Nov. 13, 1934. C. E. WINDECKER 1,980,895

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Filed April 25, 1932 2 Sheets-Sheet 1

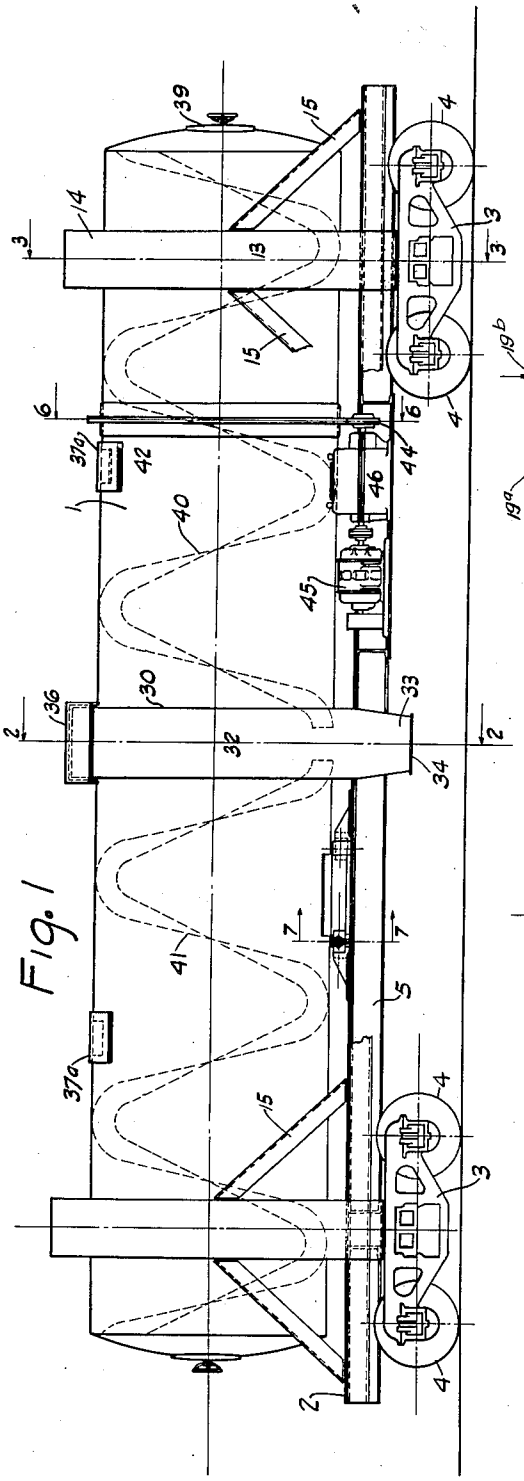


Fig. 1

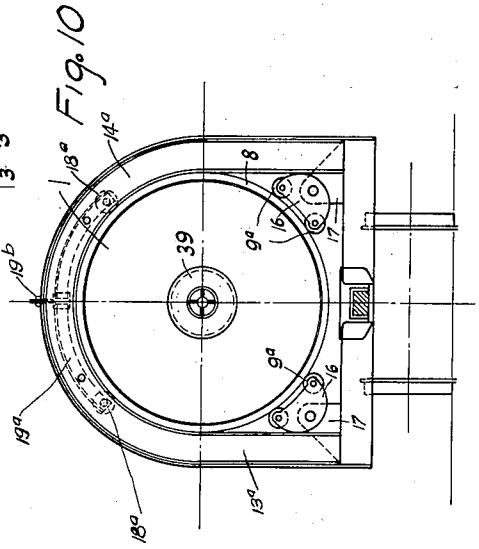


Fig. 10

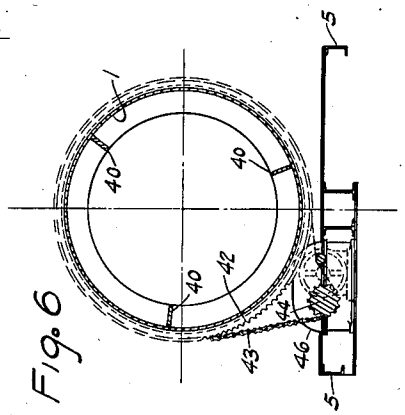


Fig. 6

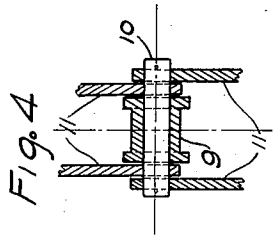


Fig. 4

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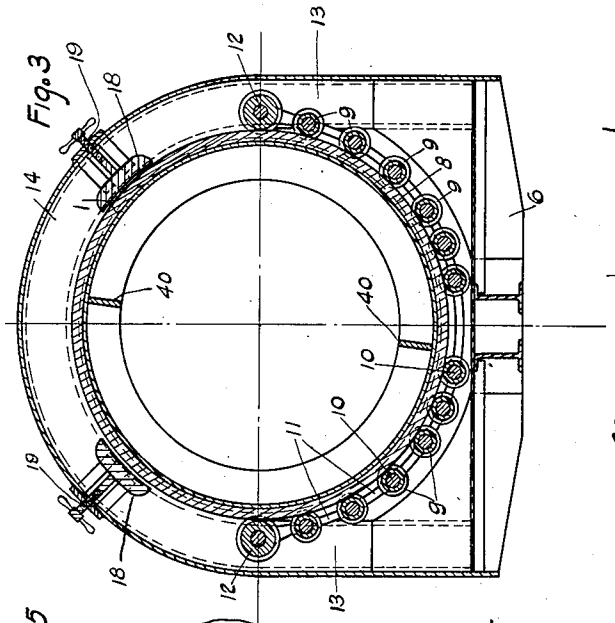
BY Harold Elder Smith

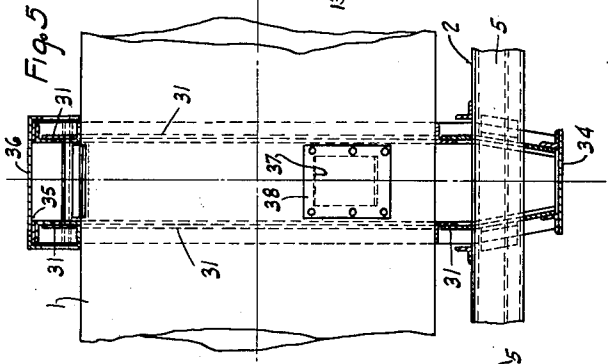
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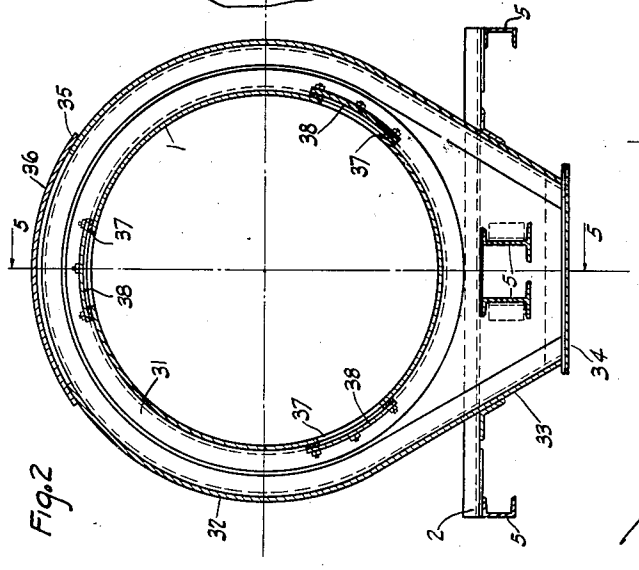
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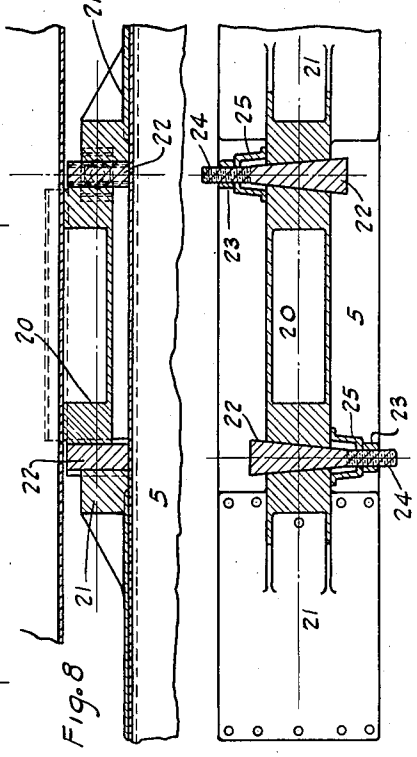
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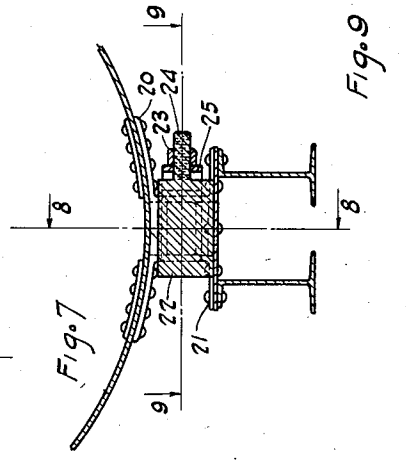
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Patented Nov. 13, 1934 1,980,895

UNITED STATES PATENT OFFICE

1,980,895

CAR

Charles E. Windecker, Painesville, Ohio

Application April 25, 1932, Serial No. 607,293

17 Claims. (Cl. 105—271)

This invention relates to portable containers for bulk industrial products, and the term "cars" adopted as a title relates not only to railway cars but also to highway conveyances. The main objects of the invention are the provision of a readily sealed container for the transportation of such substances as cement, grain, fertilizers, paint-pigments, china clay, bauxite, fuller's earth and other ores, sugar, salt and dry chemicals generally such as borax, soda, blue and green vitriol, etc. whereby the materials being transported may be adequately protected from weather, moisture, circulation of air, and pilfering; the provision of means to reduce the cost and increase the speed of loading and emptying a car of bulk material of the general nature described; the provision of a self-loading and unloading car having increased capacity per foot of car length; the provision of an improved type of car for the transportation of bulk materials having improved means for overcoming the packing of the load; the provision of a car for bulk materials which can be sealed against weather, moisture and air circulation more cheaply and conveniently than previous devices.

Further objects of my invention are the provision of a simple, strong and inexpensive transportable container adapted to be tightly and reliably sealed during transportation, and capable of being so manipulated as to break up and discharge its contents through a minimum number of openings thus enabling the disposition of the same by power-operated conveyers. Other objects of the invention are the provision of a car having new and improved means for introducing and ejecting its contents, and breaking up those contents in case of packing; the provision of a new and improved type of tank car; the provision of a new and improved mode of supporting and rotating a rotatable storing or transporting container; the provision of a new and improved means of locking a rotatable container against movement; while further objects and advantages of the invention will become apparent as the description proceeds.

A preferred form of my invention is illustrated in the drawings accompanying and forming a part of this application wherein Fig. 1 is a side elevation of a railway-car containing my improvements; Figs. 2 and 3 are vertical cross-sectional views corresponding respectively to the lines 2—2 and 3—3 of Fig. 1 and looking in the direction indicated by the arrows; Fig. 4 is a detail view of part of the supporting chain shown in Fig. 3; Fig. 5 is a vertical sectional view corresponding to the line 5—5 of Fig. 2, showing the hood in section and the tank in elevation; Figs. 6 and 7 are sectional views corresponding to the lines 6—6 and 7—7 respectively of Fig. 1; Fig. 8 is a sectional view corresponding to the line 8—8 of Fig. 7; Fig. 9 is a detail view corresponding to the line 9—9 of Fig. 7; and Fig. 10 is an end view of the car shown in Fig. 1 illustrating a modified type of tank-supporting means.

Describing by reference the parts shown in these drawings, but without intent to limit myself thereto, 1 represents a hollow, cylindrical, metal tank made in a single compartment, without partitions, and mounted with its axis horizontal and longitudinally arranged upon a rectangular frame 2, here shown as a flat platform. In the present embodiment this frame constitutes the body of a railway car carried by the usual bogie trucks 3—3 having wheels 4—4, although within my invention the tank might equally well be mounted on highway wheels, or might even be stationary since I apprehend in some instances a tank of this type may prove valuable for storage purposes. If and when employed as a railway car, this frame comprises longitudinal sills 5 and transverse bolsters 6, the platform projecting sufficiently at each side of the tank 1 to constitute a runway for the trainmen.

Encircling the tank near each end is a circular tire 8 which runs on or between the various rollers carried by the platform or frame by means of which the tank is rotatably supported. In the preferred form of the invention the supporting is effected by means of a plurality of flanged rolls 9 each journaled upon a horizontal pintle 10, these pintles being flexibly connected by means of link bars 11 into the form of a chain, the terminal pintles 12—12 being located one at each side of the tank and pivoted on horizontal axes to uprights 13—13 which are rigidly carried by the frame. These uprights are preferably continuous with an over-arching yoke 14 which both joins the uprights together to afford added strength and also encircles the tank to ensure greater safety. These uprights are also preferably braced longitudinally as indicated at 15. By mounting the supporting rolls in a flexible manner they are enabled to conform at all times to the shape of the tires 8, thereby causing all of the rolls to participate at all times in supporting the weight of the tank and its contents.

In Fig. 10 I have shown an alternative form of construction wherein the tire 8 of the tank 1 rests on rolls 9^a—9^a carried by rockers 16 pivoted to brackets 17 located on opposite sides of the frame,

inasmuch as my invention is not limited to any one form of support for the tank; although it is desirable to mount the supporting rolls flexibly in some manner so as to distribute the weight and cause all the supporting rolls to bear substantially equally despite irregularities in the shape of the tire, since a commercial load for such a car may be any weight from twenty tons to fifty, sixty tons or more.

When the tank is mounted upon a portable frame, provision is also preferably made for securing it rigidly to that frame during transit. These provisions preferably relate both to the prevention of bodily separation between the tank and frame and also to the prevention of rotation of the tank. In the present embodiment I have illustrated two separate means cooperating to this end, each of such means participating to some extent in both functions. In Fig. 3 I have shown the yoke 14 as provided above the tank with clamping members 18 movable by suitable adjusting elements such as the screws 19 to secure or release the tank as may be desired. In Fig. 10 I have shown the top part of the yoke 14^a as furnished with auxiliary rollers 18^a carried by levers 19^a movable by a threaded element 19^b so as to press more or less firmly on the tire.

Further to prevent rotation I have shown a second expedient comprising a radially projecting metal block 20 fastened to the tank exterior and rotatable between two fixed blocks 21—21 rigidly secured to the frame or platform. I have shown the block 20 as made hollow to save weight. Interposed at each end of block 20 between it and the adjacent block 21 is a transverse wedge-member 22 held in place in any simple and suitable manner, such as by means of a nut 23 screwed on a threaded extension 24 of said wedge. Suitable washers or spacers 25 may be employed in cooperation with these nuts as will be understood by those skilled in the art. When these wedges are in place the tank or container is not only prevented from turning but is also prevented from longitudinal shifting relative to the platform which is important to resist the endwise shocks and blows to which such a device is subjected. In the case of two such cars each containing a load of fifty tons the longitudinal strain produced when one of these cars moving comes into endwise contact with the other of these cars at rest, according to the degree of speed and care ordinarily encountered in railroad yard and switching practice, is a very substantial figure.

Carried by the platform 2 midway the length of the tank is a third stationary hood 30 which comprises annular cheek-plates 31 closely embracing the tank so as to permit the latter to rotate within the same, and a connecting plate 32 which is arcuate around the top-half of the tank, and slanting at the lower part thereof, depending through the platform as shown at 33 to constitute a discharging hopper having a downwardly facing discharge opening here shown as covered by a removable plate 34. The plates 31, as will be seen in Fig. 5, contact with complementary flanges on the tank and thereby serve as means for sealing and rendering weather-tight the hood and tank while permitting the rotation of the latter. At its top this hood is formed with an opening 35 closed by a removable cover-plate 36. Inside the annular chamber defined by the hood 30, the wall of the tank 1 is formed with one or more openings 37, each of which is provided with a tightly attachable closure-plate 38. In Fig. 2 I have shown three of these openings 37, which I consider a good number, although either more or fewer may be employed. These closure plates may be secured in place in any suitable manner, the arrangement here shown consisting of bolts and nuts. When these are in place the tank is entirely sealed, although I have shown optional manholes at the ends provided with removable manhole covers 39 to facilitate cleaning, inspecting, and repairing. Additional removable closure elements can be employed if desired, and additional filling apertures 37^a, also removable inspection plugs, etc. (not shown).

The interior of the tank is provided between each end and the center with one or more helical blades 40—41, the blades 40 and 41 located in opposite ends of the tank being spiraled in opposite directions so that upon rotation of the tank in one direction the contents thereof are moved from the center to the ends, and when rotated in the opposite direction are moved from the ends towards the center. At the middle of the car these blades terminate at or near the zone defined by the openings 37. In Fig. 1, for purpose of clarity, I show only one blade in each end of the tank; in Fig. 3 I have shown two blades; and in Fig. 6 I have shown three blades.

Any suitable or convenient expedient may be employed to rotate the tank, the preferred expedient being to furnish each tank with a circumferential sprocket 42 operatively engaged by a chain 43 meshing with a cooperating sprocket 44 which is driven by an electric motor 45 (or other suitable power source) carried by the platform 2 (or otherwise) and working through a speed-reduction gear-set 46. An electric motor is, of course, applicable only under conditions where electric power is available at the unloading station, and sometimes also at the loading station, but it is obvious that with only a small change in construction the device can be arranged for operation by steam, gasoline, air or other power.

The procedure of filling the car depends to some extent upon the nature of the materials. In any case, the opening 35 registers with an opening 37 at the time that the block 20 is locked into position between the blocks 21. Upon removing the covers 36 and 38 the dry granular or pulverized material to be transported can be poured therein through a suitable chute or hopper. Sometimes some materials like cement will of their own nature flow sufficiently throughout the tank so as to require no additional precautions to obtain a substantially full load. Sometimes also additional filling openings 37^a are provided near the ends of the tanks so as to enable introduction of the load at a larger number of points. The apertures $37a$ would, of course, be used only for loading purposes.

In the absence of supplementary apertures 37^a it is also possible to distribute the load by applying the closure 38 temporarily and rotating the tank by the motor 45 or its equivalent in such direction as to cause the blades 40 and 41 to move the previously introduced material to the ends of the tank, after which the tank is brought to a standstill at the proper point and the cover 38 again removed, permitting the introduction of a further quantity of material.

In order to unload the tank, the car is first positioned with the hopper 33 over a suitable bin or conveyor; the top closure 38 is removed, the tank rotated until the next closure 38 is presented to the opening 35 allowing the removal

of the second closure, and so on until all the closures have been removed, after which the tank is rotated in such direction as to transport all the contents to the center and discharge the same through the one hopper. In the case of materials which tend to pack or solidify in transit the first revolution of the tank is the most difficult but generally results in a substantial breaking up of the load, after which the continued rotation not only moves the material to the outlet but also neeps it pulverized and prevents it from caking or blocking the outlets as oftentimes happens with a container which is stationary during evacuation. The rotation of the tank also prevents any packing or catching of the load in the hopper 33.

It will be understood that while I have described my invention in detail and pointed out those constructions which seem to me most satisfactory for all around use, there are conditions existing in the specific arts which require modifications from the specific constructions and designs here shown, and I do not limit myself in any wise except as recited in my several claims which I desire may be construed each according to its own limitations and independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. A car for transporting dry granular and pulverized materials comprising in combination, an elongated, weather-tight compartment mounted with its major dimension horizontal and longitudinal, a single hopper midway of the compartment, and conveyor means inside said compartment adapted when moved in one direction to move material away from said hopper and when moved in the opposite direction to move the material toward said hopper.

2. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about an axis which is horizontal and lengthwise of said car, means supporting said tank for rotation about said axis, a stationary annular hood surrounding said tank, said hood having an inlet opening in its top and an outlet opening in its bottom, and means for rotating said tank about its axis, said tank having an inlet and outlet opening embraced by said hood.

3. A car for transporting dry granular and pulverized materials comprising in combination, a frame, an annular stationary hood carried by said frame, and terminating in a funnel at its lower end, and an elongated horizontal rotatable tank carried by said frame and extending through said hood, said tank having discharge openings delivering into said hood in all positions of said tank, and closures for said openings.

4. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about an axis which is horizontal and lengthwise of said car, means supporting said tank for rotation about said axis, means for rotating said tank about said axis, and helical blades affixed to the tank interior, said tank having discharge openings at the ends of said blades, said openings being positioned in the horizontal walls of said tank.

5. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about an axis which is horizontal and lengthwise of said car, means supporting said tank for rotation about said axis, said tank having one or more discharge apertures midway of its length, means for rotating said tank, and helical blades affixed to the tank interior between said discharge apertures and the two ends of the tank, the blades located in opposite ends of the tank being spiraled in opposite directions.

6. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, means for rotating said tank about its axis, and means for supporting said tank characterized by a plurality of chains carried by said frame and spaced lengthwise of said tank, each of said chains comprising a plurality of rollers which bear against said tank, and each chain being secured to frame members which are located upon opposite sides of said tank.

7. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a hollow metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, spaced rigid yokes carried by said frame and embracing said tank, means for rotatably supporting said tank inside said yokes, means for rotating and locking means for rigidly securing said tank against vertical, longitudinal and rotational movement.

8. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a hollow metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, means for supporting said tank for rotation about said axis, means for rotating said tank about its axis, and means for securing said tank rigidly to said frame, said means comprising interspaced blocks carried by said tank and frame and wedge members adapted to be secured in contact with adjacent blocks to prevent relative movement of the members to which said blocks are attached.

9. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, means for supporting the weight of said tank and contents and permitting rotation of said tank about said axis, and wedge means independent of said supporting means for connecting said tank to said frame to prevent rotating and longitudinal movement of said tank relative to said frame.

10. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, means supporting said tank for rotation about said axis, a sprocket embracing said tank, a chain meshing with said sprocket, a driving sprocket operatively engaging said chain, and a power-source operatively connected to said driving sprocket.

11. A car for transporting dry granular and pulverized materials comprising in combination, a frame, a metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, inclined blades fixedly secured inside said tank, means supporting said tank for rotation about said axis,

a power source carried by said frame, operative connections from said power source to said tank for rotating said tank continuously during the discharging operation, said tank having a discharge aperture positioned in its horizontal wall, and a hopper constantly in receiving relation to said aperture during such rotation of the tank.

12. A car for transporting granular material comprising in combination, a frame, a hollow metal tank located on said frame and having a wall which defines a surface of revolution about a horizontal lengthwise axis, spaced rigid yokes carried by said frame and embracing said tank, means rotatably supporting said tank inside said yokes, means for rotating said tank about its axis and clamping means carried by said yokes for releasably securing said tank with reference thereto.

13. In a tank for storing and transporting dry, granular and pulverized materials, the combination of a frame, means for supporting said tank on said frame comprising a plurality of rollers contacting with the outer surface of said tank and links connecting and carrying said rollers in constantly conforming contact with the periphery of said tank.

14. In a tank for storing and transporting dry, granular and pulverized materials, the combination of a stationary hood surrounding said tank, means for rotating said tank, and means for sealing said hood and said tank during rotation of the latter, against the ingress of exterior foreign matter.

15. In a tank for storing and transporting dry, granular and pulverized materials, the combination of a stationary hood surrounding said tank, means for rotating said tank, means for sealing said hood and said tank during rotation of the latter against the ingress of exterior foreign matter, said sealing means comprising slidably contacting flanges carried by said hopper and said tank respectively.

16. In a tank for storing and transporting dry, granular and pulverized materials, the combination of a frame for supporting said tank, means for rotating said tank comprising a power source mounted on said frame, and an endless chain entrained about said tank and connected to said driving motor.

17. In a tank for storing and transporting dry, granular and pulverized materials, the combination of a frame for supporting said tank, means for rotating said tank, and means for locking said tank to said frame comprising a projecting block on the periphery of said tank and interlocking wedge members positioned between said block and said frame.

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