Feb. 16, 1965 W. B. DARLINGTON ETAL 3,169,491

RAILWAY BOTTOM DUMP GONDOLA CAR

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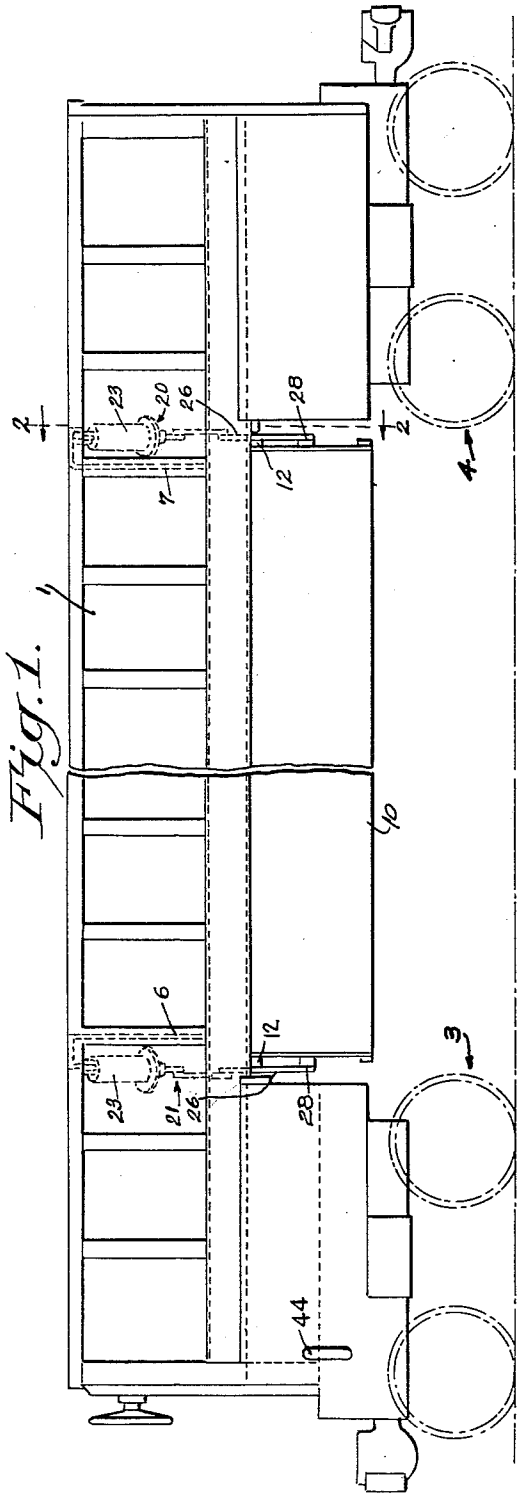


Fig. 1.

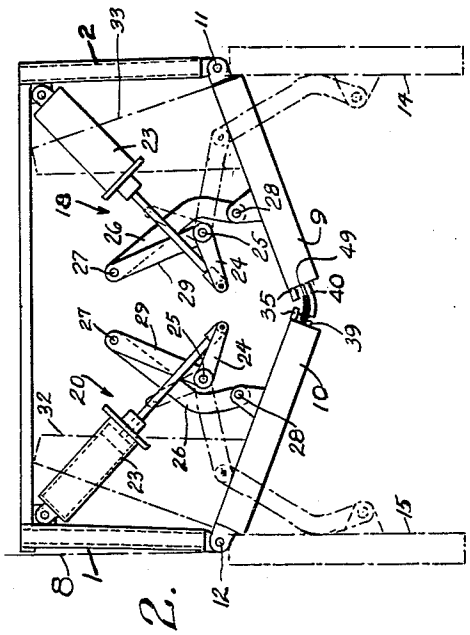


Fig. 2.

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RAILWAY BOTTOM DUMP GONDOLA CAR

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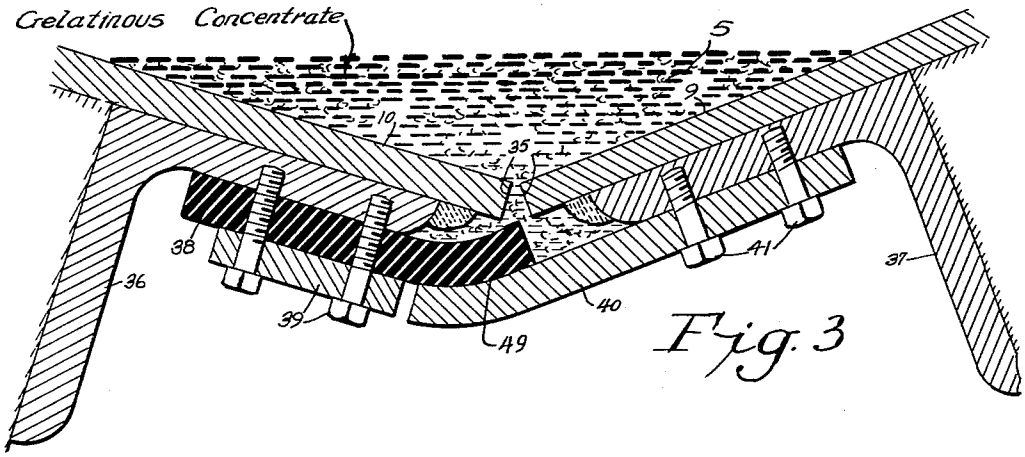


Fig. 3

Fig. 4.

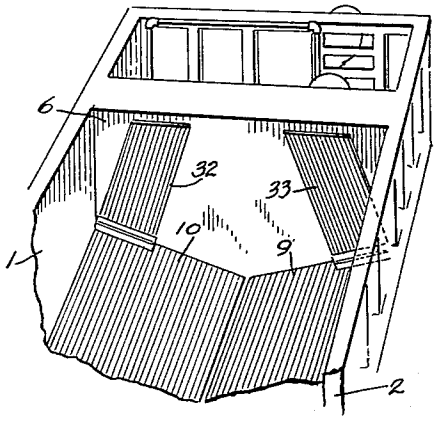
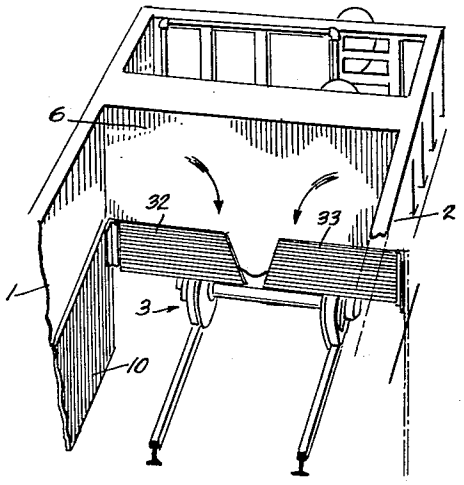


Fig. 5.



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RAILWAY BOTTOM DUMP GONDOLA CAR

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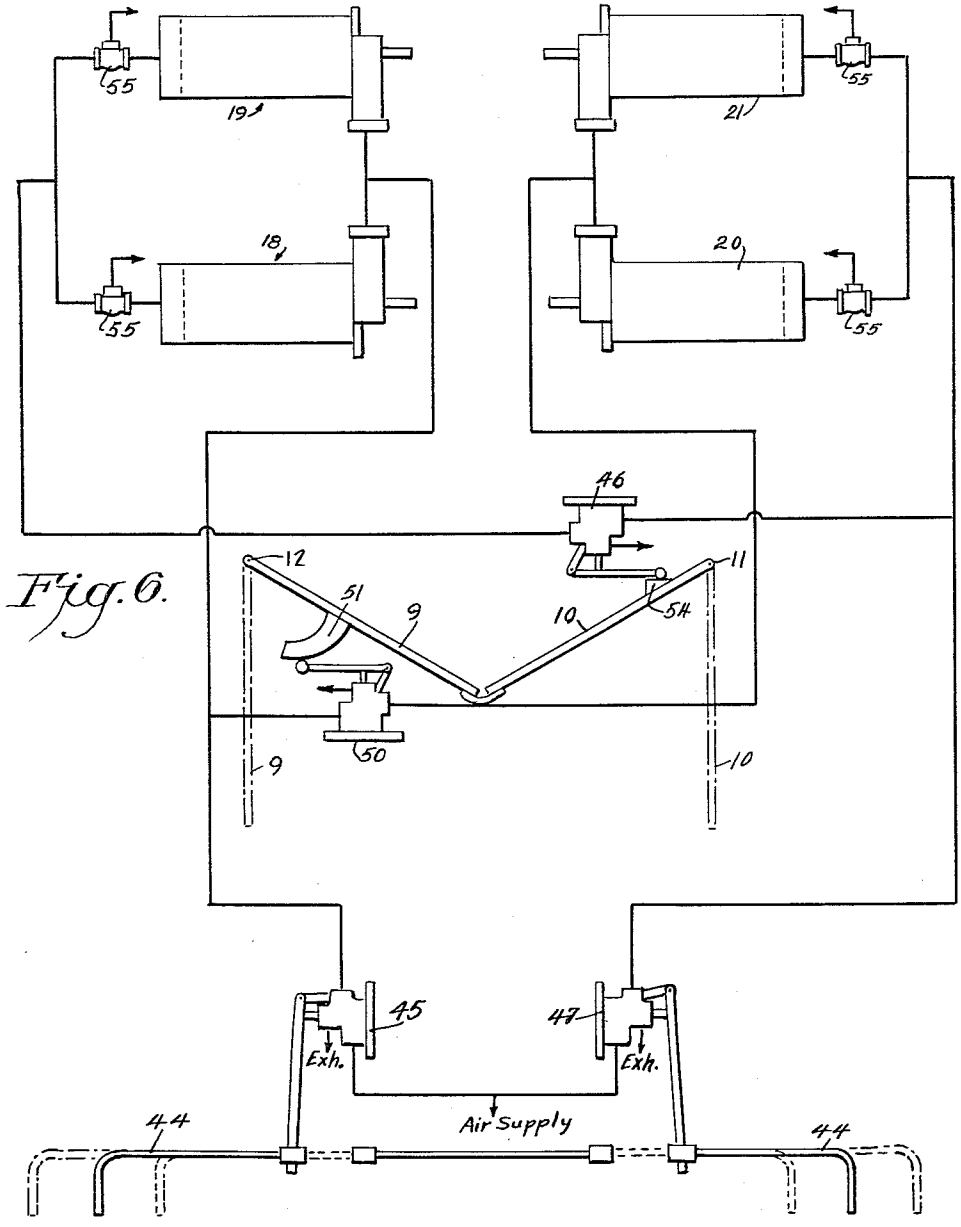


Fig. 6.

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3,169,491

RAILWAY BOTTOM DUMP GONDOLA CAR

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7 Claims. (Cl. 105—240)

This invention relates to railway bottom dump gondola cars.

Dump cars of this type are used for transporting many kinds of materials but the present invention is particularly adapted for transporting concentrate. Certain types of concentrate such as copper present a very severe problem in unloading, in that the concentrate has the perverse characteristic of being readily flowable when initially discharged into the car but turning into a gelatinous state during travel over the rails. In fact this gelatinous state evidences the peculiar conditions of being able to bridge over large openings such as the ordinary bottom openings of bottom dump gondolas heretofore used and yet in transit over the rails the concentrate will ooze or squirt out of the smallest openings thereby losing a large part of the concentrate. The bridging action of the concentrate is usually of such a tenacious nature that it requires workmen to break it loose with pneumatic crowbars or other forceful methods.

It is an object of our invention to provide an improved bottom dump gondola car that is highly effective in its unloading operation and that will practically eliminate the loss of valuable minerals in transit.

Another object is to provide an improved bottom dump gondola car that is relatively simple and economical in construction, operation and maintenance and that is extremely rugged and dependable without involving the need for power-driven hammering devices to unload the car.

Other objects and advantages will be more apparent to those skilled in the art from the following description of the accompanying drawings in which:

FIG. 1 is a general outline of the side elevation of our improved gondola car;

FIG. 2 is a transverse sectional view taken substantially on the line 2—2 of FIG. 1 with certain structural details omitted for sake of clarity;

FIG. 3 is an enlarged fragmentary transverse section adjacent longitudinal edges of the two doors when in their closed position to show the manner of sealing the doors;

FIG. 4 is a perspective view taken at one end of the interior of the car to show my improved blades for wiping material from the end walls of the cargo space during the opening of the doors, the doors being shown in their closed position in this figure;

FIG. 5 is a fragmentary perspective view similar to FIG. 4 but with the doors in their open position; and

FIG. 6 diagrammatically illustrates the operating and control mechanism for the doors, particularly to insure sequential opening and closing thereof.

In the particular embodiment of the invention disclosed herein, the car is shown, FIGS. 1 and 2, as consisting of side walls 1 and 2 extending generally for the full length of the car and supported at each end upon usual swivel trucks 3 and 4. The side walls are suitably cross connected to form a rigid unit. The structural details of such cars and the manner of supporting the same on the swivel trucks are all well-known in the art and hence need not be described herein. It will suffice to point out that the car body itself in which the gelatinous ore concentrate 5 is carried consists of stationary end plates 6 and 7 extending between the side plates between 1 and 2 and rigidly connected thereto, terminating at their lower edges

in a substantially V shape. The sides 1 and 2 are flared slightly outwardly toward the lower edge of the body, the slope preferably being about one inch in four feet as shown by a vertical line 8. The term "body" herein refers to the ore carrying portion of the car. The body is closed at its bottom by two doors 9 and 10 pivoted near their outer edges as at 11 and 12, the axes of these pivots being set outwardly from the inner surfaces of the walls 1 and 2 so that when the doors are fully opened the inner surfaces 14 and 15 of the doors will lie vertically clear of the lower ends of the outwardly inclined walls 1 and 2.

To operate these doors, door 10 is provided, FIG. 1, with two sets of operating mechanisms 20 and 21 located respectively at each end of the door and door 9 is similarly provided with two sets of operating mechanism 18, FIG. 2, and at 19 as diagrammatically indicated in FIG. 6. These mechanisms are identical except for being placed on the right and left sides of the car and hence the description of one will suffice for all. The operating mechanism consists as shown in FIG. 2 of an air-operated piston and cylinder servomotor 23 whose piston rod is connected to a short arm 24 of a bell crank having a stationary pivot 25 on the car structure. A bent link 26 has one end pivotally connected at 27 to a long arm 29 of the bell crank and its other end pivotally connected at 28 to the door. When the door is in its closed position the pivot 27 is in a locking position by reason of being off-center with respect to a straight line containing the axes of pivots 25 and 28. To open the doors the servomotor e.g., the left hand servomotor 23 in FIG. 2, is operated to swing the bell crank 24, 29 in a counterclockwise direction to move link 26 downward and the other servomotors are operated in directions to move their links 26 downwardly.

When the doors are moved downwardly a pair of blades 32 and 33 FIGS. 4 and 5 rigidly secured to each end of each door and disposed adjacent to the end walls 6 and 7 swing downwardly to the position shown in FIG. 5 thereby breaking loose any material adhering to these end walls, the material along the side walls being released therefrom by the downward outward slope thereof. Also, the elimination of briding is rendered effective in that the doors extend for the full length of the car body with no cross bracing or transverse walls extending across the load carrying space.

To effectively prevent loss of material from the car in transit we provide a seal along the adjacent lengthwide edges 35, FIG. 3, of the doors which are reinforced along such adjacent edges by angle iron 36 and 37. A thick neoprene strip 38 extends for the full length of the door 10 and is held thereto by a clamping plate and bolts 39. A sealing plate 40 also extends for the full length of the other door 9 and is secured thereto by a series of bolts 41. As shown in FIG. 3 the sealing plate 40, when in its closed position, firmly engages the flexible sealing strip 38 causing the latter to be bent upwardly into firm sealing contact with seal 38. The inner edge of sealing plate 40 is preferably slightly curved to insure a maximum supporting area over the flexible seal 38. Additional sealing pressure will be provided by cargo material bearing down on the flexible sealing strip 38. The ends of the doors are suitably sealed by strips along each lower edge of the end plates 6 and 7.

To insure an effective sealing action the doors are sequentially opened and closed so that sealing plate 40 will always be on the under side of the flexible seal 38. The operating mechanism for accomplishing this will be more apparent from the description of the mode of operation of such mechanism as shown in FIG. 6. To open the doors either one of a pair of handles 44, extending transversely of the car to each side thereof for convenience

of the operator, is moved to the right thereby shifting a 3-way valve **45** to admit air to the piston rod end of cylinders **18** and **19** thus opening door **9**. Doors **9** and **10** are shown in reverse in FIG. 6 to that of FIGS. 2 and 3, this being done for simplicity of the operating diagram of FIG. 6. The head end of the cylinders is exhausted through valves **46** and **47**. When door **9** opens sufficiently to clear the lap **49**, FIG. 3, of door **10**, the door **9** operates a 3-way valve **50** by means of a cam **51** mounted on door **9** to move therewith. Operating of valve **50** admits air to the piston rod end of cylinders **20** and **21** which thereupon opens door **10**. The head end of cylinders **20** and **21** exhausts through valve **47**.

To close the doors the handles **44** are moved to the left, FIG. 6, to shift 3-way valve 47 so as to admit air to the head end of cylinders **20** and **21** for first closing door **10**. The connecting rod end of the cylinders exhaust through valves **50** and **45**. When door **10** is closed it operates 3-way valve **46** by means of cam **54** secured to the end of door **9**. Valve **46** thus admits air to the head end of cylinders **18** and **19** to close door **9**. The connecting rod end of these cylinders exhausts through valve **45**.

Valves **45**, **46**, **47** and **50** are identical 3-way valves which may be of any well-known lever operated, spring return type. When their levers are depressed a cylinder is connected to the source of pressure and when a spring returns the valve the pressure connection is closed and the cylinder is connected to usual exhaust ports in a valve body to atmosphere. When door **9** is opened it holds valve **50** tripped so that it acts as a **T** in the line when door **10** is being closed. When door **10** is closed it holds valve **46** tripped so that it acts as a **T** in the line when door **9** is being opened. Check valves **55** have preferably a 1/16" check hole in them to control the speed of exhaust from the head ends of the cylinders thereby controlling the speed of opening the doors.

From the foregoing disclosure it is seen that we have provided a bottom dump gondola car that is extremely effective in insuring unloading of the car in minimum time by reason of preventing bridging action of the ore concentrates and at the same time of preventing the loss of valuable minerals in transit. The inverted tapered sides of the car body together with having the bottom opening completely clear across its entire width, as well as along its length, when its doors are opened has been found in actual practice to be highly effective. The wiping blades at each end of the doors are extremely useful with certain materials. In addition, the structure and operating mechanism is relatively simple and economical in construction, operation, and maintenance, and is sturdy and reliable as well having the operating mechanism compactly arranged at the ends of the car body within the limits of the sides thereof.

It will of course be understood that various changes in details of construction and arrangement of parts may be made by those skilled in the art without departing from the spirit of the invention as set forth in the appended claims.

We claim:

1. A bottom dump gondola car comprising a body with side walls, a pair of bottom doors pivotably mounted on the lower portion of said side walls, means to open and close said doors, the distal ends of said doors being adjacent each other when in a closed position, a resilient and flexible sealing element mounted on the distal end of one door, a rigid support for said resilient and flexible sealing element mounted on the distal end of the other of said doors, whereby said rigid support deforms said sealing element when said doors are in a closed position.

2. A bottom dump gondola car according to claim 1 wherein said means to open and close said doors includes latch means to hold said doors in a closed position.

3. A bottom dump gondola car according to claim 1 wherein said rigid support is bent toward said one door to thereby extend the area of support given said sealing element.

4. A bottom dump gondola car according to claim 1 wherein said means to open and close said door includes means to sequentially operate said doors so that the door with the sealing element mounted thereon has closing movement ahead of the door with the rigid support, thereby insuring that the rigid support will be beneath the sealing element.

5. A bottom dump gondola car according to claim 4 wherein said means to open and close said doors includes power means for effecting opening and closing of said doors, and cam means on said doors cooperating with said power means for controlling the sequential operation of said doors.

6. A bottom dump gondola car according to claim 1 wherein said body includes a pair of vertical parallel end walls, a pair of blades mounted on each of said doors adjacent and parallel the end walls of said dump car, whereby said blades arcuately move across said end walls when said doors open.

7. A bottom dump gondola car according to claim 1 wherein said side walls slope downwardly outwardly.

References Cited by the Examiner

UNITED STATES PATENTS

544,060	8/95	Davidson	298—30
577,452	2/97	Richardson	15—257.2
657,021	8/00	Caswell	105—280
688,174	12/01	Hipp	105—253
761,550	5/04	Simonton	105—424 X
776,149	11/04	Simonton	105—424 X
801,302	10/05	Currie	298—30
861,208	7/07	Dodds	105—250
884,323	4/08	Dodds	105—244
908,417	12/08	Neal	298—30
919,964	4/09	Seelow	298—35
965,795	7/10	Blaker	105—272
1,019,263	5/12	Lindstrom et al.	105—240
1,218,920	3/17	Averill	294—69
1,232,822	7/17	Malcher	105—243
1,908,096	5/33	Yost	105—250
1,955,868	4/34	Wine	105—424 X
1,967,845	7/34	Streun	222—503
2,036,170	3/36	Fildes	294—69
2,836,461	5/58	Shadwick et al.	298—35
1,232,822	7/17	Malcher	105—243

FOREIGN PATENTS

136,498	10/11	Canada.
739,563	11/55	Great Britain.

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