Jan. 16, 1962 J. L. BECKEL 3,016,846

HANDLING BULK MATERIALS BY RAILROAD CAR

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FIG. 1.

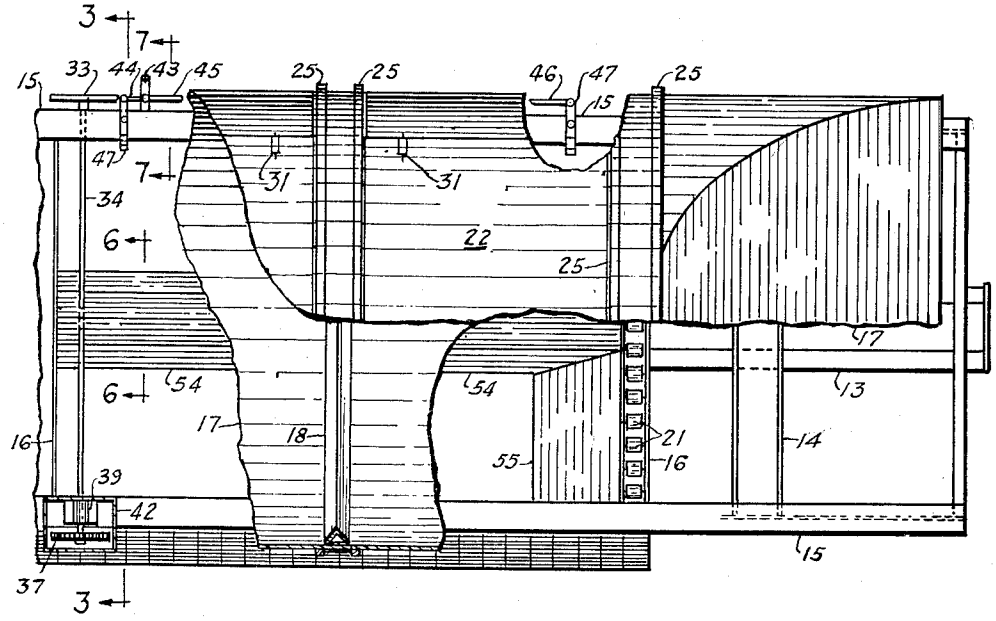
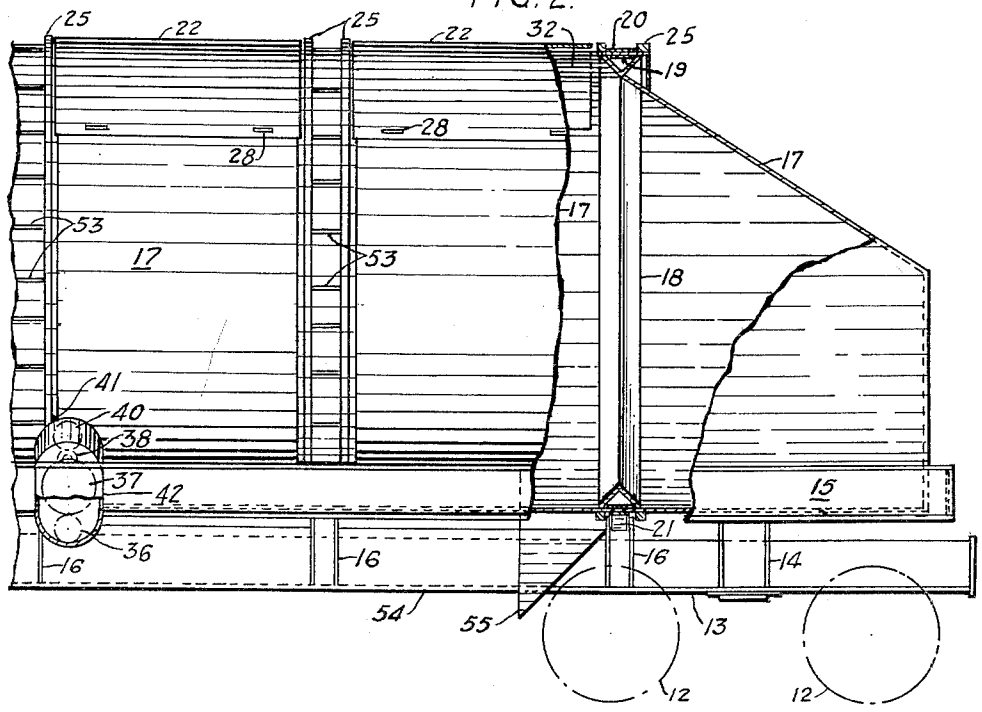


FIG. 2.



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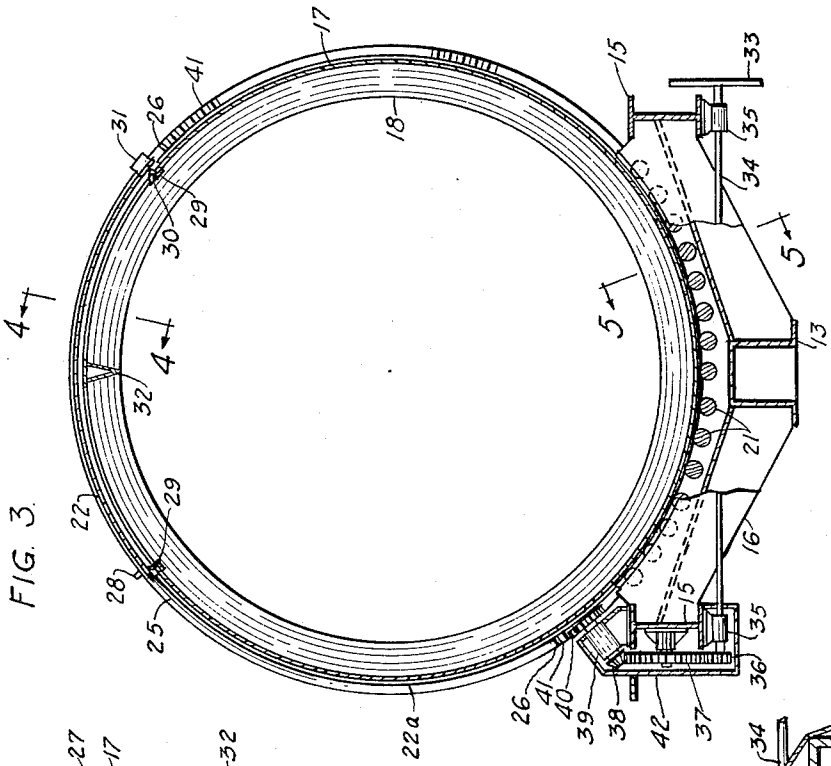


FIG. 3.

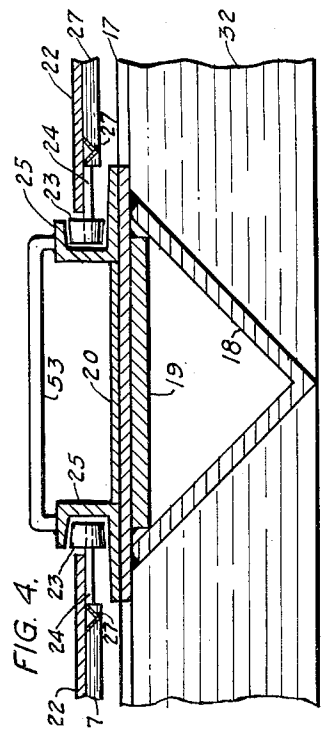


FIG. 4.

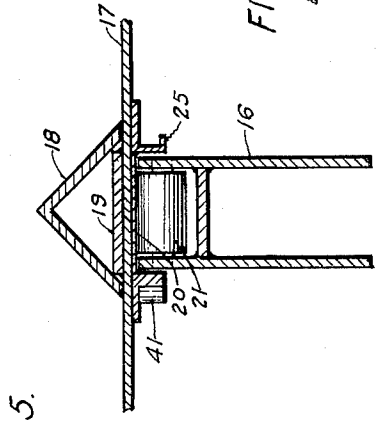


FIG. 5.

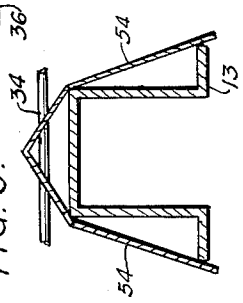


FIG. 6.

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FIG. 7.

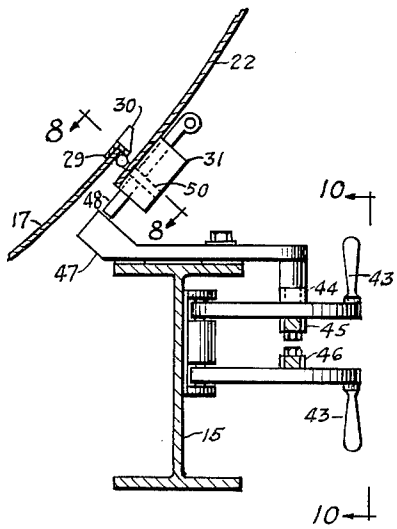


FIG. 8.

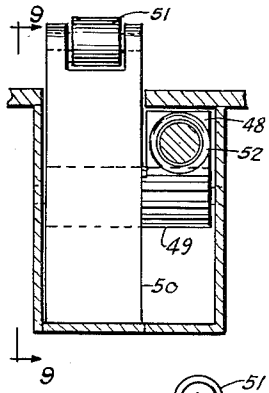


FIG. 9.

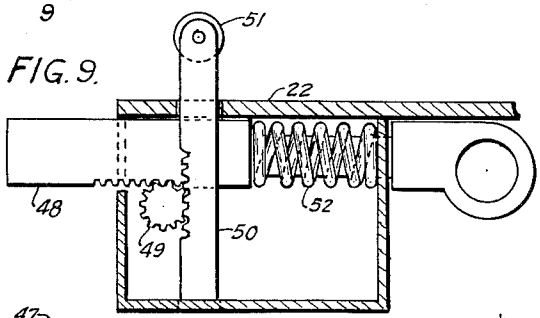


FIG. 10.

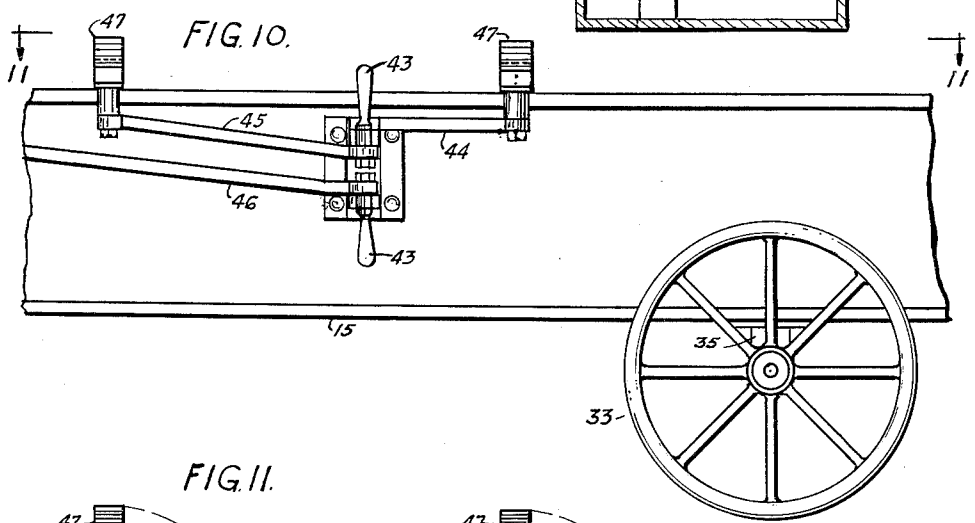
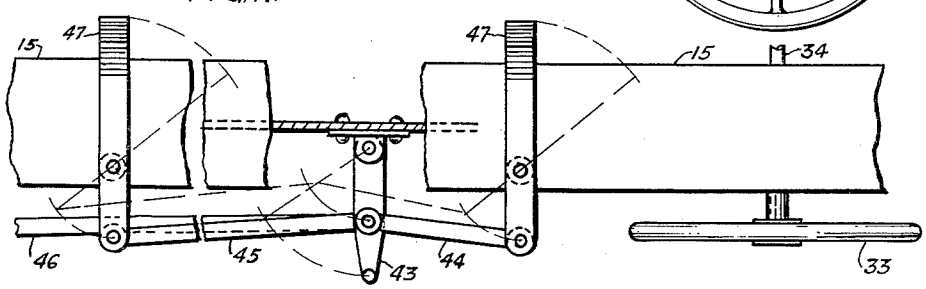


FIG. 11.



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3,016,846

HANDLING BULK MATERIALS BY RAILROAD CAR

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Filed Sept. 14, 1960, Ser. No. 56,026
8 Claims. (Cl. 105—270)

This invention relates to a universal bulk economy self unloading car to transport materials such as coal, ore, sand, bauxite, stone, wheat, corn, oats, or the like. The invention may be employed with particular advantage in time and economy in unloading the materials. The invention eliminates a car unloader, a car shaker, and means of heating frozen materials, as the invention embodies a self unloading device and an enclosed body to protect materials being transported from the elements, thus eliminating the need for car shakers or heaters to properly discharge the material.

The transporting of materials, such as mentioned, in bulk, in a car which will protect them from the elements and will allow the unloading of the materials without special handling equipment, is of considerable commercial advantage because of the tremendous saving of labor, capital investment, and maintenance, of auxiliary unloading equipment required with conventional hopper cars.

The principal object of the present invention is to provide a self unloading car to carry materials referred to, and others, whereby the body is constructed in a novel manner, to contain the material protected from the elements, during transportation. A further object of the invention is to provide a method of unloading materials by rotating the body of the car. A further object is to indicate a method of construction, for the support of a car body, allowing it to rotate freely, on the under carriage, to discharge the contents thereof. Other objects relate to the several features of construction, arrangements and operation which will appear more fully hereinafter. The nature of the invention will be understood from the following specifications taken with the accompanying drawings.

In the drawings, FIG. 1 shows a partial plan of the self unloading car with parts thereof broken away to reveal the interior construction and the body support on a typical railroad car underframe.

FIG. 2 shows a partial elevation of the car with portions thereof broken away.

FIG. 3 shows a cross section taken on the line 3—3 of FIG. 1, with a portion of the intermediate bolster broken away to illustrate the rollers on which the car body rotates; together with a showing of the means for rotating the car body.

FIG. 4 shows an enlarged detail section taken on the line 4—4 of FIG. 3.

FIG. 5 shows an enlarged detail section taken on line 5—5 of FIG. 3.

FIG. 6 shows a detail section taken on line 6—6 of FIG. 1.

FIG. 7 shows an enlarged detail section taken on line 7—7 of FIG. 1.

FIG. 8 shows an enlarged detail section taken on line 8—8 of FIG. 7.

FIG. 9 shows an enlarged detail section taken on line 9—9 of FIG. 8.

FIG. 10 shows an enlarged elevation taken on line 10—10 of FIG. 7.

FIG. 11 shows an enlarged plan view taken on line 11—11 of FIG. 10.

As illustrated in the drawings, the invention is embodied in a railroad car consisting of the standard wheeled trucks and flanged wheels 12 upon which there is supported the car underframe consisting of a conventional longitudinal center sill 13 and transverse body bolsters 14. The departure from the usual underframe consists in side sills 15 with intermediate bolsters 16 which partially support, in conjunction with center sill 15, the car body.

The car body to contain the material to be transported, consists of a plate shell 17, formed as a cylinder, with the end portions sloped to allow the easy discharge of the material when the car body is rotated 180°. This cylindrical shell 17 is reinforced, at points of support, at the intermediate bolsters 16, by means of an angle rib 18 curved to conform to the diameter of the shell body 17. Additional reinforcement is provided, to sustain the imposed loads, by means of a plate 19 fastened, by welding to the plate shell 17 and also by a hardened steel plate 20 welded or secured to the outside of the shell 17 to provide a rigid support on which the car body rotates on hardened steel rollers 21. The rollers 21 are in turn supported by the intermediate bolsters 16 transferring the load between the center sill 14 and side sills 15.

The car body shell 17 has openings for the loading of material and for its discharge. These openings are provided with sliding covers 22 which, after the material is loaded into the car body, are closed to protect the contents from the elements. The sliding arrangement is provided for by small rollers 23 attached to the sliding cover 22 by shafts 24 welded or otherwise secured to the sliding cover 22. The rollers ride freely in a track 25 curved to fit the plate shell 17 and fastened thereto by welding or other means and are of sufficient length to allow the movement of the sliding covers 22 from closed position to fully opened position 22*a*, shown in FIG. 3 and at the ends of which are stops 26 to hold the sliding covers 22 from going beyond their proper position. The sliding cover 22 is reinforced with small angles 27 to keep it firm and rigid. Handles 28 are provided on the sliding cover 22 to aid in opening and closing it.

The openings in the car body shell 17 are reinforced at the edges by means of an angle 29 to which is fastened a strike plate 30 located at the cover latching device 31. To strengthen the car body shell 17 in a longitudinal direction, where the openings occur, a bent plate rib 32 is welded to the inside of the shell 17 terminating at the rib angle 18.

The self unloading feature is carried out by having the shell 17 rotate through 180° on rollers 21, which is accomplished by turning a wheel 33 secured to a shaft 34 supported by bearings 35 on the underside of the side sill 15. Shaft 34 drives a gear 36 which meshes with a gear 37, which in turn meshes with a miter gear 38. Gear 38 is affixed to a shaft supported by a bearing 39 and carries a pinion gear 40 which in turn meshes with a circular rack gear 41 which is secured circumferentially about the outer surface of shell 17, causing the entire shell to rotate though an arc of 180°. The gear mechanism is enclosed in a dustproof cover 42 with a removable portion to allow for proper maintenance.

Levers 43, shown in FIG. 10, are arranged for movement from a closed position, indicated by dash lines in FIG. 11, to open position shown in full lines in the same figure. Levers 43 actuate connecting bars 44, 45 and 46 which operate the latch opening bars 47, locating the same in a position to release the latch device 31, which holds the sliding cover 22 in a closed position as shown in FIG. 7.

Levers 43 can be operated independently, to allow the opening of individual covers 22, to discharge the material at a confined location or may be operated simultaneously to discharge the entire contents in one operation. With the latch opening bars 47 in position to re-

lease latch device 31, and wheel 33 operated to rotate shell 17 approximately 90°, pin 48 on device 31 strikes the bar 47, and as rotation of shell 17 continues, pin 48 which is formed with rack teeth meshing with a gear 49, rotates said gear 49 which also meshes with rack teeth formed on a latch release bar 50 carrying a roller 51 at its outer end.

As release bar 50 is withdrawn, roller 51 rolls over angle 29 clearing the same and then holds cover 22 stationary while shell 17 continues to rotate approximately another 90° to allow discharge of material. After material is discharged from shell 17, the shell is rotated back to its original position by turning wheel 22 in the opposite direction. As the shell 17 returns to said position, roller 51 on release bar 50 rolls over strike plate 30 causing latch release bar 50 to actuate gear 49 which in turn moves pin 48 to compress spring 52 until roller 51 clears angle 29. When spring 52 expands, release bar 50 is moved to a position to lock cover 22 in place.

With shell 17 restored to its original, upright position and covers 22 are in their closed position, an access ladder 53 is provided, at each track 25, to allow personnel to climb to the top of the shell to release latches 31 by pulling pins 48 and sliding covers 22 back to their open position to allow for loading shell 17. After loading is completed, ladders 53 are used to allow personnel to close covers 22. Bent plates 54, shown in FIG. 6, deflect material, during the unloading operation, away from the center sills as does plate 55 shown in FIGS. 1 and 2.

The shell 17, its reinforcing ribs 18, 32 and plates 54, 55 are shaped so the inclination of any surface thereof is substantially greater than the angle of repose of the materials to be handled, so that there is no tendency for the material to adhere to these surfaces in unloading. By means of the instant invention, the novel method of unloading the material by rotating the car body breaks up the material which may have a tendency to pack during shipment.

The interior of the body 17 is so designed so cleaning of the same by steam, air or water is readily accomplished when the body is rotated to its discharge position, thus allowing materials of different kinds to be transported without being contaminated by materials previously handled.

It is thought, from the foregoing, taken in connection with the accompanying drawings, that the construction and operation of the novel device will be apparent to those skilled in the art, and that changes in shape, size, proportion and detail of construction may be made without departing from the spirit and scope of the invention.

While a single embodiment of the invention has been shown and described, by way of illustration, it is understood that all matter herein shown or described is not by way of limitation except as set forth in the appended claims.

I claim:

1. A freight car for transporting bulk material comprising a frame, a cylindrical shell arranged for rotation on said frame about its horizontal, longitudinal axis, means for rotating said shell, said shell having at least one combination filling and discharge opening in the wall thereof, cover means slidably mounted on said shell for covering said opening and arranged for movement relative to said shell between open and closed positions thereof, cooperating means on said cover and said frame for holding said cover stationary during rotation of said shell to bring the opening therein to a discharge position whereby to automatically expose said opening to allow the discharge of the contents of said shell.

2. A car as in claim 1 wherein said cooperating means comprises latch means on said cover, keeper means on said shell engageable by said latch means, and abutment means on said frame engageable by said latch means for actuating said latch means to disengage said keeper means and to cause relative movement between said cover and said shell in response to rotation of said shell.

3. A car as in claim 2 wherein said latch means comprises a slidable pin for abutting said abutment means and a bar engageable with said keeper means, said bar being retracted to a disengaged position in response to movement of said pin.

4. A railroad car comprising an underframe, a cylindrical shell mounted on said underframe for rotation about a horizontal, longitudinal axis thereof, said shell having at least one combination filling and discharge opening in the wall thereof, a cover for said opening arranged for slidable movement relative to the outer surface of said shell, means for rotating said shell to bring said opening to a discharge position, and means for automatically causing relative movement between said cover and said shell to expose said opening in response to continued rotation of said shell.

5. A car as in claim 4 wherein said shell has a plurality of openings in the wall thereof, a slidable cover for each opening, and means for selectively causing relative movement between at least one of said covers and said shell to expose the respective openings in response to rotation of said shell toward its discharge position.

6. A car as in claim 4 and including means for locking said cover in the closed position thereof against movement relative to said shell, and means operative to release said cover for movement relative to said shell in response to movement of said shell toward its discharge position.

7. A car as in claim 6 wherein said locking means comprises keeper means on said shell and a movable latch member on said cover engageable with said keeper means, and said release means comprises a movable member for actuating said latch member, and abutment means on said frame for engagement by said movable member to move said movable member to its operative position in response to continued rotation of said shell.

8. A railroad car comprising a frame, a cylindrical shell, means for rotatably mounting said shell on said frame for rotation about a horizontal, longitudinal axis thereof, a combination filling and discharge opening in the side wall of said shell, cover means movably mounted on said shell for covering said opening and arranged for movement to a position uncovering said opening, means on said cover and means on said frame interengageable upon rotation of said shell to a predetermined angular position, said interengageable means being operative in response to continued rotation of said shell beyond said predetermined position to cause relative movement between said cover and said shell to expose the opening in said shell.

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