June 27, 1933. R. C. PIERCE 1,915,757

CAR

Original Filed Dec. 15, 1930 5 Sheets-Sheet 1

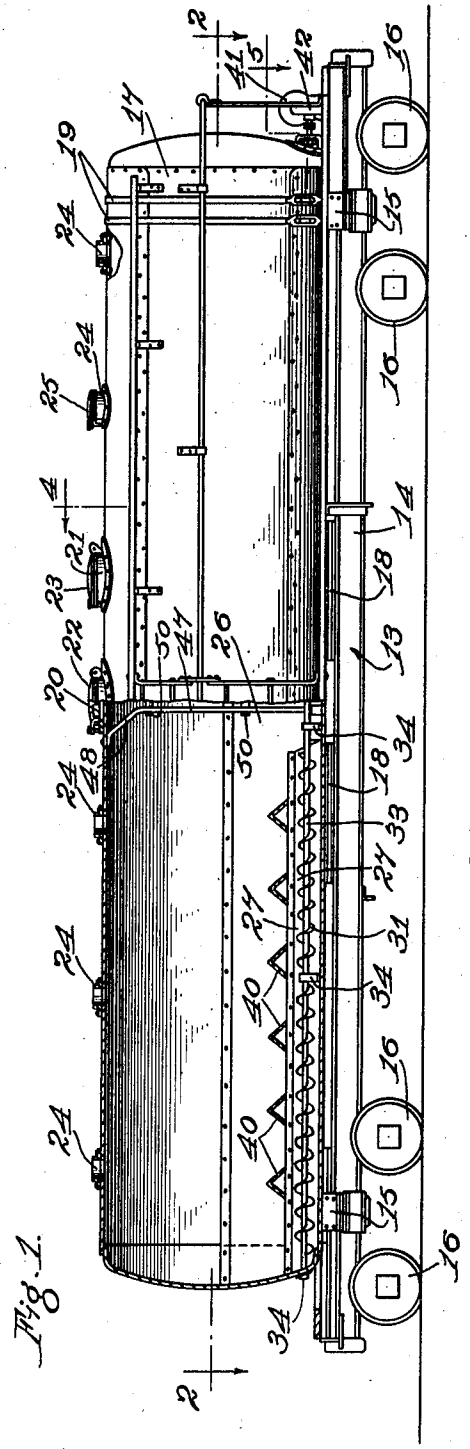


Fig. 1.

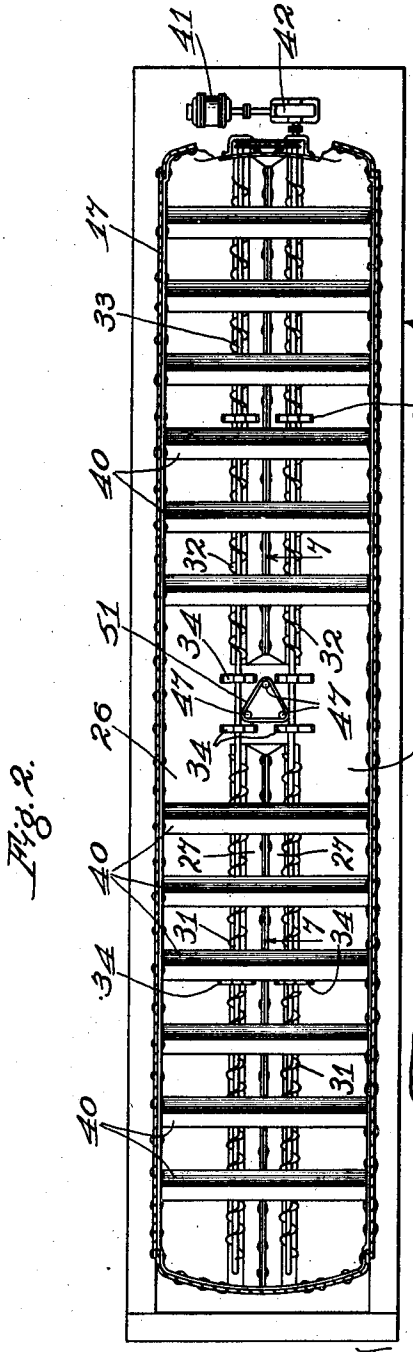


Fig. 2.

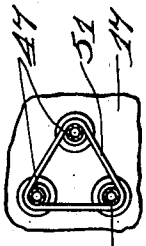


Fig. 3.

Inventor.
Raymond C. Pierce.
By Dyrenforth, Lee, Chritton & Wilk
Attys.

June 27, 1933. R. C. PIERCE 1,915,757

CAR

Original Filed Dec. 15, 1930 5 Sheets-Sheet 2

Fig. 4.

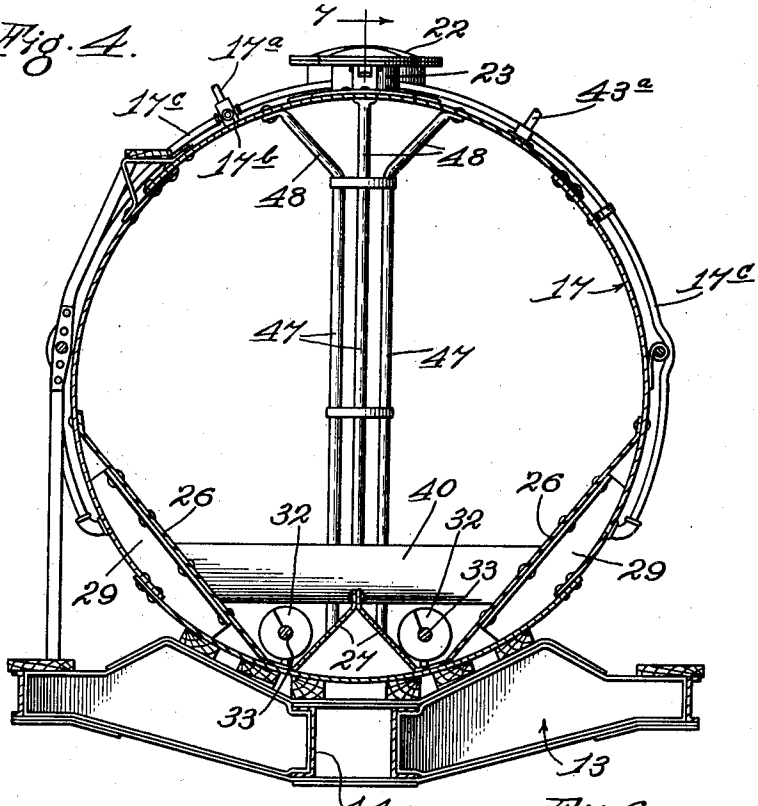


Fig. 5.

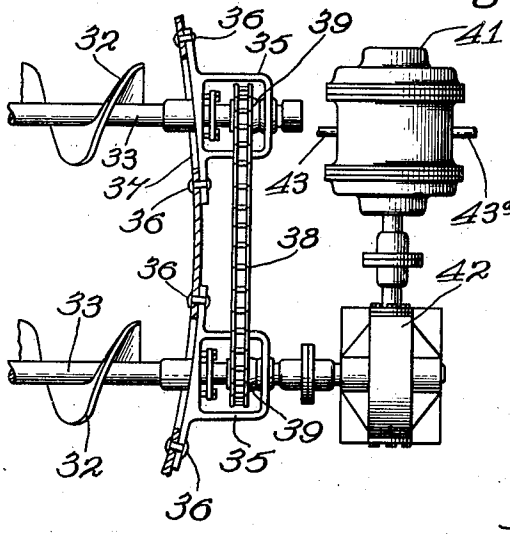
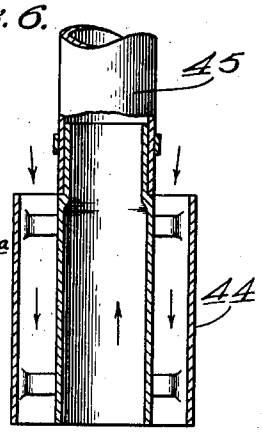


Fig. 6.



Inventor.
Raymond C. Pierce.
By Dyrenforth, Lee, Christen & Voiles.
Attys.

June 27, 1933. R. C. PIERCE 1,915,757

CAR

Original Filed Dec. 15, 1930 5 Sheets-Sheet 3

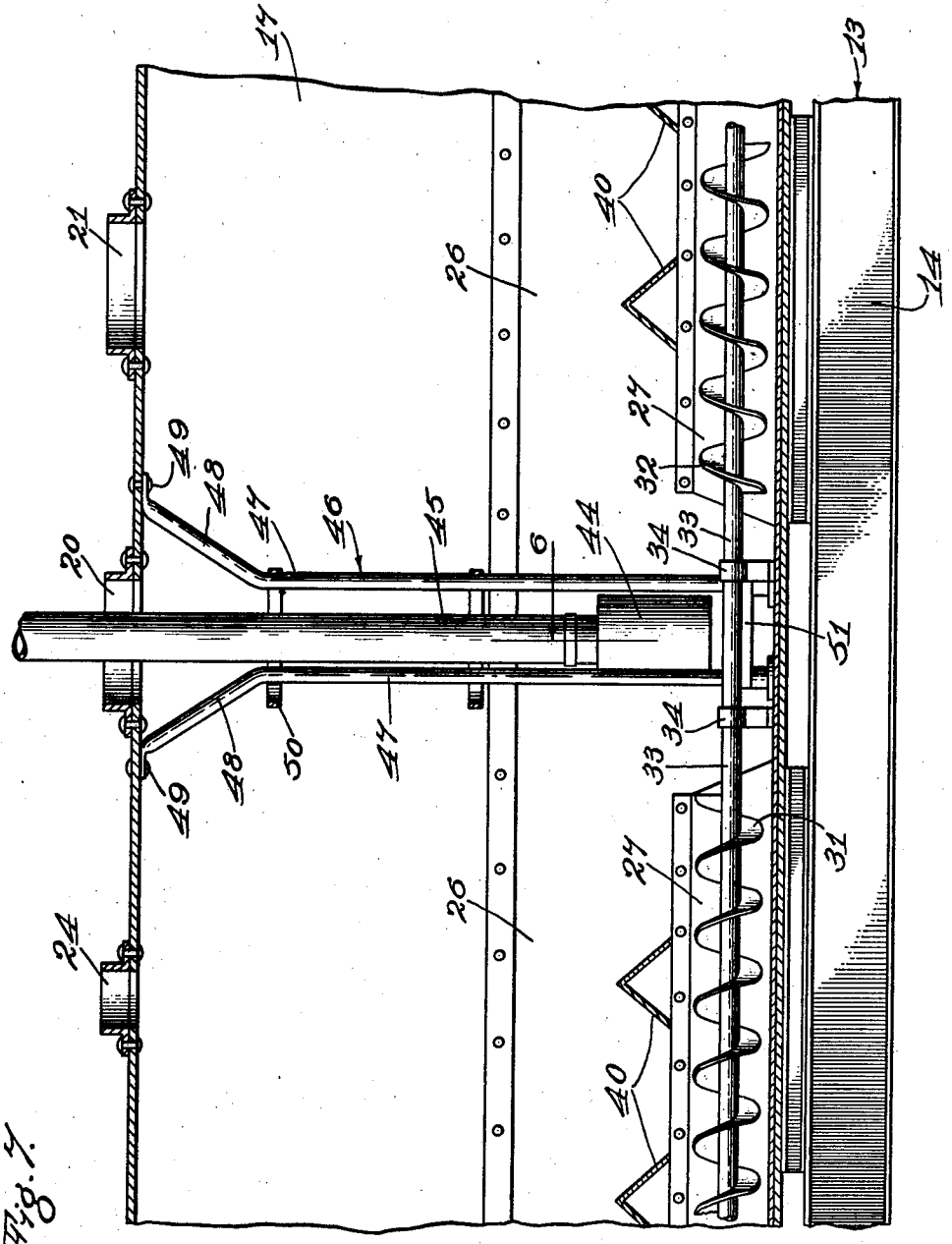


Fig. 1.

Inventor.
Raymond C. Pierce.
By Dyrenforth, Lee, Chritton & Wilks
Attys.

June 27, 1933. R. C. PIERCE 1,915,757

CAR

Original Filed Dec. 15, 1930 5 Sheets-Sheet 4

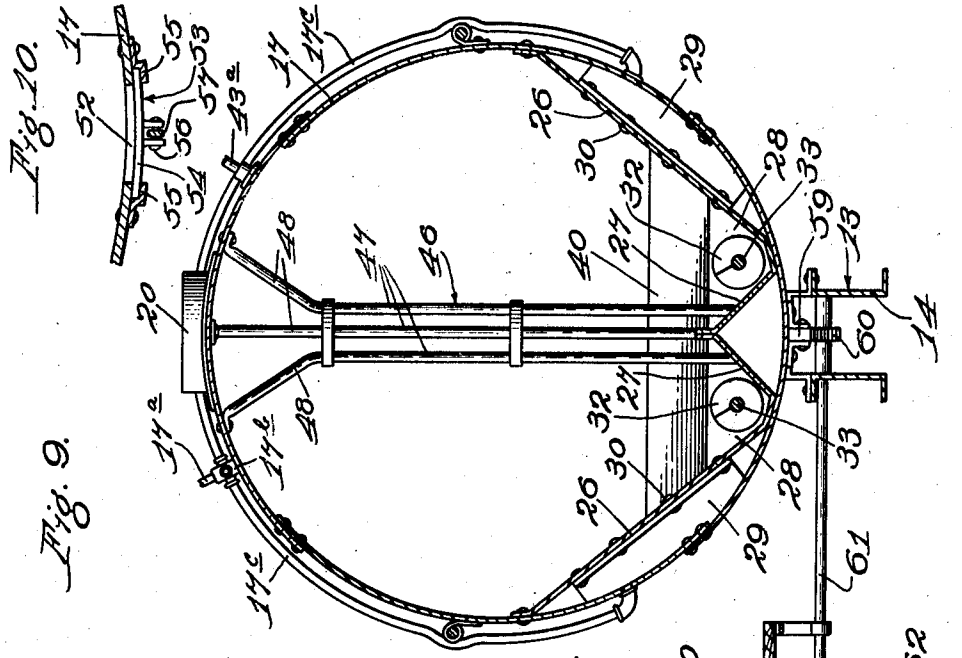


Fig. 10.

Fig. 9.

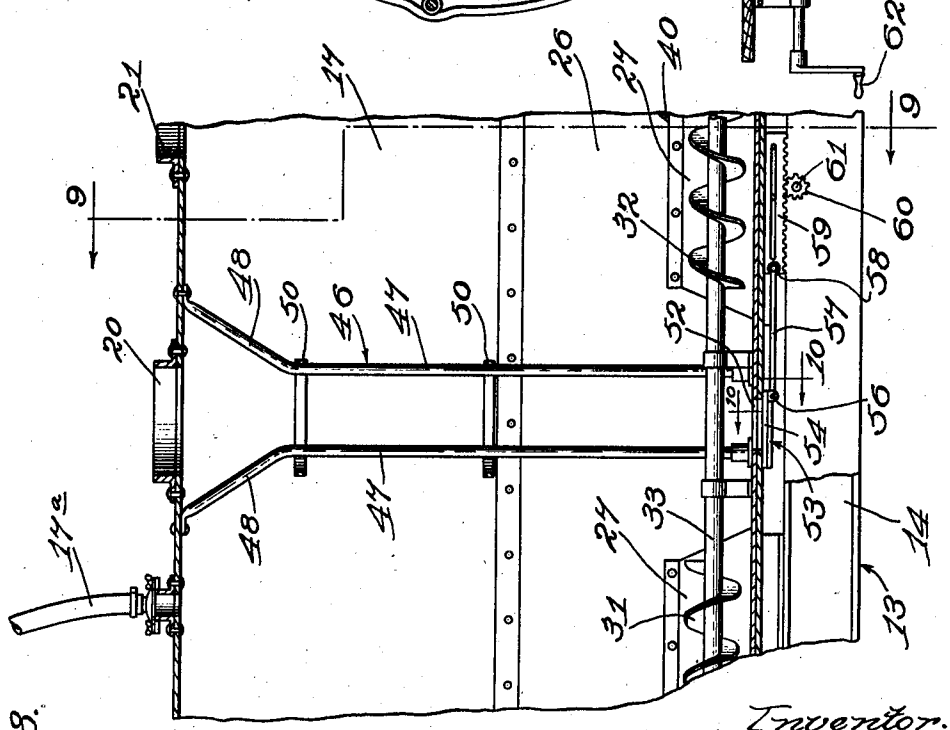


Fig. 8.

Inventor.
Raymond C. Pierce.
By Dyerforth, Lee, Christie and Wills.
Attys.

June 27, 1933. R. C. PIERCE 1,915,757

CAR

Original Filed Dec. 15, 1930 5 Sheets-Sheet 5

Fig. 11.

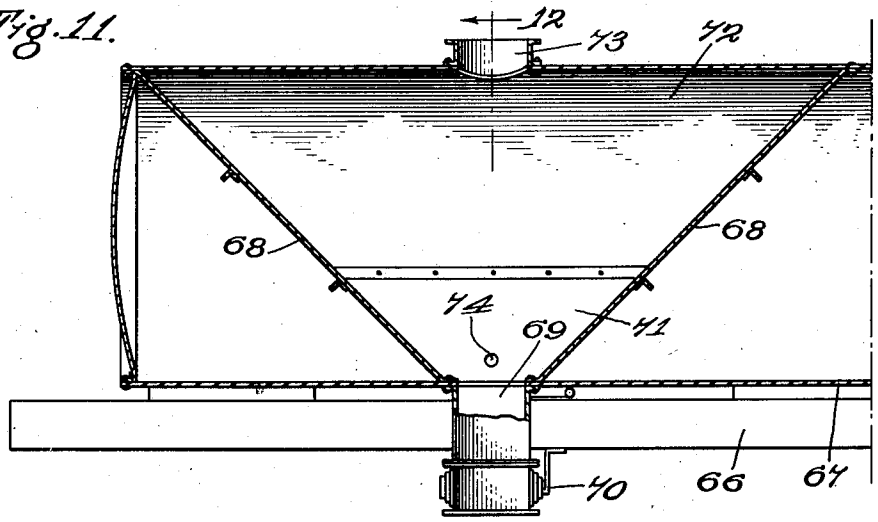
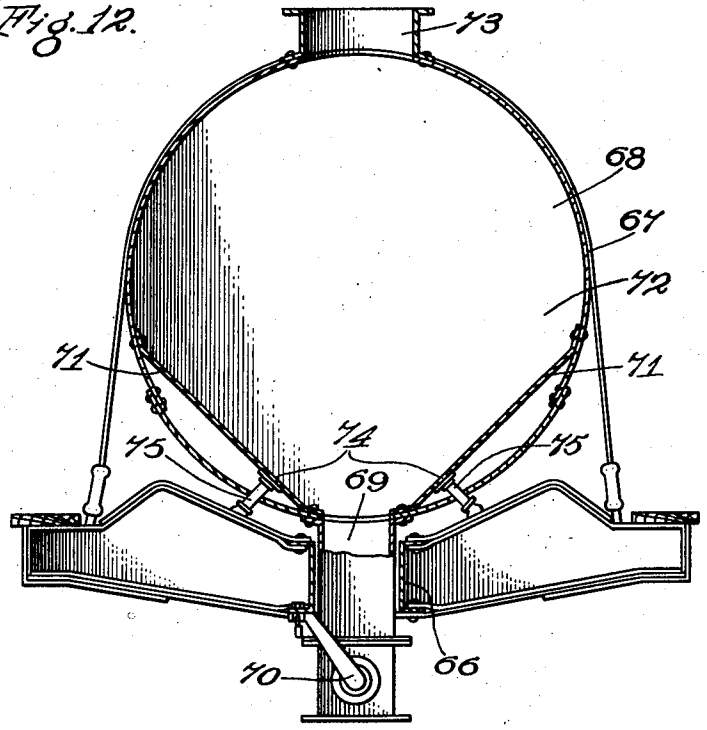


Fig. 12.



Inventor.
Raymond C. Pierce.
By Dyrenforth, Lee, Chritton & Wilkes
Attys.

Patented June 27, 1933 1,915,757

UNITED STATES PATENT OFFICE

RAYMOND C. PIERCE, OF CHICAGO, ILLINOIS, ASSIGNOR TO GENERAL AMERICAN TANK CAR CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA

CAR

Application filed December 15, 1930, Serial No. 502,525. Renewed November 26, 1932.

My invention relates more particularly to cars for transporting in bulk relatively fine material such as for example pulverized coal, cement, soda ash, pulverized clay, flour, sulfur, grains and seeds.

According to prior practice the common procedure is to load such material into sacks, boxes, or barrels weighing usually from fifty pounds to four hundred pounds each, and in such packaged condition trucked into the cars in which the material is to be shipped, and in some instances the material has been loaded in bulk into paper lined box cars.

The shipping of such material either in packaged condition or in bulk in box cars as stated involves relatively great expense in the loading and unloading of the cars due to the high cost of labor required and in the case of packaged material the additional expense for the packages.

One of my objects is to provide for the more expeditious and economical transportation of ladings of the character above referred to.

Another object is to provide a novel, simple and relatively inexpensive construction of car suitable for the transportation of such ladings.

Another object is to minimize the amount of labor required in the loading of such material into cars and the unloading thereof; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view partly in side elevation and partly in longitudinal section of a railway car constituting one of the embodiments of my invention.

Figure 2 is a plan sectional view taken at the line 2—2 of Fig. 1 and viewed in the direction of the arrows.

Figure 3 is an enlarged plan sectional view of the guide for the nozzle of a suction conveyor for use in unloading the car.

Figure 4 is a enlarged cross sectional view of the car taken at the line 4 on Fig. 1 and viewed in the direction of the arrow.

Figure 5 is a broken fragmentary plan sectional view of the car taken at the irregular line 5 on Fig. 1 and viewed in the direction of the arrow.

Figure 6 is a broken enlarged sectional view of the suction-nozzle referred to, the section being taken at the line 6 on Fig. 7 and viewed in the direction of the arrow.

Figure 7 is a broken section taken at the line 7 on Fig. 4 and the line 7—7 on Fig. 2 and viewed in the direction of the respective arrows.

Figure 8 is a view like Fig. 7 of a modification of the structure of the preceding figures.

Figure 9 is a section taken at the irregular line 9—9 on Fig. 8 and viewed in the direction of the arrows.

Figure 10 is an enlarged section taken at the irregular line 10—10 on Fig. 8 and viewed in the direction of the arrows.

Figure 11 is a view in longitudinal sectional elevation of one of the similar ends of a car constituting another embodiment of the invention as to certain features of the latter; and

Figure 12, a section taken at the line 12 on Fig. 11 and viewed in the direction of the arrow.

Referring to the construction of car shown in Figs. 1 to 7, inclusive, 13 represents the underframe of the car which may be of any desirable construction that shown being of the common center sill type comprising, generally stated, a center sill 14 suitably supported at its ends on bolsters 15 which in turn are supported on trucks in accordance with common practice the wheels of which are represented at 16.

The car also comprises a cylindrical tank represented at 17 supported on its side on the bolsters 15 and extending lengthwise of the underframe, the tank 17 being constructed of sheet metal in accordance with the common practice of manufacturing tank cars as commonly provided.

The tank 17 may be held on the underframe against shifting thereon in any desirable manner as for example by anchors 18 shown as located adjacent the middle of the tank, the ends of which latter are free to slide on the bolsters 15 and are engaged by tank bands 19

anchored to the underframe and extending over the tank at its opposite ends.

The top of the tank 17 adjacent its center and also to one side thereof is provided with manholes 20 and 21 equipped with removable closures 22 and 23, respectively, of any suitable construction. At intervals along the top of the tank loading-hatches 24 are provided each of which is equipped with a removable closure such as that represented at 25 of one of the hatches.

Located inside the tank 17 and extending lengthwise thereof throughout its length at opposite sides of its median line are slope sheets 26 which incline upwardly and outwardly from the median line of the tank as shown, the lower edges of these sheets forming, in combination with upwardly converging plates 27 at the median line of the car, hopper shaped troughs 28; the slope sheets 26 being preferably backed at intervals along their length by angle plates 29 secured thereto by the rivets 30 and bearing against the inner surface of the tank 17, for the purpose of preventing the deforming of the sheets 26 by the weight of the lading imposed thereon as hereinafter described; and the plates 27 extending from the ends of the tank to points short of the vertical plane in which the manhole 22 extends, as represented in Figs. 1, 2 and 7.

The tank 17 which is thus constructed to present a bottom of general hopper form, is provided with conveyors shown as of the screw type for moving the lading of fine material loaded into the tank as hereinafter described, from opposite ends of the tank to a point midway between its ends and in vertical alinement with the manhole 20.

In the construction shown one set of screw conveyors comprising a right and left-hand screw is located in each trough 28, the screws of each set thereof being represented at 31 and 32 and secured to a shaft 33 extending lengthwise of the car and journalled in bearings 34 and 35. The bearings 35 are secured, as by the rivets 36, to one of the end walls of the tank 17 which latter is preferably apertured, as represented at 37, to permit of the expeditious installing of the screw conveyors in the tank and their removal therefrom, if desired.

The two shafts 33 are connected together by a sprocket-drive comprising a chain 38 engaging sprockets 39 on the shafts 33 which drives these shafts in the same direction so that the screw elements on these shafts operate to convey the lading from opposite ends of the car to a point midway between its ends as above stated.

Inasmuch as the lading is superposed on the screw conveyors it is desirable that these conveyors be relieved of at least a portion of the dead weight of the lading and to this end the tank 17 is preferably provided at intervals with members 40 having upwardly converging sides which extend crosswise of the tank from one slope sheet 26 to the other thereof.

Any suitable means, such as an electric motor or air motor, for driving the conveyors may be provided, it being preferred that such means be provided as a part of the car equipment as shown. In the particular construction shown these means comprise a compressed air operated motor represented at 41 and operatively connected, through reduction gearing represented generally at 42, with one of the shafts 33, the inlet of the motor 41 being represented at 43 and its outlet at 43^a.

In the case of the car now being described, it is contemplated that the unloading thereof be effected by means of suction conveyor apparatus or pressure-conveyor apparatus installed at the place where the car is to be unloaded. The conveyor apparatus shown is of a common form of the suction type which as commonly provided comprises a suction-nozzle represented at 44 and carried on the lower end of a pipe 45 through which the suction is exerted to convey through the pipe 45 to a point of discharge the material in which the nozzle 44 is partially submerged.

The suction-nozzle 44 which, for effecting the unloading of the car, is introduced into the latter through the manhole 20, is guided for vertical movement by the guide structure represented generally at 46 and located in vertical alinement with the manhole 20, the guide structure shown comprising three upwardly extending rods 47 disposed in a triangular arrangement with the upper ends outwardly inclined as represented at 48 and connected with the tank as for example by the rivets shown at 49, bands 50 surrounding the rods 47 and secured thereto serving to hold the latter in the desired spaced relation. The nozzle 44 is movable up and down between these rods grouped as stated the point to which it may be lowered being determined by any suitable stop means as for example those shown and comprising a strap member 51 embracing the guide rods 47 adjacent their lower ends and extending into the path of downward movement of the nozzle 44.

As will be understood from the foregoing description the lading to be charged into the tank 17 may be introduced therein through any one or all of the above described openings in the top of the tank either by spouting it into the tank or otherwise discharging it into the tank.

In the unloading of the car the suction-nozzle 44 is introduced through the manhole 20 into the material in the tank which, under the operation of the suction apparatus, is withdrawn through the pipe 45, the nozzle 44 being lowered progressively as the level of the material at the nozzle 44 lowers. As the nozzle 44 nears the limit of its downward movement the screw conveyors above de-

scribed are set into operation and operate to effect a continuous feed of the material from opposite ends of the car to the center thereof where it may be operated on by the suction apparatus to discharge it from the car it being understood that by constructing the car as shown the lading is steadily moved from the end portions of the car to an unloading point where the material is subjected to the suction apparatus for removing it from the car.

The suction action produced in the pipe and exerted against the lading in the unloading operation may be augmented as by supplying air pressure to the interior of the tank at the top thereof through a pipe 17^a leading from any suitable source of air under pressure and opening at 17^b into the tank 17, or by leading the exhaust air from the air motor 41 through the pipe 43^a into the top of the tank, or by a combination thereof; the pipe 17^a also communicating with pipes 17^c which open into the spaces between the slope sheets 26, and the side wall of the tank 17 for equalizing the air pressure on opposite sides of the slope sheets.

Furthermore, if desired, the unloading of the tank may be effected through the conveyor pipe 45 by air pressure, instead of suction, introduced into the tank and exerted against the lading, as for example through the pipe 17^a aided, if desired, by the exhaust air pressure from the motor 41 entering the tank through the pipe 43^a.

It is also contemplated that, if desired, the unloading of the car may be effected by discharge through a lower outlet in the tank 17 preferably with the aid of compressed air. As illustrative of a construction by which such discharge of the material may be effected, reference is made to the construction shown in Figs. 8, 9 and 10 of the drawings which illustrate a car which may be unloaded either by suction conveyor mechanism as described of the car of the preceding figures, or by gravity discharge aided by air pressure.

The car of Figs. 8, 9 and 10 is of the same construction as that shown in Figs. 1 to 7, inclusive, except for the addition of a discharge opening 52 in the bottom of the tank 17 midway between its ends and controlled by closure mechanism represented generally at 53.

The closure means 53 above referred to are shown as comprising a plate 54, forming a gate, slidably mounted in guides 55 for movement into and out of a position for preventing the discharge of the material through the outlet 52, the gate 54 being shown as pivotally connected at one end 56 with a link 57 pivoted at 58 to a reciprocably-supported rack 59 actuated by means of a pinion 60 secured to a shaft 61 suitably journalled on the underframe of the car and extending at one end into a position in which it is accessible for operation as for example by a crank handle 62 thereon.

The means for supplying air pressure to the interior of the tank for forcing the lading therefrom through the outlet 52 comprise the pipe 17^a, which may be supplemented if desired by the exhaust air pressure supplied to the tank from the air motor 41 through the pipe 43^a.

It will be understood from the foregoing description that the lading in the particular construction just described may be removed either by means of the suction or pressure conveyor mechanism introduced into the tank 17 through the manhole 20 in which case the outlet 52 would be closed, or by gravity, aided by air pressure, in which latter case the outlet 52 would be open and the compressed air introduced into the interior of the tank above the lading would operate to forcibly drive the material through the outlet 52 to which it is steadily moved by the action of the conveyors.

Referring now to the construction of car shown in Figs. 11 and 12, it comprises an underframe indicated generally at 66 and corresponding with the underframe of the construction of Figs. 1 to 7, inclusive, the underframe having superposed thereon a cylindrical tank 67 one end only of which is shown in Fig. 11, the other end thereof being of similar construction.

The tank 67 contains slope sheets 68 which extend crosswise of the tank and converge downwardly to an outlet 69 at the bottom of the tank this outlet being shown as provided with valve mechanism represented at 70 forming a removable closure for the outlet. Other downwardly converging slope sheets 71 are positioned in the tank these slope sheets extending lengthwise of the tank and from one to the other of the slope sheets 68 and terminating adjacent the outlet 69 whereby this part of the tank 67 is caused to present a compartment 72 of general hopper form, in vertical alinement with the outlet 69, to which the fine material to be carried therein is supplied in any suitable way through an opening 72 in the top of the tank 67 preferably in vertical alinement with the outlet 69. Of course, it will be understood that in the particular construction now being described the hopper construction 72 is provided at each end of the tank, it being further understood that if desired the number of the hopper-compartments 72 may be varied.

In the case of the construction just described it is desirable where the lading is of such character that it tends to pack and which might cause arching thereof over the outlet 69 preventing discharge of the material therethrough, means be provided for loosening the material. In the construction

shown compressed air is used for this purpose, the air being supplied to the lower portion of the hopper compartment 72 through openings 74 in the slope sheets 71, these openings communicating with pipes 75 leading from any suitable source of air under pressure.

While I have illustrated and described certain constructions embodying features of my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered and the invention embodied in other forms of structure without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. A car comprising a substantially cylindrical tank supported on its side and having an opening between its ends through which the material may be removed, and slope sheets in said tank extending from the sides of the tank in downwardly converging relation and forming a hopper compartment therein substantially vertically alined with said opening.

2. A car comprising a substantially cylindrical tank supported on its side and having a closure-controlled outlet in its bottom between its ends, and slope sheets in said tank inclining upwardly and outwardly away from said outlet and extending to the sides of the tank.

3. A car comprising a substantially cylindrical tank supported on its side and having a closure-controlled outlet in its bottom between its ends, and slope sheets in said tank inclining upwardly and outwardly away from said outlet and extending to the sides of the tank, certain of said sheets extending lengthwise of said tank and others of said sheets crosswise thereof.

4. A car comprising a substantially cylindrical tank supported on its side and having an opening midway between its ends through which the material may be removed, slope-sheets in said tank extending lengthwise thereof at its opposite sides and upwardly diverging, said slope sheets being spaced apart at their lower ends, members extending lengthwise of the tank and located between said slope sheets adjacent the bottom of said tank and forming with said slope sheets troughs at opposite sides of the median line of said tank and screw conveyors in said troughs for moving the lading from opposite ends of the tank toward the center thereof.

5. A car for transporting lading having a container portion in which the lading is carried and provided with an opening in its top, said container portion having a substantially horizontal bottom, a conveyor pipe extending downwardly through said opening into said container portion and laterally immovable, and means in said container portion adjacent the bottom thereof for conveying the lading in said container portion to said conveyor pipe.

6. A car for transporting lading having a container portion in which the lading is carried and provided with an opening in its top, said container portion having a substantially horizontal bottom, vertical pipe-conveyor guide-means in said container portion in line with said opening, and means in said container portion adjacent the bottom thereof for conveying the lading in said container portion to a conveyor pipe positioned by said guide means.

7. A car for transporting lading having a container portion in which the lading is carried and provided with an opening in its top, said container portion having a substantially horizontal bottom, vertical pipe-conveyor guide-means in said container portion in line with said opening, and a stop for preventing the seating of said pipe on the bottom of said container portion.

8. A car comprising an underframe, a substantially cylindrical tank supported on its side on said underframe and extending wholly beyond said underframe and having an opening midway between its ends through which the material may be removed, slope-sheets in said tank extending lengthwise thereof at its opposite sides and upwardly diverging, said slope sheets being spaced apart at their lower ends, members extending lengthwise of the tank and located between said slope sheets adjacent the bottom of said tank and forming with said slope sheets troughs at opposite sides of the median line of said tank and conveyor means in said troughs for moving the lading from opposite ends of the tank toward the center thereof.

9. A car comprising a substantially cylindrical tank supported on its side and having an opening midway between its ends through which the material may be removed, slope-sheets in said tank extending lengthwise thereof at its opposite sides and upwardly diverging, said slope sheets being spaced apart at their lower ends, members extending lengthwise of the tank and located between said slope sheets adjacent the bottom of said tank and forming with said slope sheets troughs at opposite sides of the median line of said tank and conveyor means in said troughs for moving the lading from opposite ends of the tank toward the center thereof.

10. A car comprising a substantially cylindrical tank supported on its side and containing an outlet, and slope sheets in said tank extending lengthwise thereof at opposite sides of the median line of the tank said sheets extending from the sides of the tank in downwardly converging relation.

RAYMOND C. PIERCE.