July 30, 1957 G. MANIERRE 2,800,991

CAR LOADER

Filed April 8, 1954 3 Sheets-Sheet 1

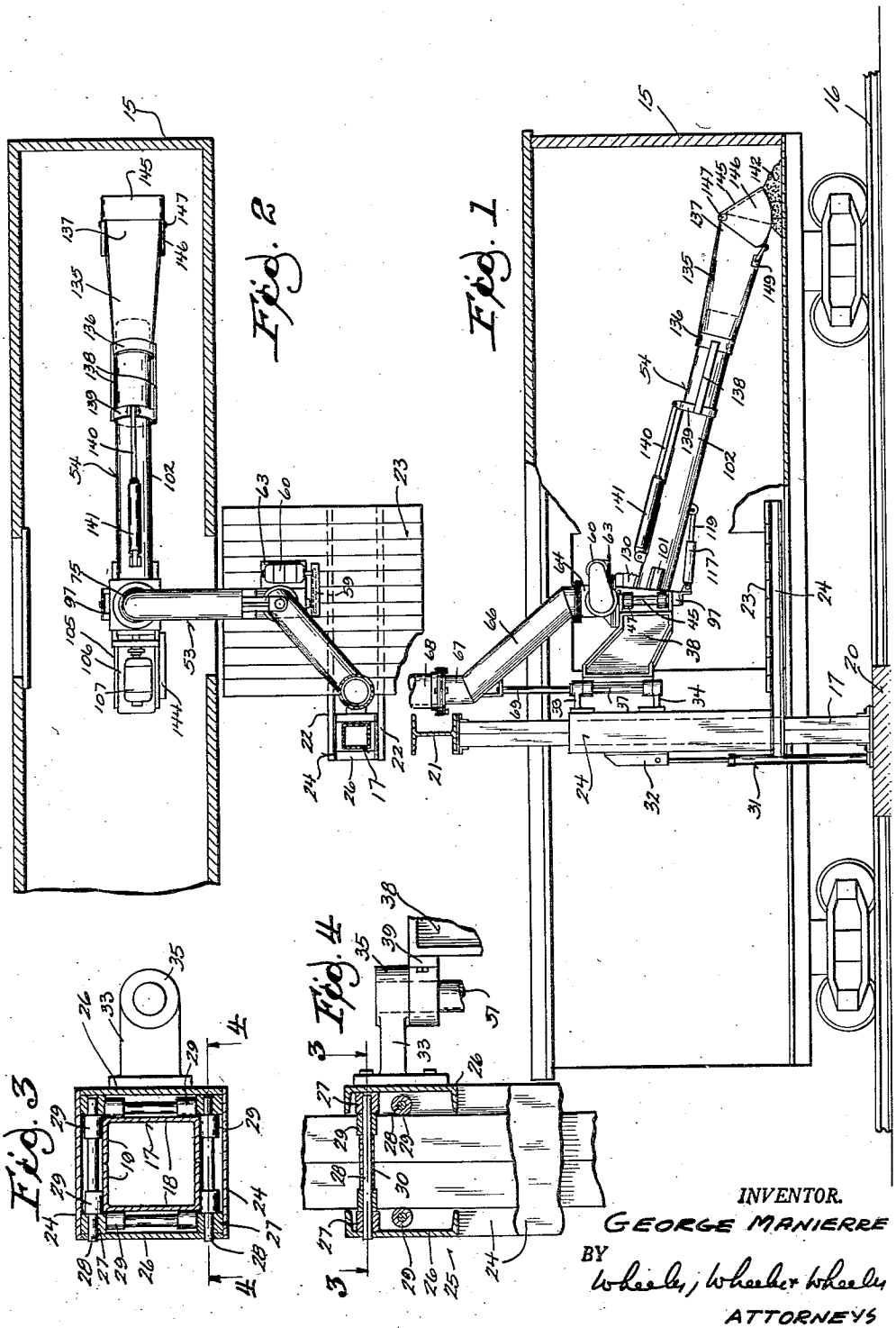


Fig. 2

Fig. 1

Fig. 3

Fig. 4

INVENTOR.
GEORGE MANIERRE
BY
Wheeler, Wheeler & Wheeler
ATTORNEYS

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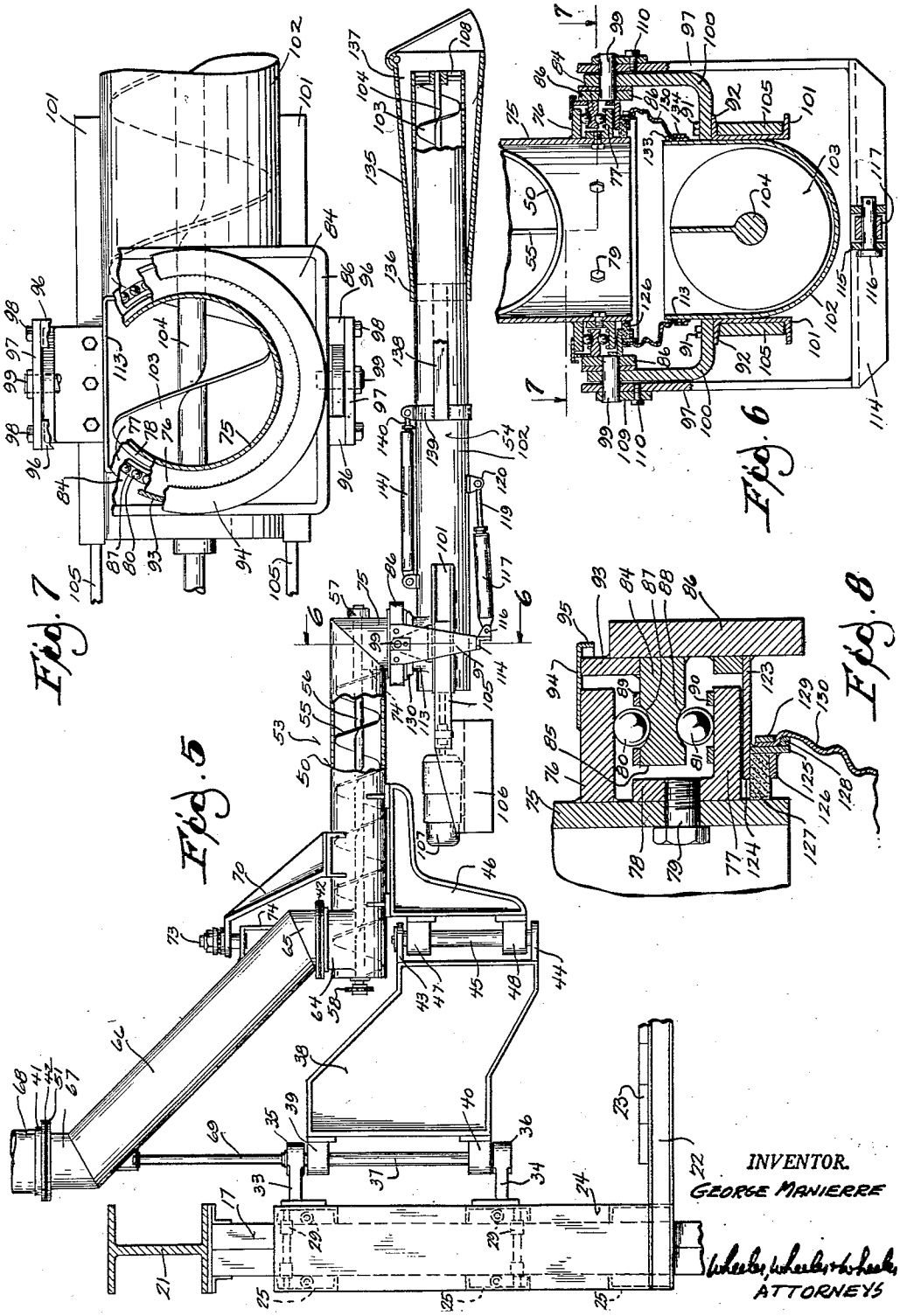


Fig. 7

Fig. 6

Fig. 8

Fig. 5

INVENTOR.
GEORGE MANIERRE

ATTORNEYS

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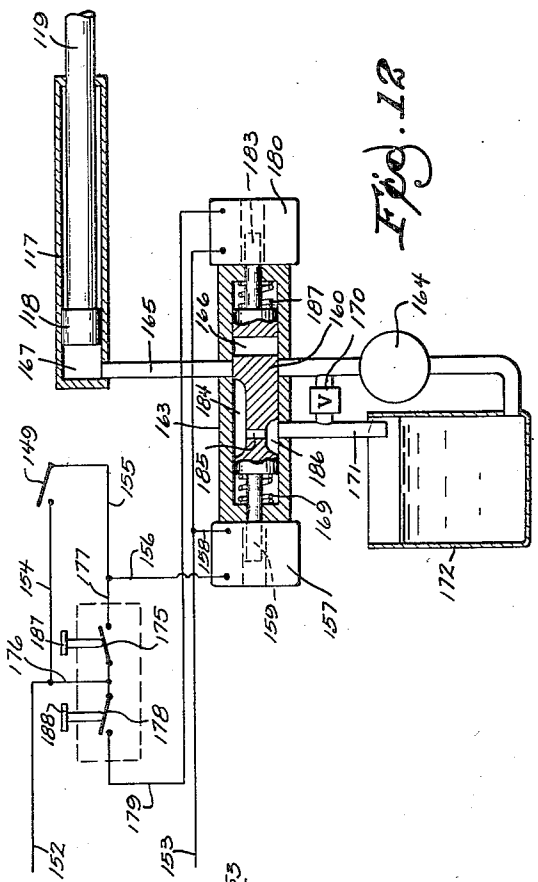


Fig. 12

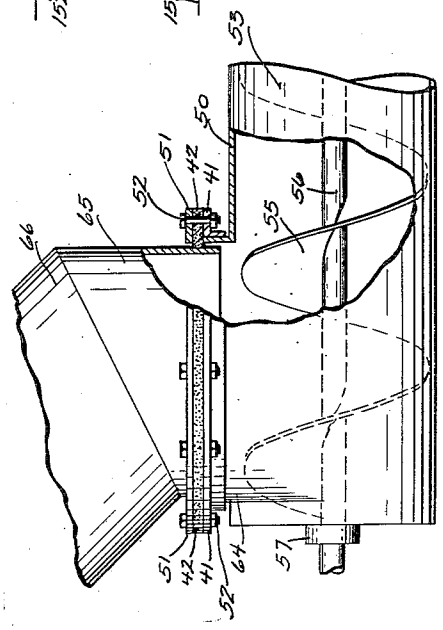


Fig. 9

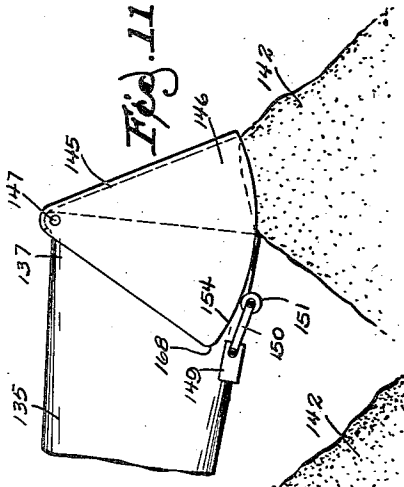


Fig. 11

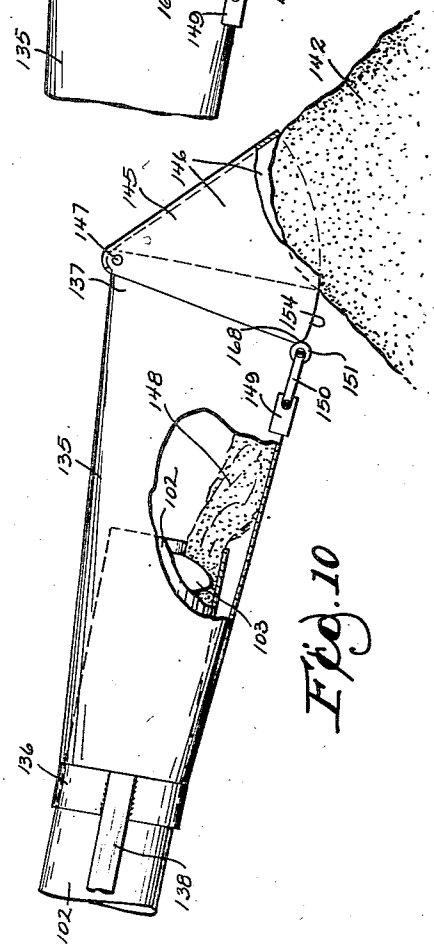


Fig. 10

INVENTOR.
GEORGE MANIERRE
BY
Wheeler, Wheeler & Wheeler
ATTORNEYS

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2,800,991

CAR LOADER

George Manierre, Milwaukee, Wis.

Application April 8, 1954, Serial No. 421,754

14 Claims. (Cl. 198—5)

This invention relates to improvements in car loaders:

The loader of this invention is designed primarily to load finely divided granular material and powders, such as grain, feed, soda ash, muriate, copperas, ammonium, sulphate, etc., in bulk into a box car. Such material may contain a substantial quantity of dust, and is itself dusty. It is the principal object of the invention to provide a loader for such finely divided material which is substantially completely enclosed from its input end to the pile of discharged material. Thus, the material is loaded without permitting the material to escape to the atmosphere in the form of dust. For this purpose an important feature of my invention is my provision for continuously sealing the end of the loader to the pile of discharged material. In this connection I provide means for automatically adjusting the level of the discharge end of the loader in response to the rising level of the pile of discharged material, while at the same time maintaining the loader in sealed communication with the pile.

For this purpose I provide a novel gate at the end of the loader, the gate being free to swing in response to the rising level of the discharged material and having motion transmitting connection to a microswitch which controls power means adjusting the level of the loader. When the rising level of discharged material swings the gate to full open position the microswitch is thrown to actuate the power means to raise the level of the loader. When the gate is thus lifted from the pile it will swing by gravity toward closed position and reverse the switch to hold the loader in its raised position. At all times, however, the gate is sealed to the pile. In this manner the loader is raised in increments as the pile of discharged material rises.

Another feature of the invention is to provide a vertically adjustable support upon which the entire car loader is mounted. The adjustable support also carries a personnel platform. Accordingly, the car loader may be properly oriented to different sizes and types of cars and the personnel platform is adjusted concurrently therewith.

The invention further resides in the specific dust proof connections between the various articulated sections of the loader. These, in conjunction with the end gate, maintain a relatively dust free atmosphere within the car despite the loading thereinto of a steady stream of dusty material.

In the drawings:

Fig. 1 is a side elevation, partly in vertical cross section through a freight car, showing a car unloader embodying my invention in position with respect to the freight car, the loader being shown in the initial stage of loading the car.

Fig. 2 is a fragmentary plan view, partly in horizontal cross section, through the apparatus of Fig. 1

Fig. 3 is a horizontal cross section taken through the adjustable post on which the loader is supported, this view being taken along the line 3—3 of Figure 4.

Fig. 4 is a cross section taken along the line 4—4 of Figure 3.

Fig. 5 is a side elevation partly in vertical cross section, of the device of Figure 1, the parts being disposed in one plane to show their relative proportions and connections.

Fig. 6 is a cross sectional view taken along the line 6—6 of Figure 5.

Fig. 7 is a cross sectional view taken along the line 7—7 of Figure 6.

Fig. 8 is an enlarged fragmentary cross sectional view through the ball bearing and associate parts of Fig. 6.

Fig. 9 is an enlarged elevation, partly in cross section, of the articulate connection between the feeder spout and feeder section of the device.

Fig. 10 is a fragmentary diagrammatic view showing the position of the conveyor section of the loader during one stage of the loading operation.

Fig. 11 shows the device of Fig. 10 in a subsequent stage of the loading operation.

Fig. 12 is a schematic and diagrammatic view of the control connections for the hydraulic motor which adjusts the level of the loader conveyor section, a conventional solenoid control valve being shown in cross section.

In Figures 1 and 2 box car **15** is shown positioned on its track **16** adjacent stationary upright post **17** at a loading station. As best shown in the cross sectional view of Figure 3, post **17** comprises paired channels having oppositely disposed base webs **18** and side flanges **19** in welded edge abutment and together forming a square or box section post. The post is supported on a concrete bed **20**. The upper end of the post may be securely fastened to an I-beam **21**, or like member, which may form part of a warehouse or like building at the loading station.

Telescopically adjustable on the post **17** is a sleeve **24—30** which in turn mounts the remaining parts of the loader for vertical adjustment on the post. The sleeve comprises side plates **24** which are mounted in spaced apart relation to the flanges **19** of the post by vertically spaced sets **25** of transverse spacer channels **26**. Between the respective sets **25** the base webs **18** of the post channels are exposed.

The sleeve is guided for vertical reciprocation on the post **17** by sets of roller bearings best shown in Figures 3 and 4. The respective channels **26** and plates **24** are provided with bearing blocks **27** in which pins **28** carrying roller bearings **29** are journalled. The axial position of the roller bearings on the pins **28** may be fixed by spacer sleeves **30**. As shown in Figure 4 the sets of rollers mounted on the channels **26** are above the level of the sets of roller bearings mounted on the plates **24**. Accordingly, the sleeve is provided with anti-friction bearings in contact with the post **17** at all four sides thereof.

To the lower set **25** of channels **26** are welded channel arms **22**, on which personnel platform **23** rests. The sleeve, personnel platform, and loader structure hereinafter described may be raised and lowered as a unit by means of the hydraulic motor **31** having a piston rod connected by means of bracket **32** to the sleeve. A conventional control for the motor **31** may be mounted on control panel **144** (Fig. 2) within reach of personnel on platform **23**.

To the upper and intermediate sets **25** of channels **26** are connected brackets **33, 34** which are respectively provided with bearings **35, 36**, for shaft **37** to which the swing bracket **38** is pivotally mounted on its upper and lower bearings **39** and **40** respectively. The swing bracket **38** is in turn provided with upper and lower bearings **43, 44** for shaft **45** to which a second swing bracket **46** is pivotally connected on its upper and lower bearing

brackets 47, 48. The second swing bracket 46 supports conveyor tube 50 of the feeder section 53 of the loader.

The tube 50 is of heavy gage metal adequate to support the weight of the following conveyor section 54, as hereafter described. Tube 50 is provided with an internal screw conveyor 55 mounted on a shaft 56 journalled in the bearings 57 at the ends of the tube. The end of shaft 56 at the input end of the tube is provided with a sprocket 58 to receive a chain drive 59 (Fig. 2) from electric motor 60. The motor 60 is supported on a platform 63 carried at one side of the tube 50. A conventional control for motor 60 is mounted on panel 144 within reach of personnel riding on platform 23.

The input end of tube 50 is provided with an upright cylindrically walled mouth 64, coaxial with support shaft 45 (see Figure 5). Coupled to the cylindrical wall 64 through a dust proof rotatable seal (see Figure 9) is the cylindrically walled discharge port 65 of the inclined conveyor spout 66. At its input end the spout 66 is provided with an upright cylindrical tube portion 67 connected through a like dust proof pivotal connection to the stationary pipe 68. Tube 67 and pipe 68 are coaxial with shaft 37. The spout 66 is supported on rod 69, also coaxial with shaft 37, and bracket 70 mounted on the tube 50. Bracket 70 carries a rod 73 connected by means of the bracket 74 to the spout 66. Rod 73 is coaxial with shaft 45.

Tube 67 is in telescopic connection with pipe 68, and is of substantial length to maintain communication with pipe 68 regardless of the vertical adjustment of the sleeve on post 17.

Moreover, as post 65 and tube 67 are respectively coaxial with shafts 45 and 37, brackets 38 and 46 may swing to any position and pipe 68 will remain in continuous dust proof connection through spout 66 with the tube 50 of the feeder section 53.

The dust proof joints between spout 66 and pipe 68 and tube 50 will now be described. The joints at both ends of the spout are substantially identical, accordingly only the jont between port wall 65 and the input wall 64 of tube 50 shown in Figure 9 will be specifically referred to. Wall 64 is provided with an annular flange 41 to which annular seal 42, of felt or like material, is clamped by annular ring 51 and a series of bolts 52. The seal 42 is under slight compression on wall 65 to prevent escape of dust, but permits wall 65 to turn in the seal 42. In this connection, it is noted that spout 66 is supported wholly on rods 69, 73 from both its ends and that accordingly, no stress is placed upon the dust proof joints.

Screw 55 in tube 50 terminates at 74 just short of down turned cylindrical end wall 75 of tube 50. As best shown in Figures 6 to 8, the end wall 75 of the tube 50 is provided with an upper annular flange 76 welded to the wall and with an axially spaced lower annular flange 77. Flange 77 is provided with a mounting collar 78 by which it is connected to the pipe 75 by means of bolts 79 extending through suitable apertures in the pipe 75. The respective annular flanges 76, 77 provide spaced raceways for upper and lower ball bearings 80, 81. These bearings support for rotation in its plane an intermediate plate 84 which has a square periphery, as viewed in plan in Figure 7, but has a circular aperture defined by its inner margin 85 through which the pipe 75 and associated parts have relative turning movemnet. The outer square margins of the plate 84 is provided with a flange 86.

Plate 84 is provided at its upper and lower surfaces with upwardly and downwardly open circular grooves 87, 88 in which the bearings 80, 81 respectfully ride. The top surface of plate 84 may be additionally provided with circular ribs 89 at the sides of groove 87 to further enclose the bearing 80. Flange 77 may likewise be provided with circular ribs 90 defining the raceway for bearing 81.

Plate 84 is also provided with an upstanding annular sealing collar 93 in close proximity to or in slight bearing contact with a sealing plate 94 welded to the upper surface of flange 76. The sealing plate 94 has a downturned lip 95 at its outer periphery and spaced by plate 94 outwardly of the collar 93. The sealing flange 93 and plate 94 cooperate to exclude atmospheric dust from the bearing.

As best shown in Figures 6 and 7, flange 86 carries outboard spacers 96 at diametrically opposite sides of the wall 75 and to which trapezoidal shaped plates 97 are connected by means of the bolts 98. Plates 97 and flanges 86 provide end bearings for axially aligned pivot pins 99 from which bracket arms 100 depend for support of the conveyor section 54 from the tube 50 of the feeder section 53. Pins 99 may be held in place by welding their outer ends to plates 109, in turn releasably connected by means of the bolts 110 to the arms 97, as shown in Figure 6. Loosening of bolts 110 permits withdrawal of the pins 99.

Bracket arms 100 are incurved as shown in Figure 6 and are connected by means of bolts 91 to the upper flanges 92 of channels 101. Channels 101 extend along the outer surface of conveyor tube 102. The tube 102 is provided with a screw conveyor 103 supported for rotation on shaft 104 to convey material fed to the conveyor section 54 from the feeder section 53. Tube 102 is of heavy gage metal for self-support. Within the channels 101 are rearwardly extending bracket arms 105 which support a platform and counterweight 106, and electric motor 107. Motor 107 is in driving connection with screw shaft 104. Open spider 108 at the discharge end of tube 102 supports the shaft 104 and permits discharge of material therethrough.

Tube 102 is provided with an upwardly open cylindrically walled inlet mouth 113 axially alined with the wall 75 of tube 50. Hence, tube 50 of the feeder section 53 discharges directly into the mouth 113 of tube 102 of the conveyer section 54. Tube 102 however, is free to pivot in a vertical plane on the pins 99, and to rotate in a horizontal plane on the ball bearings 80, 81. The pins 99 and bearings 80, 81 combine to constitute a universal joint between feeder section 53 and conveyer section 54.

Bracket arms 97 are cross-connected below the level of tube 102 by angle piece 114 which has forwardly directed spaced ears 115 pivotally mounting a pin 116 for the articulate support of hydraulic motor cylinder 117. Cylinder 117 is provided with a piston 118 (see Figure 12) and a piston rod 119 which extends to a connection with a depending ear 120 on the tube 102. The cylinder 117, piston 118 and piston rod 119 comprises a hydraulic motor by means of which the tube 102 is articulated about pins 99 in a vertical plane. A control for the hydraulic motor is mounted on control panel 144 within reach of personnel riding on platform 23 (see Figure 2).

Flange 86 is also provided with a square lower plate 123 (see Figure 8) which has a circular aperture defined by the inner periphery 124 thereof. Circular flange 125 depends from plate 123 and is provided with an annular flange 126 spaced from plate 123. Plate 124 and flange 126 define a groove or seat for an annular dust seal 127. The dust seal may be of felt or like material and is in bearing contact with the wall 75 to exclude dust within the conveyer from bearings 80, 81.

Flange 125 is also provided with a beaded margin 128 which cooperates with a ring 129 to secure the upper margin of a canvas or like flexible sleeve 130. The other end of the sleeve 130 is secured between the beaded margin 133 and a ring 134 about the rim of cylindrical inlet wall 113 of tube 102 (see Figure 6). Sleeve 130 is sufficiently flexible to accommodate the vertical pivoting of tube 102 about the axis of pins 99. It provides for dust proof discharge of material from feeder section 53 to conveyer section 54.

Tube 102 is provided at its discharge end with a slidable flaring discharge sleeve 135. The rear end 136 of sleeve 135 is circular in cross section and is in sliding fit with the tube 102. The forward end 137 of sleeve 135 is flared to a square cross section (see Figure 2). The rear end 136 of tube 135 is connected by cross slide arms 138 and cross slide collar 139 to the piston rod 140 of hydraulic motor cylinder 141. Cylinder 141 and piston rod 140 comprise a double acting hydraulic motor having a conventional control mounted on panel 144 within reach of personnel on platform 23.

The completely retracted position of the sleeve 135 is shown in Figure 5. Its forwardly extended position is shown in Figure 2. The extreme ends of the box car 15 may be loaded first with the sleeve extended. When the end of the car is filled, the sleeve may be retracted along the tube 102 to deposit successive increments of material along the car floor until the sleeve is completely retracted. Thereupon the feeder section 53 of the loader may be withdrawn from the box car. The unfilled center portion of the car may be easily loaded within the range of articulation of conveyer section 54 about the universal joint between the conveyer section and feeder section.

As best shown in Figures 10 and 11, the square end 137 of sleeve 135 is provided with a gate or closure hood comprising an end gate 145 and side panels 146. The sleeve 135 is provided at its upper corners with a shaft 147 on which the side panels 146 of the closure hood are journalled for pivotal movement of the entire hood with respect to the end of the sleeve. The hood may swing from a completely closed position (not shown) in which the end gate 145 closes the end of the sleeve, to an intermediate position, as shown in Figure 11, in which the gate is partly open, and a full open position, as shown in Figure 10. In any of its partially or full open positions, the side panels 146 laterally enclose the opening so that the material may flow from the loader only through the open bottom of the gate hood.

As diagrammatically illustrated in Figures 10 and 11, the stream 148 of material feeding the pile 142 of previously deposited material is confined against escape to the atmosphere by the sealing of the hood to the pile. The stream of material will deposit only on the portion of the pile 142 confined by the gate 145 and panels 146 of the hood. Thus, I preclude escape of the material to the atmosphere and reduce the dust which would otherwise be entrained in the air to create explosion hazard and breathing impediment.

To maintain the hood sealed about the pile on which the material is deposited, and to provide for adjusting the position of the conveyer section 54 with respect to the increasing level of deposited material, I provide the novel control apparatus schematically and diagrammatically shown in Figure 12. A microswitch 149 is mounted on the side wall of sleeve 135 with its operating arm 150 with a contact roller 151 extending into the path of oscillation of the lower margiin 154 of hood side panel 146. In the Figure 11 position of the parts, the pile 142 has not yet risen within the hood sufficiently to oscillate the side panel 146 forwardly. Accordingly, the lower margin 154 of the side panel 146 is in contact with the switch arm roller 151 to keep the switch 149 open, in its position shown in Figure 12. However, as the stream of material adds to the height of pile 142, the rising level of the pile will lift the hood from its Figure 11 position to its Figure 10 position to ultimately release panel 146 from engagement with the roller 151 of the switch arm. The microswitch is spring biased to close when its arm is permitted to raise to its Figure 10 position.

Closure of the switch 149 then completes an electric circuit from the electric input line 152 through line 154, line 155, line 156 through solenoid 157 and line 158 back to input line 153. When the solenoid is actuated, it will attract armature 159 within the solenoid core. The armature 159 will draw with it the valve spool 160 which is mounted for reciprocation in the valve spool housing 163. Complete withdrawal of the spool to the left from its position shown in Figure 12 will place hydraulic fluid pump 164 in direct communication with the hydraulic line 165 through the cross channel 166 in the valve spool.

Hydraulic fluid line 165 communicates with the chamber 167 behind piston 118 in hydraulic motor cylinder 117 and will advance piston rod 119 to pivot tube 102 upwardly about its pivot pins 99. As soon as the tube has been lifted far enough to permit the hood to oscillate downward by gravity to its Figure 11 position, lower margin 154 of the side panel 146 of the hood will reengage roller 151 of switch actuator arm 150 to open microswitch 149. Note that the lower corner of plate 146 is rounded at 168 to facilitate engagement of the plate with the switch arm roller.

When the microswitch 149 is thus opened, the circuit to solenoid 157 will be broken and compression spring 169 in valve housing 163 will return the valve spool 160 to its Figure 12 position in which the spool closes hydraulic fluid line 165, thereupon closing the outlets of cylinder 117 and pump 164. Tube 102 will thus be held by the hydraulic motor in its new position until switch 149 is again closed to add fluid to chamber 167. As long as valve spool 160 is in its Figure 12 position, pump 164 will recirculate fluid through the bypass 170 and through the return pipe 171 to the fluid reservoir 172.

If it is desired to raise the level of tube 102, independently of action of the microswitch 149, manual switch 175 may be actuated. Switch 175 is in parallel with microswitch 149 and closes a connection through lines 176, 177 to complete the circuit through the solenoid 157.

When it is decided to lower tube 102 manual switch 178 may be closed. This switch completes a circuit through lines 176, 179, and solenoid 180 back to line 153. Solenoid 180 will then attract armature 183 at the other end of valve spool 160 to draw the spool toward the right as shown in Figure 12. This permits hydraulic fluid in chamber 167 of the hydraulic motor cylinder 117 to drain through hydraulic fluid line 165 through spool cavity 184, spool duct 185 and spool cavity 186 through return line 171 into the reservoir 172. When the tube 102 has dropped to the desired level, switch 178 is released to break the circuit to solenoid 180. Thereupon compression spring 187 returns the spool 160 to its Figure 12 position in which hydraulic fluid line 165 is closed.

The switches 175, 178, with their respective actuator buttons 187, 188, may also be mounted on panel 144 (Figure 2) within the reach of personnel on the platform 23. Accordingly, all manual control of loader action is readily available to operating personnel. The microswitch 149, of course, is entirely automatic and adjusts the level of the conveyer section 54 solely on the basis of the rising level of the deposited material.

From the foregoing description, taken in connection with the accompanying drawings, it is clear that I have provided a car loader which is substantially enclosed from the warehouse outlet to the pile of deposited material. Even the discharge end of the conveyer section, where most of the dust problem has heretofore been encountered, is made dust proof in the device of this invention. I also provide effective seals about the various articulate joints in the loader system to protect the bearings and prevent escape of dust or power into the atmosphere. By making the entire car loader vertically adjustable, I overcome difficulties heretofore encountered in loading box cars of various styles and sizes. My novel post and telescopic sleeve thereon provides an easily fabricated, inexpensive adjustable support for the entire car loader.

I claim:

1. A device for loading a car with free-flowing material comprising an upright post having a sleeve telescopic therewith, a motor connected to said sleeve for moving the sleeve with respect to the post, a swing bracket mounted on the sleeve, a conveyer mounted on the swing bracket, a fixed position supply pipe for such material and having its axis alined with the axis of swing bracket articulation, and a spout connecting the supply pipe with the conveyer, said spout having an axially shiftable telescopic slip connection coaxial with said pipe whereby to be in continuous closed communication with the supply pipe and convey such material from the pipe to the conveyer regardless of the position of the sleeve on the post.

2. A device of the character described comprising an upright post having a sleeve telescopic therewith, a motor connected to said sleeve for moving the sleeve with respect to the post, a swing bracket mounted on the sleeve, a conveyor mounted on the swing bracket, a fixed position supply pipe having its axis alined with the axis of swing bracket articulation, and a spout connecting the supply pipe with the conveyor, said spout having a telescopic slip connection coaxial with said pipe whereby to convey material from the pipe to the conveyor regardless of the position of the sleeve on the post, in which said post comprising a pair of channels having flanges connected in edge to edge abutment to constitute a box section, said sleeve comprising box section members about said post, and bearing means between said box sections for guiding said sleeve on said post.

3. The device of claim 2 in which said bearing means comprise roller bearings between said post and said sleeve.

4. The device of claim 3 in which said sleeve comprises side plates and transverse channel members connecting said plates, said channel members and plates respectively having opposed bearing blocks, said roller bearings comprising shafts rotatable in said bearing blocks.

5. A car loader comprising an upright post having a sleeve telescopic thereon, a motor connected to said sleeve for moving said sleeve on said post, a swing bracket mounted on the sleeve, a loading conveyor mounted on the swing bracket, said loading conveyor being provided with a control panel, and a personnel platform mounted on the sleeve in axially fixed relation to said control panel whereby the space relation between the platform and control panel remains the same regardless of adjustment of the sleeve with respect to the post.

6. A car loader for finely divided material comprising a spout through which said loader discharges said material into piles in said car, said spout being provided with a closure hood having a wall, said hood being pivotally connected to said spout in a manner adapted to normally close said spout and to yield pivotally to pressure applied by material within the spout, said wall laterally confining the stream of material discharged from said spout, said wall having a lower margin engaged with said pile to confine deposit of said material to a portion of the pile enclosed by the wall of said hood.

7. The device of claim 6 in which said hood comprises means for lifting said spout in response to the rising level of said pile, said means further comprising power means and a control for said power means, said control comprising a switch having an actuator arm in the path of hood oscillation, said hood being oscillatable about said pivot under pressure of the rising level of said pile to actuate said switch when the hood reaches a predetermined open position, and control circuit means actuated by said switch to energize said power means to lift said spout, said hood being oscillatable in the opposite direction about said pivot as the spout rises to again actuate said switch to de-energize said power means and hold the spout in elevated position with the hood sealed to said pile.

8. The device of claim 7 in which said power means comprises a hydraulic motor having a hydraulic fluid feed line, said control circuit means comprising a solenoid operated hydraulic valve in said hydraulic fluid feed line.

9. The device of claim 7 in further combination with a manual switch in parallel with said switch whereby said power means can be actuated independently of said switch.

10. The device of claim 7 in which said power means comprises a single acting hydraulic motor, said control means comprising means for relieving fluid pressure in said motor to permit said spout to descend by gravity.

11. In a device of the character described, a dust proof connection between conveyor sections having an articulate joint therebetween, one of said sections being provided with a cylindrical wall, the other said section comprising a coaxial cylindrical sleeve within said wall, said wall being provided with an annular seal having its inner periphery engaged with said sleeve.

12. The device of claim 11 in which said connection further comprises an annular flange on said wall and an annular ring spaced from said flange, said seal being disposed between said flange and ring, and means clamping said flange and plate against said seal.

13. In a device of the character described, series connected conveyor sections having an articulate joint therebetween, said sections comprising tubes having alined lateral openings and alined cylindrical walls about said openings, a pivot on which said tubes are swingable in one plane, pivotal means on which said tubes are pivotal in a transverse plane, and a flexible sleeve connecting the communicating cylindrical walls of said tubes, the cylindrical wall of one tube being provided with axially spaced annular flanges, means for suspending the other tube therefrom and comprising a flange intemediate said spaced flanges, bearings between said intermediate and axially spaced flanges for the rotatable support of said other tube from said one tube, said intermediate flange being provided with a circular ring spaced from the outer periphery of one of the annular flanges of said one tube, said annular flange being provided with a dust excluding plate spanning the space between said flange and ring and extending beyond said ring and having a down turn lip beyond said ring.

14. The device of claim 13 in which said other tube is provided with an annular flange extending inwardly in spaced relation to said intermediate flange and beyond the annular flange on the said one tube, said last mentioned flange providing a connection to which said flexible sleeve is mounted, said flange being further provided with an annular seal in bearing contact with the cylindrical wall of said one tube.

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