of the door from the hinges to the opposite edge of the door.

6. In a car, in combination, a hinged door, an operating shaft below the door in a vertical plane intermediate the hinges and the swinging margin of the door, a crank arm on the shaft, and a link for connecting the arm with the door, the combined lengths of the arm and link being less than half the width of the door from the hinges to the opposite swinging margin of the door, outward movement of the arm and link opening the door and inward movement of the link and arm bringing the point of connection of the arm and link to the opposite side of the line joining the shaft with the point of connection of the link with the door for holding the latter in closed position.

7. In a car, in combination, a hinged door, an operating shaft vertically below said door, a crank arm on the shaft, and a link pivotally connecting the arm with the door for opening and closing the latter, the angle through which the door turns in moving from closed to open position being less than one-third the angle through which the said arm turns in producing such movement of the door.

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