

No. 686,902.

Patented Nov. 19, 1901.

E. J. MÜLLER & B. H. JESSEN.
SWINGING DOOR FOR FREIGHT CARS.

(Application filed May 1, 1901.)

(No Model.)

3 Sheets—Sheet 1.

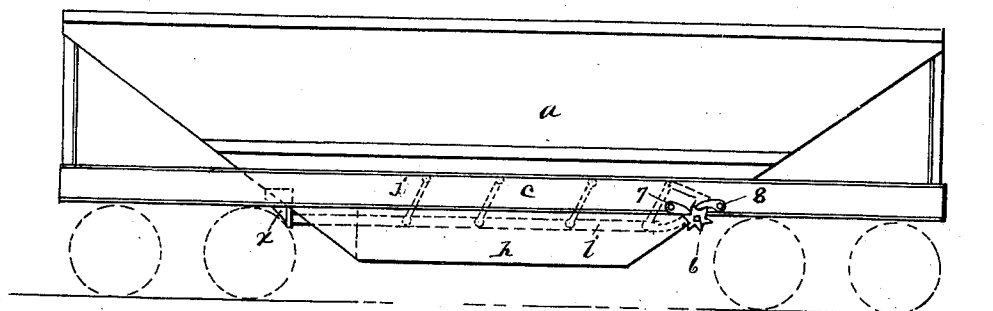


Fig. 1.

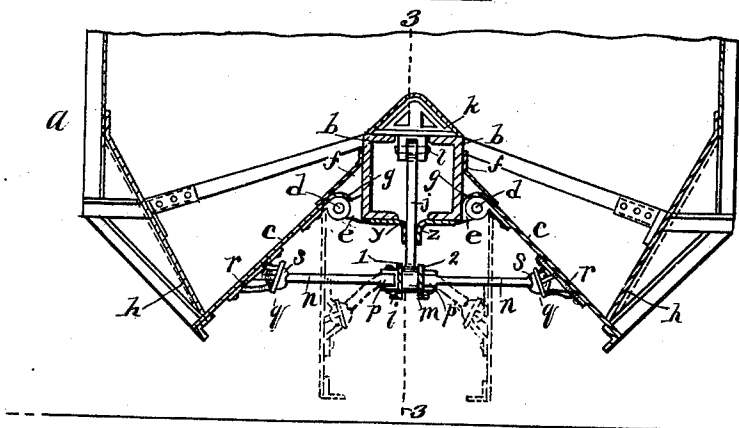


Fig. 2.

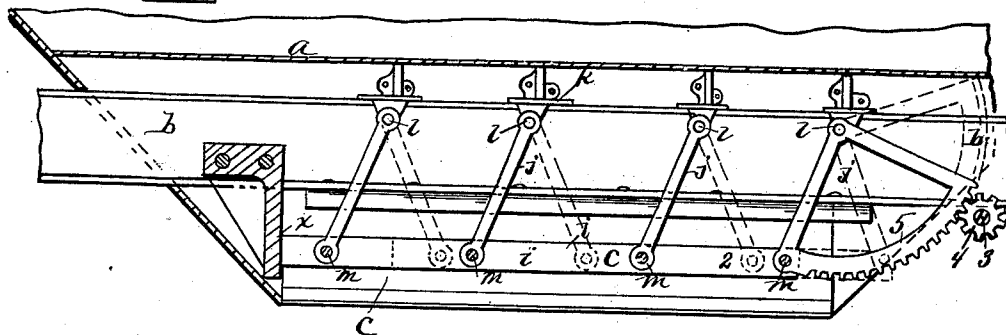


Fig. 3.

WITNESSES.

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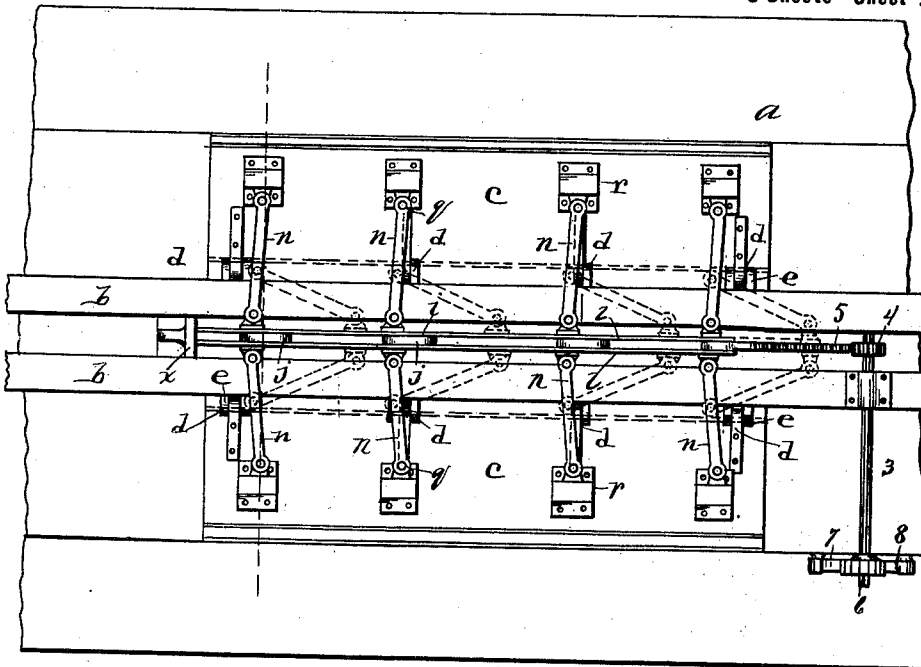


Fig. 4.

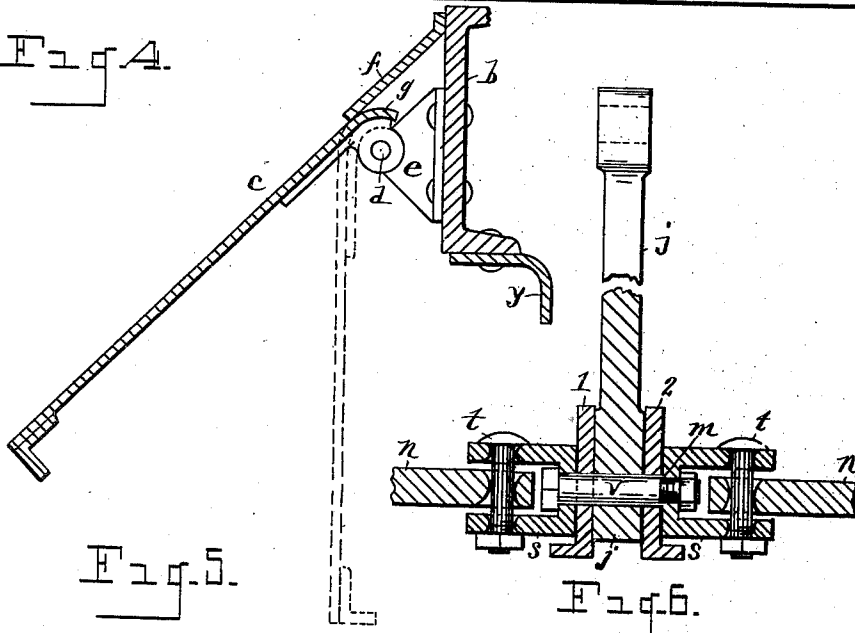


Fig. 5.

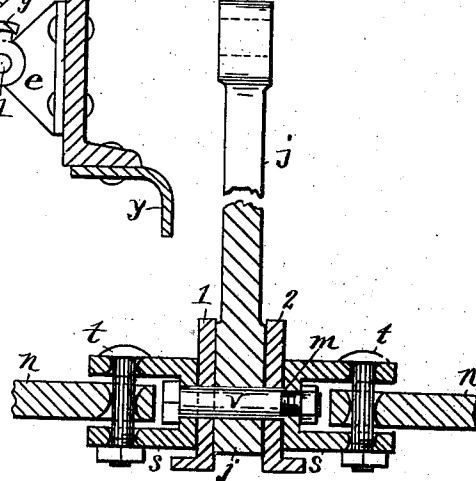


Fig. 6.

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3 Sheets—Sheet 3.

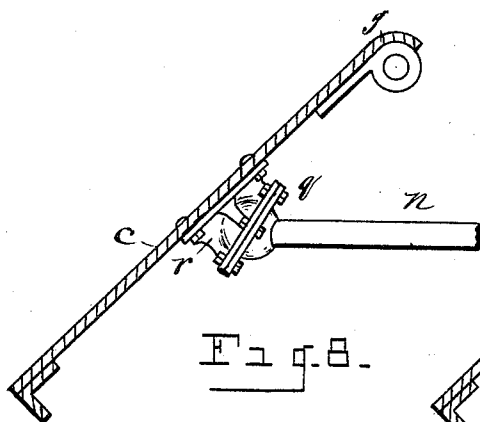
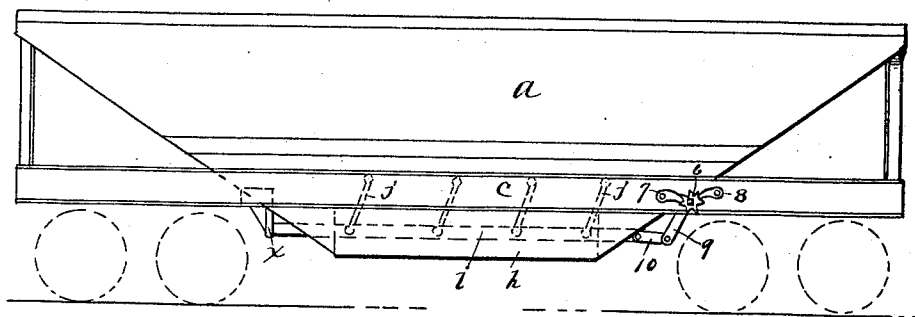


Fig. 7.

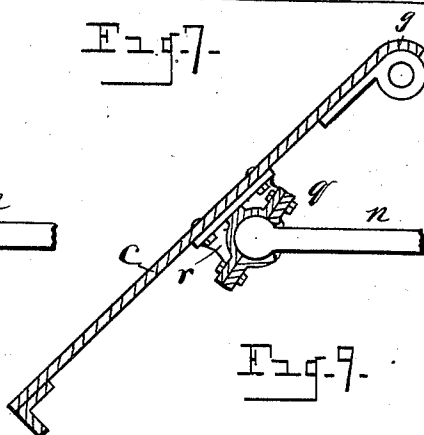


Fig. 9.

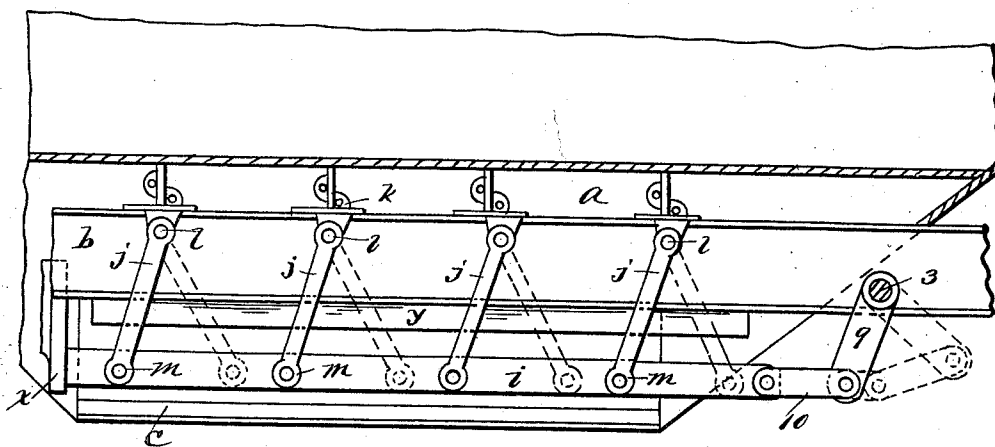


Fig. 10.

WITNESSES.

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UNITED STATES PATENT OFFICE.

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SWINGING DOOR FOR FREIGHT-CARS.

SPECIFICATION forming part of Letters Patent No. 686,902, dated November 19, 1901.

Application filed May 1, 1901. Serial No. 58,234. (No model.)

To all whom it may concern:

Be it known that we, EJNAR J. MÜLLER and BURCHARD H. JESSEN, subjects of the King of Sweden and Norway, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Swinging Doors for Freight-Cars; and we declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Our invention has for its object an improved door for freight-cars designed for carrying coal, coke, limestone, &c., the same being adapted for a variety of cars of different constructions—as, for example, to gondola cars or to hopper-cars. We have shown our invention in the accompanying drawings as applied to a hopper-car; but we would have it definitely understood that we do not limit ourselves solely thereto. We have also shown our improved door with its operating devices arranged longitudinally of the car; but we would also have it understood that our invention may be applied transversely of the car, if preferred.

Among the objects of the invention are, first, to save space and to provide a larger cubic capacity of the car than would otherwise be obtained, especially in hopper, ore, or coal cars; second, to reduce the height of the cars without diminishing their capacity, and, third, to give a larger door-opening for dumping the car.

The objects of our invention contemplate also the general construction, combination, and arrangement of devices and appliances hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation. Fig. 2 is a view in vertical section, showing the doors closed in full lines and in open position in dotted lines. Fig. 3 is a view in longitudinal section on the line 3-3, Fig. 2, showing the door in closed position in full lines and in open position in dotted lines. Fig. 4 is an inverted plan view showing the door in closed position in full lines and in open position in

dotted lines. Fig. 5 is a detail view, in vertical section, on an enlarged scale, showing one of the doors with its jointed connection with the center sill. Fig. 6 is a detail view, in vertical section, showing a construction of the jointed engagement of two oppositely-swinging arms with the center sills and a swinging hanger.

In the accompanying drawings we have shown the doors arranged to operate longitudinally of the car. While we do not limit ourselves solely thereto by operating the door longitudinally on hopper, ore, or coal cars instead of transversely, as is usually the case, the height of the cars can be reduced very materially.

As illustrated in the drawings, we carry out our invention as follows:

The body of a car is indicated at *a*, and at *b b* are shown the center sills of a car. The car, except as regards the doors and the means of their operation, may be of any ordinary or desired construction. We have shown in the drawings two doors (indicated at *c c*) on opposite sides of the sills. These doors may run the whole length of the bottom of the car, if desired, so that by opening the same the whole car could be dumped in one operation. If desired, however, each of the doors might be divided so that each part would extend half the distance of the bottom of the car, provision being made at each end of the car for the operation of each half of each door. By these means each half might be operated separately, where it is desired to dump only a portion of the load at one time. As many doors might be put in corresponding to our invention as might be desired, with corresponding operating mechanism. The doors are each jointedly supported toward the upper edge thereof, as indicated at *d*, upon suitable castings or brackets (indicated at *e*) connected with the corresponding center sill. Cover-sheets (indicated at *f*) form part of the bottom of the car and extend downward over the joints.

In order to effectually prevent coal or other commodity in the car from clogging at the joints of the door, we prefer that the door, sheet, or plate should be curved at its upper edge and caused to extend over the joint, as indicated at *g*, so that when the door swings

down into open position, as indicated in dotted lines in Fig. 2, the space between the upper portion of the door and the adjacent cover-sheet *f* will at all times be closed. The doors 5 are arranged to drop down into vertical position when open and to close in an angular position against the corresponding portions *h* of the bottom of the car.

To actuate the doors, we provide a longitudinal strut, (indicated at *i*,) which may be constructed in any suitable manner. As shown, the strut consists of two angle-irons, (indicated by the numerals 1 and 2.) This strut constitutes practically a push-bar or operating-bar. The strut is connected with 15 swinging hangers *j*, of any desired number, said hangers being supported toward their upper ends to any suitable portion of the car construction—as, for example, to a center-sill cover-bracket, (indicated at *k*, the jointed connection of the hanger being indicated at *i*.) The lower end of the hanger is jointly connected with the strut *i*, as indicated at *m*. The strut is connected with the doors *c c*, 25 respectively, by horizontally-swinging arms *n*, said arms having a jointed connection with the strut at one extremity thereof, as indicated at *p*, said swinging arms also being jointly connected at their opposite 30 extremities with the adjacent doors in any suitable manner, as indicated at *q*. We have shown each of the doors provided with a bracket *r*, with which the corresponding arms have a jointed engagement. We prefer that 35 the jointed engagement of the arms *n* with the respective doors or with the bracket *r* connected therewith should be in the nature of a universal joint, so that the arms *n* may not only be free to swing horizontally, but may have a vertical oscillation, the arms *n* 40 being capable of swinging in any direction. We do not limit ourselves to any specific manner of constructing the universal joints; but, as shown more particularly in Figs. 8 and 9, a ball-joint may be employed. By 45 this construction it will be apparent that the arms *n* may swing in any direction. Any suitable form of joint may be employed within the scope of our invention. The arms *n* 50 have a universal-joint connection at both extremities, at the one end with the door and at the other end with the strut, the arms *n n* being preferably arranged in pairs on opposite sides of the strut and connected with the 55 opposite doors *c c*, the strut *i* intervening between the adjacent ends of said arms. As shown, the strut swings longitudinally upon the hangers *j*; but we do not limit ourselves thereto. The hangers *j* are preferably arranged to normally hang at an angle to the 60 perpendicular line both when the door is closed and when it is open, said hangers preferably swinging past the perpendicular both to open and to close the doors. This 65 arrangement will require the least power to either open or to close the doors. It will be obvious that when the strut is moved to and

from a knee-joint action will be exerted upon the corresponding arms *n* to actuate the doors. In Fig. 4 in full lines the arms *n* are 70 shown in position to close the doors. It will readily be seen that when the strut is moved in the desired direction to open the doors the arms *n* will be forced into an angular position, drawing the outer extremities of said 75 arms toward the center as the doors are opened, said arms *n* being extended laterally when the door is closed.

Any desired means may be employed to actuate the strut. Thus it might be actuated 80 from the end of the car, or, as shown more particularly in Figs. 3 and 4, a transverse rod or shaft (indicated by the numeral 3) may be employed, extending to one side of the car, said shaft provided intermediate its extremities 85 with a pinion 4, meshing with a rack 5, connected with said strut. At one extremity of the shaft 3 is a ratchet-wheel 6, with which pawls 7 and 8 engage to hold the shaft in given position. As shown in Figs. 7 and 10, 90 instead of employing a pinion and segmental rack connected with the strut the shaft 3 may be provided with a crank-arm connected with the strut by an intervening link 10.

We prefer that when the doors are closed 95 the arms *n* should be moved slightly past the center and that one end of the strut *i* should then be brought in contact with a suitable stop, (indicated at *x*,) the tendency of the load in the car being to force the strut 100 against the stop to prevent any liability of accidental displacement of the strut and any consequent accidental dumping of the load. By this construction it will be apparent that 105 in order to dump the load the arms *n* must first be swung past the center in the opposite direction from the stop, when the weight of the load will force open the doors. The strut *i* may be actuated by the shaft 3 in any 110 manner, as by attaching a wrench to one end of the shaft 3, by which the shaft may be rotated sufficiently to force the strut into position to carry the arms *n* beyond the center in a direction opposite the stop. Then the corresponding pawl being disengaged from the 115 ratchet-wheel 6 the load will be dumped.

Should it be desired to divide the doors *c*, the strut would also be divided intermediate its extremities and provided with mechanism 120 to actuate each of the struts independently. By providing the doors with mechanism to be worked horizontally, as above described, the height of the car might be lowered, still retaining the same capacity—an important feature in freight-car construction. 125

To effect the more certain opening of the doors or the greater certainty of the opening of both doors simultaneously, we prefer to provide the center sills with guides *y z*, projecting downward alongside the hangers *j* 130 to prevent any lateral movement of said hangers, so that when one of the doors opens the other door must open simultaneously. In Fig. 6 a single bolt *v* is shown uniting two adja-

cent U-shaped unions *s* with the center sills and the adjacent swinging hanger. When a segmental rack *5* is used, one radial arm of the segmental rack may form one of the hangers *j*. Instead of employing the segmental rack and pinion upon the shaft *3* the operating-shaft *3* might be suitably engaged with any one of the hangers *j*.

What we claim as our invention is—

- 10 1. The combination with a car, of a vertically-swinging door, horizontally-swinging arms to actuate said door, and means to actuate said arms.
- 15 2. The combination with a car, of a vertically-swinging door, horizontally-swinging arms to actuate said door, and a strut or operating-bar to actuate said arms.
- 20 3. The combination with a car, of vertically-swinging doors, horizontally-swinging arms to actuate said doors, and means engaging the inner ends of said arms to actuate said arms.
- 25 4. The combination with a car, of vertically-swinging doors, horizontally-swinging arms to actuate said doors, and means to actuate said arms to simultaneously actuate said doors.
- 30 5. The combination with a car, of swinging doors, horizontally-swinging arms to actuate said doors, and means engaging the inner ends of said arms to simultaneously actuate said doors, said arms arranged in pairs to have a knee-joint action.
- 35 6. The combination with a car, of swinging doors, oscillatory arms swinging out of a vertical plane to actuate said doors, and a strut or operating-bar engaging the adjacent ends of said arms, said arms arranged to have a knee-joint action.
- 40 7. The combination with a car, of swinging doors, swinging arms to actuate said doors, and means to actuate said arms to simultaneously actuate said doors, said arms having a universal-joint connection with said doors.
- 45 8. The combination with a car, of swinging doors, swinging arms to actuate said doors, and a strut or operating-bar intermediate said doors engaging the adjacent ends of said arms to simultaneously actuate said doors, said arms having a universal-joint connection with said doors and with said strut or operating-bar.
- 50 9. The combination with a car, of swinging doors, a strut or operating-bar, horizontally-swinging arms on opposite sides of the strut or operating-bar to actuate said doors, and one or more swinging hangers carrying said strut or operating-bar.
- 55 10. The combination with a car provided with a center sill, of swinging doors on oppo-

site sides of said sill, a strut or operating-bar movably suspended from the center sill, and swinging arms engaged at their inner ends with the strut or operating-bar to actuate said doors.

11. The combination with a car, of vertically-swinging doors, an oscillatory strut or operating-bar, and horizontally-swinging arms engaged at their inner extremities with said strut or operating-bar to actuate said doors.

12. The combination with a car, of a swinging door, an oscillatory strut or operating-bar, and swinging arms on opposite sides of said operating-bar and actuated by said bar to actuate said doors.

13. The combination with a car, of swinging doors, an operating-bar, swinging arms on opposite sides of the operating-bar to actuate said doors, and one or more vertically-swinging hangers carrying said operating-bar.

14. The combination with a car, of swinging doors, an operating-bar, swinging arms on opposite sides of the operating-bar to actuate said doors, and one or more vertically-swinging hangers carrying said operating-bar, and means to prevent the lateral movement of the swinging hangers.

15. The combination with a car provided with lower cover-sheets, of swinging doors having their upper edges adjacent to said cover-sheets, said doors curved at their upper edges and expanding over the adjacent joint.

16. The combination with a car provided with center sills, of swinging doors, an operating-bar or strut, swinging arms connecting the doors with said operating-bar, swinging hangers supporting said operating-bar, and the center-sill cover-bracket supporting said swinging hangers.

17. The combination with a car, of a swinging door, an oscillatory operating-bar, swinging arms connecting the door with said bar, and a stop to limit the movement of said bar, said swinging arms normally swinging past the center and carrying the operating-bar against the stop when the doors are closed.

18. The combination with a car, of swinging doors, an oscillatory operating-bar, swinging arms connecting the door with the operating-bar, and swinging hangers supporting the operating-bar, said hangers normally located at an angle to the perpendicular.

In testimony whereof we sign this specification in the presence of two witnesses.

EJNAR J. MÜLLER.

BURCHARD H. JESSEN.

Witnesses:

N. S. WRIGHT,
M. HICKEY.