May 18, 1937. W. H. YOST 2,080,845

DUMP CAR

Filed Aug. 5, 1936 2 Sheets-Sheet 1

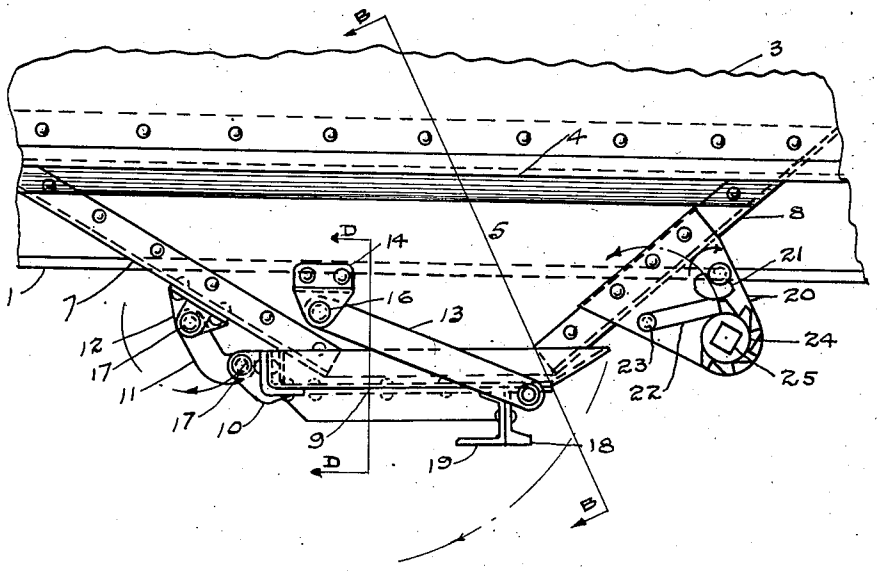

FIG. 1.

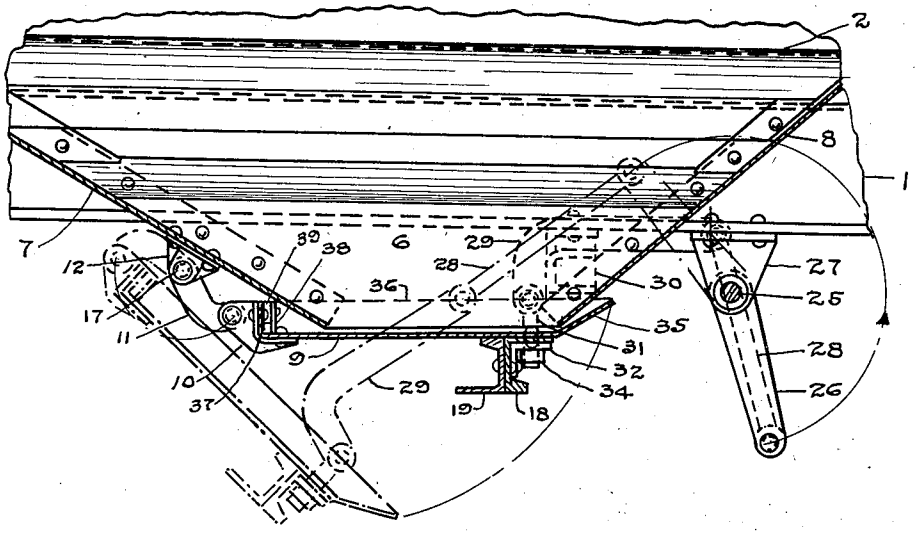

FIG. 2.

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Filed Aug. 5, 1936 2 Sheets-Sheet 2

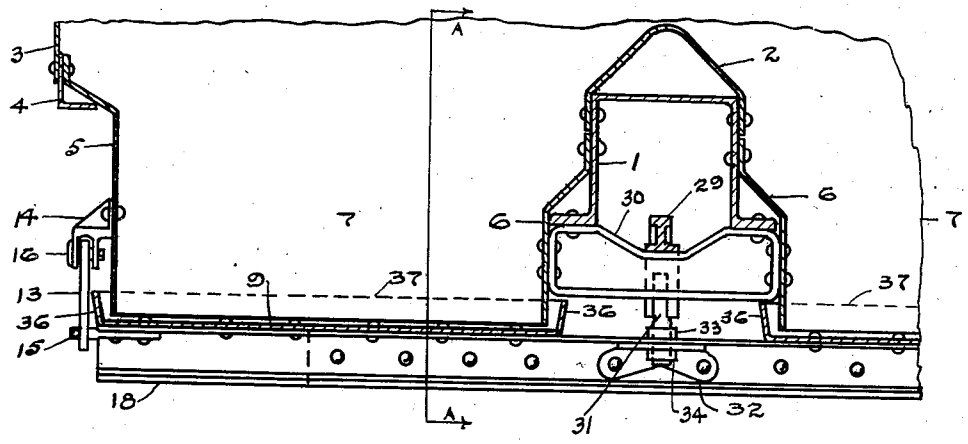

FIG. 3.

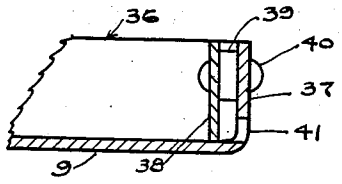

FIG. 4.

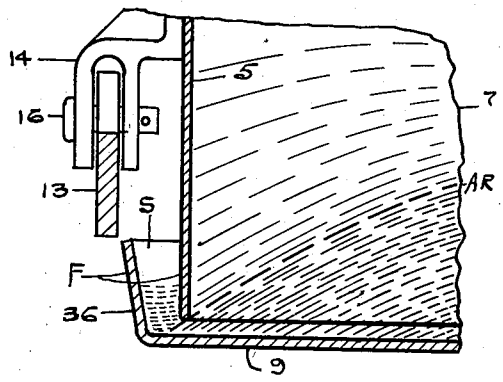

FIG. 5

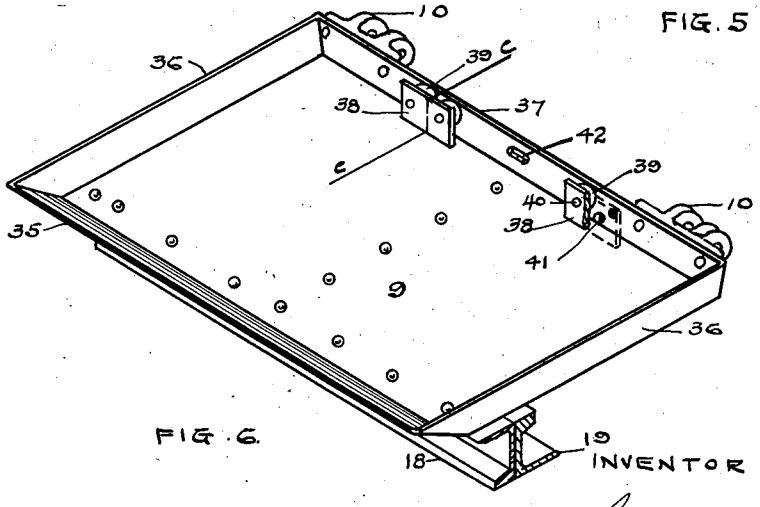

FIG. 6.

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DUMP CAR

Winfield Hancock Yost, Montreal, Quebec, Canada

Application August 5, 1936, Serial No. 94,345

8 Claims. (Cl. 105—253)

My invention relates to dumping doors for use in railroad cars and the like. These cars are built for carrying bulk freight, such as coal, sand, cement, ore, etc., the contents being discharged through the door openings at destination. As the lading carried is valuable it is necessary for these cars to have doors that will not let this lading leak out or be lost in transit.

Various forms of doors and door frames have been used for this purpose prior to my invention. These however depend upon the door and door frame being in tight contact at all points at all times. It is a well known fact that it is almost impossible to build a freight car in quantity production and make this necessary positive contact between the dump door and all points of the door frame so that fine lading will not leak or sift out while the car is in motion, owing to irregularity of workmanship. Even if originally built tight the wear and tear of daily use will soon allow the door contact to loosen and an opening to appear between the door and door frame for the lading to leak out, and be lost in transit. If the dumping cars are built with the doors at a steep angle when closed gravity will accelerate leakage of the lading between the door and door frame. Furthermore distortion following rough usage will result in the hoppers and doors spreading, collapsing and getting out of square from daily use thus making a leak-proof fit between the door and door frame impossible to be maintained. An additional disadvantage present with dump cars as heretofore constructed resides in the obstruction of the doors to complete closing position by the residue of previous lading remaining upon the floor of a poorly cleaned door. This residue jams against the lower edge of the door frame and holds the door in a faulty ajar position.

When freezing atmospheric conditions prevail the satisfactory operation of the door is still further prevented by collection of ice and frozen lading which obstructs the closing of the door and at times binds the door and its frame or hopper sides and resists the opening operation to a serious extent.

My present invention was conceived with the object of avoiding the above mentioned defects by the establishment primarily of a relationship between the door and the opening to be closed thereby whereby leakage of the lading is prevented through the principle developing the angle of repose of a body of particles comprised by the lading. The conception avoids dependence, for the avoidance of leakage, upon such supreme accuracy of construction and the maintenance of such accuracy to achieve a leak-proof closure and thereby avoids the development of leaky closures through the action of the normally experienced faulty workmanship and loosening or distorted closure members.

A further object of the invention is to provide clearage space facilitating the clearing away of lading residue which would otherwise jam and hold the door ajar.

Another object of the invention is to confront the hampering action of freezing temperatures by minimizing collection of moisture ordinarily trapped and frozen and furthermore to effect such a relationship between the door and its frame or hopper sides that it is positive in overcoming the binding therebetween due to frozen lading.

The above with additional objects and advantages will be apparent from the following specification and drawings, in which latter,

Figure 1 is a side elevation of the door and hinge construction.

Figure 2 is a section A—A on Fig. 3, through the hopper and door longitudinally of the car, the door being shown in the closed position in full lines and open in dotted lines.

Figure 3 is a fragmentary section on line B—B Fig. 1, transversely of the car.

Figure 4 is an enlarged fragmentary section on line C—C Fig. 6, showing the baffle plate and drain hole.

Figure 5 is an enlarged section on line D—D Fig. 1, of one side of the hopper wall and door to illustrate the sealing action of the lading.

Figure 6, a perspective view of one of the doors showing the baffle plates, drain holes and upturned flanges.

While my invention can be applied to old cars or new cars, the accompanying drawings only show portions of a standard dump car with my invention applied thereto. In said drawings and the following description, the same reference characters indicate the same parts.

The car shown in the drawings comprises center sill structure 1, center sill hood 2, side walls 3, side bottom flange angle 4, outside hopper wall sheet 5, inside hopper wall sheet 6, end sloping floor 7, center sloping floor 8, door 9, door hinge 10, hinge link 11, hinge on car 12, door guide link 13, guide link bracket 14, guide link trunnion 15, guide link pin 16, door hinge pins 17, door spreader beams 18 and 19, ratchet plate 20, locking dog 21, locking pawl 22, locking pawl pivot 23, locking ratchet 24, operating shaft 25, crank arm 26, crank arm bracket 27, operating link 28, operating hook 29, operating hook support

30, door adjusting eyebolt 31, eyebolt bearing 32, eyebolt nuts 33 and 34.

In the construction illustrated the walls 5, 6, 7 and 8 form a hopper for the car lading which latter discharges through the opening formed by the bottom edges of those walls. The lower margins of these walls constitute a frame for door 9 and the latter is of pan-form to embrace the frame and close the opening.

The door 9 is hung from the car frame by hinges 12 on the car, hinges 10 on the door and hinge links 11 connecting these hinges by pins 17. These hinges control the movement of the rear portion of the door. The front part of the door is controlled by guide link 13, pivoted to bracket 14 by pin 16 at its upper end and to the door 9 by trunnion 15. These links will swing the door in a flat arc and allow the door to embrace and leave the projecting flanges of the door frame during the closing or the opening operation of the door. This hinge arrangement is not a part of this invention.

To dump the contents of the car locking dog 21 is turned in the direction of the arrow Figure 1 to release locking pawl 22 from ratchet 24. Then the operating shaft 25 can be turned in the direction of the arrow in Figure 2 and will turn crank arm 26 which is secured thereto. The turning of crank arm 26 will force operating link 28 upwardly thereby lifting the long end of door operating hook 29 thereby permitting the door to swing to the open position.

To close the door 9 the shaft 25 is turned in the opposite direction of the arrow in Figure 2 after locking pawl 22 is in engagement with the ratchet 24. Continued turning movement of shaft 25 will bring the door 9 to closed and locked position.

The door consists of floor 9 up from which extend flanges or sides to form the pan, the front side being indicated at 35, lateral sides at 36 and rear or hinged side at 37.

I have especially so proportioned the hopper and door that their relationship is deliberately spaced, that is, when the door is in closed or closing relationship with the hopper and the door flanges embrace the frame constituted by the lower margins of the hopper sides. This spacing is such that the gravitational urge of the lading in the hopper (see Figure 5) promotes a seepage of the lading under the lower edges of the hopper into the space S therebetween and the door flanges. The development of the angle of repose of the hopper load indicated at AR Figure 5, in conjunction with the frictional resistance set up by the opposing walls (F Figure 5) of the door flanges and hopper establish an equilibrium between the load and the seepage in space S thereby establishing such seepage as a sealing medium for the lading. It has been demonstrated in actual commercial operation that while this seal may rise slightly through the agitation of the traveling car, the sealing body remains in sealing position and prevents leakage of the lading.

Should a residue of lading remain upon floor 9 after a car unloading operation and especially if such residue includes lumps of coal or ore, it will be apparent that the engagement of such a lump with the lower edge of the hopper opening will hamper the closing of the door. In practice extra forceful operation of the closing gear will tend to crush the lump but a point of compression of the material being crushed between the door and frame will be reached beyond which the door cannot be moved. In order to prevent the uncleared material so limiting the closing movement of the door I have calculated the space S between the door flanges and the door frame that such space will serve as an expansion space receiving the material crushed during the closing of the door so that such material can escape or spread both inside and outside the door frame as the latter shears down through it. In this manner the limit point of compression of the material in the line of force applied is unlikely to be reached owing to the lateral escape of the crumbling material neutralizing the resistance which would normally be set up if such an escape space were not provided.

The space S is also calculated to permit of lump material or particles between the frame and door flange being rolled or shifted by the relatively moving walls during the movement of the door and so worked out of door jamming or wedging position which they would otherwise assume to obstruct movement of the door.

In forming the flanges of the door I prefer that their relationship with the door frame be such that, when the door is closed the space between the sides of the latter and the door frame is upwardly flared. For this purpose the flanges 35 and 36 are preferably inclined outwardly and upwardly from floor 9. For example the flanges 36 are made slightly beyond the 90 degree angle with respect to the floor and flange 35 at a greater angle, the inclination of flange 35 being to facilitate discharge of lading over the front clearing edge of the door when the latter is opened.

The purpose of thus providing an outwardly flaring space by inclining the side flanges is to produce a construction overcoming the binding action between door and its frame and resulting from the freezing of the sealing body of lading in space S. When frozen the lading becomes solidified and adheres to the surfaces F but as the mass of the sealing body freezes and expands the expansion is accommodated upwardly by the flared space and thus will not so rigidly bind to the walls and freeze the door closed. This avoidance of frozen-up condition is supplemented by the fact that the frozen mass is of reducing size in the downward direction the door moves to open, due to the upwardly flaring space, the freezing-up action being further minimized because immediately the door opening force is commenced the initial counterwedge action thereof positively sets up a releasing action freeing the binding frozen lading at the start and leaving the door clear to move.

In the preferred construction the door floor 9 is flat as shown or it may be of any other construction that will not retard the discharging lading when the door is in open position. The door when closed preferably is in a substantially horizontal position to supplement the sealing action described. A door of horizontal type especially of pan-shaped construction will trap moisture therein and in order to drain off this liquid collected during rainy weather or accumulating owing to melting snow, I form drainage holes in the door, the construction illustrated showing holes 41 in flange 37 near the level of floor 9 and the latter inclined towards the holes to direct the water thereto. This inclination of the floor can be readily achieved in one way or another, such as for example by the simple expedient of so hinging and supporting the door in closed position that it is inclined slightly towards its hinge side.

The rear flange 37 may be 90 degrees to the door floor 9 as shown or at any angle to the

door floor. I prefer to make it more or less perpendicular to the door floor as in this manner drainage holes can be used without any chance of the lading sifting out of the car as this construction locates the holes remotely from the hopper opening.

In order to positively obstruct possible sifting of lading through holes **41** I provide baffle plates **38** bridging the holes. The plates **38** are spaced from and span or bridge the holes **41**, in the illustrated form the plates being suspended from flange **37** by rivets **40** carrying fillers or distance pieces **39** between the flange and plates to position the latter alongside of and spaced inward from the flange.

Additional auxiliary drainage may be provided for excessive water or slush through the medium of hole **42** through flange **37** but at a higher level from floor **9** than holes **41**, this hole **42** being located above the level assumed by the sealing material in the space S.

It will be seen by the drawings and the above description that I have a very simple and efficient door in combination with a car frame to accomplish a result heretofore unknown.

The operating mechanism and the hinge arrangement are not a part of this invention. The operating gear may be any type generally used.

Although I have shown and described my improvements in considerable detail, I do not wish to be limited to the exact and specific details shown and described, but may use such substitutions, modifications or equivalents thereof, as are embraced within the scope of my invention as covered by the following claims.

I claim:

1. In a dump car, portions of which form a lading discharge-opening at the lower margins thereof, the combination of a door adapted to close said opening, with means for moving the door into and out of closing relationship with the discharge-opening, said door presenting an upwardly flared lading seepage reception space exteriorly and laterally of said margins and in communication with the discharge-opening in the closed position of the door.

2. In a dump car, the combination of a discharge-opening having members projecting therefrom, a pan-shaped door pivoted to the car to cap and embrace such projecting members of the said discharge-opening; said pan-shaped door being substantially horizontal in the closed position and provided with means disposed laterally of the discharge opening to drain water or the like from said pan-shaped door and means to protect the lading of the car from leaking out of said draining means, and means for operating said door.

3. In a dump car presenting a discharge-opening, the combination of a door adapted to close said opening, with means for operating the door, said door presenting a fluid drainage aperture to drain water and the like therefrom, and a baffle plate bridging the aperture.

4. In a dump car, portions of which form a discharge-opening at the lower margins thereof, the combination of a door adapted to close said opening and including a floor for the door and door sides extending upwardly and outwardly from the floor beyond the 90 degree angle thereto, with means for moving the door into and out of closing relationship with the discharge-opening and supporting the door in closed position with the floor and sides spaced from the margins forming the discharge-opening.

5. In a dump car, downwardly extending walls terminating in a discharge-opening, the lower margins of the walls constituting a door frame, the combination of a door adapted to embrace said frame and including a floor for the door and door sides extending upwardly from the floor, and presenting drainage holes through one of said door sides, a hinge connecting that side of the door having the drainage holes to the car and operating mechanism for locking the door in closed position with the door sides embracing the door frame.

6. In a dump car, downwardly extending walls terminating in a discharge-opening, the lower margins of the walls constituting a door frame, the combination of a door adapted when closed to embrace said frame and including a floor for the door and door sides extending upwardly from the floor, and presenting drainage holes through one of said door sides, a hinge connecting that side of the door having the drainage holes to the car and means for supporting the door in said embracing position with the floor inclined towards its hinged side.

7. In a dump car, downwardly extending walls terminating in a discharge-opening with a door frame provided at its lower margins, the combination of a door adapted when closed to embrace said frame and including a floor for the door and door sides extending upwardly from the floor and presenting drainage apertures through one of said door sides, a hinge connecting that side of the door having the drainage apertures to the car, baffle plates bridging the drainage apertures at their interior ends, said door being adapted to move into and out of position with the door sides embracing the door frame and means for holding said door in closed position.

8. In a dump car, downwardly extending walls terminating in a discharge-opening with a door frame provided at its lower margins, the combination of a door adapted when closed to embrace said frame and including a floor for the door and door sides extending upwardly from the floor and presenting drainage holes through one of said door sides near the floor level and an additional drainage hole spaced upwardly from the floor, a hinge connecting that side of the door having the drainage holes to the car, baffle plates bridging the lower drainage holes at their interior ends and spaced therefrom, said door being adapted to move into and out of position with the door sides embracing the door frame and means for holding said door in closed position.

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